

BRITISH CHEMICAL ABSTRACTS

A.—PURE CHEMISTRY

APRIL, 1936.

General, Physical, and Inorganic Chemistry.

Intensity variation in the fine structure of the Balmer lines H_α and H_β . B. SVENSSON (Physica, 1936, 3, 91—104).—Data are recorded for the intensity ratio (I_k/I_l) of short- and long-wave components, for pressures of 0.005—0.8 mm. at different c.d. With varying pressure, the transition from non-striated to striated discharge corresponds with a discontinuity in the I_k/I_l vals. L. J. J.

Comparison of theoretical and empirical values for Stark effect displacement of the components of H_γ , $\pi 18$. K. BASU (Z. Physik, 1936, 98, 576—579). A. B. D. C.

Source of doubly ionised helium. O. LUHR (Physical Rev., 1936, [ii], 49, 317—319).—A magnetron type of low-voltage arc, giving about 2% He^{++} by multiple electron impact, is described. N. M. B.

Zeeman effect in helium. L. E. KINSLER and W. V. HOUSTON (Physical Rev., 1934, [ii], 46, 533—534).—The anomalous effect previously reported (A., 1935, 1437) is due to an experimental error. The val. of e/m obtained from Zeeman splitting of singlet lines of Zn, Cd, He, and Ne is $1.7570 \pm 0.0007 \times 10^7$ e.m.u. per g. L. S. T.

Analysis of $3d-4f$ for C II, N III, and N II. Intercombinations in C II and N III. B. EDLÉN (Z. Physik, 1936, 98, 561—568). A. B. D. C.

New members of the Lyman-Birge-Hopfield system [of N_2]. J. KAPLAN and L. D. LEVANAS (Physical Rev., 1934, [ii], 46, 331).—A max. val. of 7.7 volts for $D(N_2)$ is obtained. L. S. T.

New bands of the ionised nitrogen molecule. F. H. CRAWFORD and P. M. TSAI (Physical Rev., 1934, [ii], 46, 935).—400 new lines have been assigned in the $2\Sigma-2\Sigma$ bands of N_2^+ . L. S. T.

Zeeman effect in the atmospheric oxygen bands; production of a strong magnetic field over a length of 80 cm. R. SCHMID (Physical Rev., 1936, [ii], 49, 271).—A means of obtaining fields over the lengths necessary for the Zeeman effect is described. A qual. discussion of the observed effect is given. N. M. B.

Oxygen afterglow. E. M. STODDART (Proc. Roy. Soc., 1935, A, 153, 152—157).—A reply to Rayleigh's criticisms (A., 1935, 907). Experiments are described showing the effects on the O_2 afterglow of H_2O vapour in the gas phase and adsorbed on the surfaces of the vessels, which are in agreement with the results of other investigators. L. L. B.

Zeeman effect in neon. L. E. KINSLER (Physical Rev., 1934, [ii], 46, 533).—Measurements of the

Zeeman splitting of the Ne lines 5852 and 6074 Å. indicate that the g -sum rule is valid to $< 0.1\%$; assuming the validity of this rule, e/m is $1.7580 \pm 0.0014 \times 10^7$ e.m.u. per g. L. S. T.

Series lines of magnesium in the solar spectrum. H. N. RUSSELL, H. D. BABCOCK, and C. E. MOORE (Physical Rev., 1934, [ii], 46, 826—827).—Members of the series $3^1D-n^1F^0$ and $3^3D-n^3F^0$ observed in the arc spectrum of Mg (A., 1932, 315), together with additional members, have been found in the infra-red solar spectrum. L. S. T.

Spectra of phosphorus. I. Spectra of neutral and singly-ionised phosphorus. H. A. ROBINSON (Physical Rev., 1936, [ii], 49, 297—305).—Using the discharge emitted by a Geissler tube containing P vapour, 22 new terms classifying 36 lines of P I were located; these lines also appear in a 25-amp. C arc containing Ca_3P_2 . The revised ionisation potential is approx. 10.9 volts. 52 new terms classifying 194 lines in the Schumann and visible regions were located in P II. The singlet and triplet sequences are located from more than 20 inter-system combinations. Full data for classified lines of P I and P II are tabulated. The revised P II ionisation potential is 19.56 volts. N. M. B.

Band spectrum of sulphur and the statistics of the sulphur nucleus. R. M. BADGER (Physical Rev., 1934, [ii], 46, 1025—1026).—The analysis made by Naudé and Christy (A., 1931, 540) is criticised. Consts. of the S mol. are revised. L. S. T.

Nuclear mechanical and magnetic moments of K^{39} . D. A. JACKSON and H. KUHN (Nature, 1936, 137, 108; cf. A., 1935, 555).—Photometric measurements of the intensities of the hyperfine structure doublets of the resonance lines of K show that the shorter- λ component is the stronger, thus establishing that the magnetic moment of the nucleus of K^{39} is negative. The val. calc. is -0.39 nuclear magneton. L. S. T.

Hyperfine structure of some vanadium multiplets. H. KOFFERMANN and E. RASMUSSEN (Z. Physik, 1936, 98, 624—637).—The mechanical moment of the V nucleus is $7/2$. A. B. D. C.

Photographic photometry of iron multiplets in electric furnace spectra. R. B. KING (Physical Rev., 1934, [ii], 46, 327). L. S. T.

Band spectra of rubidium and of its combinations with other alkali metals. P. KUSCH (Physical Rev., 1936, [ii], 49, 218—222).—The magnetic rotation spectrum and absorption spectrum

of Rb_2 in the region 6500—7100 Å. have been measured and correlated and a vibrational analysis is given. The vibrational frequency in the $^1\Sigma$ ground state is 57.31 cm^{-1} , and that in the excited $^1\Pi$ state is 48.05 cm^{-1} . The corresponding vals. in the magnetic rotation spectrum of NaRb are 106.6 and 61.5 cm^{-1} . A band system due to RbCs has been identified.

N. M. B.

Characteristics of the long and short spectral lines. II. Silver, zinc, and iron. S. DATTA and K. M. CHATTERJEE (Indian J. Physics, 1936, 10, 65—73; cf. A., 1935, 908).—The long and short lines of Ag, Zn, and Fe have been classified. The fundamental generalisation previously given, with regard to the relative changes in orientation of the L and S vectors in the initial and final states for the long and short lines, appears to be verified. M. S. B.

Regularities in the spectrum of trebly ionised iodine. S. G. KRISHNAMURTI (Proc. Physical Soc., 1936, 48, 277—281).—The spectrum of a condensed discharge through I has been photographed in the range 6000—1900 Å. under varying conditions of excitation. Data for 68 lines ascribed to I IV and classifications of 34 lines are tabulated. Term vals. and assignments are given on analogy with the isoelectronic spectra Te III, Sb II, and Sn I.

N. M. B.

Extinction coefficients of iodine and other halogens. E. RABINOWITCH and W. C. WOOD (Trans. Faraday Soc., 1936, 32, 540—546; cf. A., 1935, 586).—Extinction coeffs. of I vapour, measured at 20° in the range λ 4300—6200 Å., are 2—6 times > the accepted vals. Small humps on the extinction curves, appearing both in vapour and solutions, are due to absorption by vibrating mols. The "limiting" extinction curve, obtained by diluting the vapour to a very low partial pressure with an inert gas, has a max. at 5200 Å., and resembles in shape the curve of a CS_2 solution. The influence of the solvent on the extinction curves of solutions of Cl_2 , Br, and I is investigated.

F. L. U.

Band system of caesium. P. KUSCH and F. W. LOOMIS (Physical Rev., 1936, [ii], 49, 217—218; cf. A., 1934, 1148).—A provisional analysis of the complex system at 6250 Å. is reported.

N. M. B.

Magnetic moment of caesium determined from the hyperfine structure of the $6p^2P_1$ state. L. P. GRANATH and R. K. STRANATHAN (Physical Rev., 1934, [ii], 46, 317).—A g val. of 0.70 is obtained for Cs.

L. S. T.

Spark spectrum of mercury, Hg II and Hg III. T. S. SUBBARAYA (J. Mysore Univ., 1934, 7, 100—134; cf. A., 1934, 1280; 1935, 3).—Additional lines are classified. The ionisation potentials of Hg I and Hg II are 18.67 and 26.1 volts, respectively.

CH. ABS. (e)

Second spark spectrum of mercury. R. RICARD (Compt. rend., 1935, 201, 1342—1344).—30 new terms belonging to the Hg III spectrum have been identified in the visible and ultra-violet spectrum excited with an electrodeless discharge.

T. G. P.

Anomalous Zeeman effect of single hyperfine structure components of the mercury resonance

line 2537 Å. II. The σ components. A. ZVIRONAS (Helv. phys. Acta, 1934, 7, 684—708; Chem. Zentr., 1935, i, 3516; cf. A., 1935, 3).

H. J. E.

Influence of pressure on the discharge-radiation in mercury vapour. V. FABRIKANT, F. BUTAEVA, and J. CIRG (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 183—184; cf. A., 1934, 1280).—Absorption in Hg discharge at low pressures has been studied.

R. S.

Fraunhofer's spectrum in the neighbourhood of 96,000 Å. A. ADEL, V. M. SLIPHER, and O. FOUTS (Physical Rev., 1936, [ii], 49, 288—290; cf. A., 1935, 806).—The absorption of solar radiation by the atm. of the sun and earth, examined in the range 70,000—110,000 Å., is discussed in the vicinity of 96,000 Å. Fine-structure data for the O_3 band with centre at 1043.7 cm^{-1} are given, and the structure of the mol. is discussed.

N. M. B.

Resistance to electric discharge in gas mixtures. G. M. KOVALENKO (Compt. rend. Acad. Sci. U.R.S.S., 1936, 1, 15—17).—The breakdown potential (V) for spherical electrodes at various distances apart in mixtures of NH_3 and N_2 at approx. 1 atm. decreases with increasing % of NH_3 to a min. at approx. 30% NH_3 . With mixtures of Et_2O and N_2 a min. occurs at 30% Et_2O . Since V for pure Et_2O and NH_3 is > V for N_2 , the decrease in V on adding NH_3 and Et_2O to N_2 is attributed to chemical action. With NH_3 V decreases at each discharge with successive discharges (ultimately becoming const.) owing to the formation of H_2 , the presence of which in N_2 at a total pressure of 100 mm. is shown to decrease V .

R. S. B.

Electric discharge in gases and the Debye-Hückel theory. V. T. CHIPLEONKAR (Current Sci., 1936, 4, 481).—The Debye-Hückel electrolytic theory is applied to the phenomena in discharge tubes. In approx. agreement with experiment the length of the cathode fall is shown to vary as the log of the p.d. across it.

R. S. B.

Ionisation steps and excitation energies of spectral lines according to the emission distribution in the arc light. H. STEPHAN (Z. wiss. Phot., 1936, 35, 33—69).—The intensity of spark lines immediately in front of the cathode is dependent on cathode temp. The increase of intensity of arc lines just in front of the poles is due to higher v.d. The best conditions for observation of ionisation steps are obtained by the use of the smallest possible current through the arc. The arc and spark spectra of Mg, Ca, Cu, and Zn were separated by examining the emission distribution of arcs. The cause of the pole effect with arc lines (displacement of $\lambda\lambda$ in the neighbourhood of the poles) is probably due to increased v.d.

A. J. M.

Arcs in rare gases. R. C. MASON (Physical Rev., 1934, [ii], 46, 630).

L. S. T.

Determination of the temperature in the column of a discharge from the intensity measurement of rotational band spectra. T. HAMADA (Proc. K. Akad. Wetensch. Amsterdam, 1936, 39, 50—57; cf. A., 1928, 930).—The radial

temp. distribution in a special N_2 discharge tube of known volt-amp. characteristics has been studied by determination of the intensity of spectral lines. The axial (max.) temp. varies linearly with the product of pressure and current. R. S.

Effect of evaporated films on energy distribution in grating spectra. J. STRONG (Physical Rev., 1936, [ii], 49, 291—296).—Wood anomalies of intensity distribution can frequently be developed by coating the grating, especially if of fine ruling, with an evaporated film of Mg, Ag, or Al. The phenomenon is shown typically by a double band consisting of a dark band on the red side of a bright band; the dark band is characterised by a sharp boundary on the blue side, agreeing with the Rayleigh formula. N. M. B.

Ultra-rapid spectrograph at the Pic du Midi. H. GARRIGUE (Compt. rend., 1936, 202, 44—45).—An instrument operating at f 0.55 is described. H. J. E.

Photographic method for determining the distribution of light intensity in interference rings. J. ROIG (Compt. rend., 1935, 201, 1346—1348). T. G. P.

Fixing scale of Röntgen wave-lengths in absolute measure. M. SÖDERMAN (Nova Acta Soc. Sci. Upsaliensis, 1935, [iv], 9, No. 8; Chem. Zentr., 1935, i, 2942—2943).—The λ of the Al K lines in the 9th and 10th orders are compared directly by a combination of the plane and concave grating methods with the Al spark lines at 50—90 Å., giving 1000 X (exp.) = 1.00212—1.00225 Å. The calcite lattice spacing is recalcd., and e calc. as 4.806 ± 0.003 c.s.u. J. S. A.

Accuracy of determination of emission and absorption of monochromatic X-rays. H. KÜSTNER and E. ARENDS (Ann. Physik, 1936, [v], 25, 385—412).—An examination of the accuracy of methods previously employed (A., 1935, 556, 676). A. J. M.

Theory of X-ray absorption by molecular gases. III. H. PETERSEN (Z. Physik, 1936, 98, 569—575; cf. A., 1933, 332).—Calculations involved in Kronig's theory are simplified; applied to $GeCl_4$ they agree with experiment. A. B. D. C.

Polarisation of X-rays from thin targets. D. S. PISTON (Physical Rev., 1936, [ii], 49, 275—279).—The polarisation of the portion of the continuous X-ray spectrum between the K limits of Ta and W, measured for targets of Al foil (0.7 μ) and Ag foil (0.17 μ), at voltages from the quantum limit up to 120 kv., is complete at the quantum limit, and decreases, more rapidly for Ag than for Al, as the tube voltage is raised above the quantum voltage for the spectrum band. N. M. B.

Wave-length measurements in the K-series of aluminium, sulphur, and chlorine, and in the L-series of zinc. J. SHEARER (Phil. Mag., 1936, [vii], 21, 501—505).—Vals. are tabulated for 9 lines arising from impurities in Ni during investigations previously reported (cf. A., 1935, 1293). N. M. B.

Ruled-grating wave-length of the copper $K\alpha_1$ line. P. F. GOTTLING and J. A. BEARDEN (Physical Rev., 1934, [ii], 46, 435—436). L. S. T.

K spectrum of copper. Y. CAUCHOIS (Compt. rend., 1935, 201, 1359—1361).—Data for the K β regions are recorded and discussed. T. G. P.

K radiation of elements from chromium to copper. M. PRIVAULT (Ann. Physique, 1936, [xi], 5, 280—324).—Three new lines in the K β spectra are recorded. The effect of magnetisation of the anticathode on the K β spectrum of Fe has been examined. Magnetisation to 75% saturation has no observable effect on the K β_1 and K β_2 lines. Temp. changes in the neighbourhood of the Curie and γ points are similarly without effect (for K β_1 and K β_2). The effect of combination on the K spectra has been examined by a fluorescence method. $K_2Cr_2O_7$, MnO_2 , and Fe_2O_3 show a more general splitting of the lines than recorded by Yoshida (A., 1933, 656). L. J. J.

K spectra of molybdenum and rhodium. H. HULUBEI (Compt. rend., 1935, 201, 1356—1359; cf. A., 1935, 811).—Data for the K β spectra are recorded and discussed. T. G. P.

Effects of chemical combination on the L absorption limits of tantalum, tungsten, gold, and lead. S. KAWATA (Proc. Phys.-Math. Soc. Japan, 1935, 17, 89—99).—The shifts of the L_{III} limits are (in volts): $HTaO_3 + 2.0$; $H_2WO_4 + 3.0$, $Au_2O - 4.6$, $Au_2O_3 - 3.4$; $PbO + 3.4$, $PbO_2 + 6.8$. The assumption of a selection rule for X-ray absorption spectra is supported. The Au L_{III} absorption edge is double in Au_2O_3 . CH. ABS. (c)

Probability of KL ionisation and X-ray satellites. R. D. RICHTMYER (Physical Rev., 1936, [ii], 49, 1—8).—A theory of multiple ionisation produced by a fast-cathode electron in the target of an X-ray tube is developed. The effective cross-section for $1s2s$ ionisation of K, the distribution of energy and angular momentum, and the probability of $1s2p$ ionisation are examined. N. M. B.

Ionisation potentials of the N_2 molecule. J. SAVARD (Rev. Fac. Sci. Univ. Istanbul, 1936, 1, 1—7).—Using the method of electronic impact, 11 potentials in good agreement with calc. vals. are reported and the corresponding transformations are given. N. M. B.

Calculation of work of exit in the Richardson effect by a method of O. Scherzer. A. SOMMERFELD [with E. BARTELINK] (Helv. phys. Acta, 1934, 7, Suppl. II, 31—32; Chem. Zentr., 1935, i, 2953).—Theoretical. An expression is derived connecting the work of exit with the at. vol., which agrees with experimental data for the alkali metals. J. S. A.

Calculation of Townsend's α for neon. M. J. DRUYVESTEYN (Physica, 1936, 3, 65—74).—Theoretical. The velocity distribution of electrons diffusing through an inert gas is calc., assuming elastic, exciting, and ionising collisions. Calc. and observed vals. of the ionisation coeff. α agree for potential gradients of 5—30 volts per cm. per mm. gas pressure. L. J. J.

Electrons and positrons. C. H. DIX (Physical Rev., 1934, [ii], 46, 329—330).—Theoretical.

L. S. T.

Production of positrons by β -rays. D. SKO-BELTZYN and E. STEPANOVA (Nature, 1936, 137, 272; cf. A., 1935, 425).—Further evidence of the production of electron-positron pairs by the passage of fast β -rays through Pb and Al is presented. With Al, the predominating effect is the emission of a single positron accompanying the absorption of the primary β -particle. Production of positrons along the track of the β -particle in the gas (N_2) was also confirmed. The effective cross-section in N_2 is of the order 5×10^{-24} sq. cm.

L. S. T.

Positron emission accompanying β -ray activity. C. MÖLLER (Nature, 1936, 137, 314).—Theoretical.

L. S. T.

Emission of positrons by a source of Th-B + C. S. DE BENEDETTI (Compt. rend., 1936, 202, 50—52).—Counts of the positron emission are recorded, using Cellophane and Al screens of varying thickness.

H. J. E.

Production of electron pairs. J. C. JAEGER and H. R. HULME (Proc. Roy. Soc., 1936, A, 153, 443—447).—Mathematical. A method, which avoids the use of the Born approximation, for finding the no. of electron pairs created by a γ -ray traversing matter is described. The results are somewhat $>$ those of Bethe and Heitler (A., 1934, 1150), but it is found that even for heavy elements the Born approximation may be expected to give good results for γ -rays of high energy.

L. L. B.

Thomson's theory of condensation on ions. E. HÜCKEL (Physikal. Z., 1936, 37, 137—138).—The assumption made by Thomson, that the charge of the drop is uniformly distributed over the surface of a sphere, does not hold in the case of single ions or electrons, where the charge is rather conc. at the centre of the sphere. An equation is derived on this assumption.

A. J. M.

Emission of positive ions by platinum when heated in oxygen. T. B. RYMER (Proc. Roy. Soc., 1936, A, 153, 422—442).—The variation with temp. of the positive ion emission from Pt heated in O_2 has been examined, and the results are discussed in the light of the Saha equation. Satisfactory agreement with the theory is obtained, but a different val. from that determined experimentally must be assumed for the electronic work function, on account of the discontinuous nature of the emitting surface.

L. L. B.

Absorption of high-energy protons by matter. J. SOLOMON (Compt. rend., 1936, 202, 204—206).—The energy lost by protons and electrons by radiation and ionisation is considered theoretically.

T. G. P.

Scattering of high-energy protons in hydrogen. M. G. WHITE (Physical Rev., 1936, [ii], 49, 309—316).—Comparison of scattering frequency from 7340 photographs of high-energy proton tracks in H_2 with Mott's wave-mechanical treatment showed strong anomalies for incident proton energies $>$ 600 kv. Since Mott assumes coulomb forces, the dis-

crepancies indicate a departure from the inverse square law for such energies. For a classical distance, therefore, of closest approach of about 6×10^{-13} cm. the two protons cannot be treated as point charges, but on classical grounds this is not so down to 10^{-16} cm.

N. M. B.

Formation of negative atomic ions of mercury. F. L. ARNOT and J. C. MILLIGAN (Nature, 1936, 137, 150).—By means of the mass spectrograph negatively charged atoms but not negatively charged mols. of Hg have been detected. Their energies are $>$ can be accounted for by the total potential across the tube or by the dissociation of excited mols.

L. S. T.

Production of high-velocity particles in a cyclotron by the use of multiphase oscillators. R. J. MOON and W. D. HARKINS (Physical Rev., 1936, [ii], 49, 273).

N. M. B.

At. wt. of element 93. H. J. WALKER (Phil. Mag., 1936, [vii], 21, 262—265).—By analogy with the relations between the isotopes of Ru, Rh, and Pd and between those of Th, Pa, and U, it is suggested that the α -radioactive isotope of element 93 (eka-Re) has a mass no. 237. The mass nos. of the α -radioactive isotopes of U and eka-Os are probably U, 232, 233, 234, 235, 236, and 238; eka-Os, 238, 239, 240, 241, 242, and 244. The lighter isotopes of eka-Os are probably short-lived, but eka-Os²⁴¹ is probably of long life and may exist terrestrially.

R. S. B.

Masses of some light atoms measured by means of a new mass spectrograph. F. W. ASTON (Nature, 1936, 137, 357—358).—Observations on the doublets linking H, D, He, C, and O give the following as the most probable vals. of the isotopic wts. on the physical scale: H 1.00812 ± 0.00004 , D 2.01471 ± 0.00007 , He 4.00391 ± 0.00016 , and C 12.0035 ± 0.0003 .

L. S. T.

Abundance ratio of isotopes of potassium in mineral and plant sources. A. K. BREWER (J. Amer. Chem. Soc., 1936, 58, 365—370).—Mass-spectrographic data for a large no. of K-containing minerals show only small differences in the isotope content. The ratio K^{39}/K^{41} is about 14.25. Greater variation is found in plant ashes, the K^{41} content differing by as much as 15%. Kelp shows a pronounced deviation from the average. The ratio varies with the variety, age, and section of the plant, and the type of soil.

E. S. H.

Mass-spectrographic determination of the constancy of the at. wt. of potassium in ocean water. A. K. BREWER (J. Amer. Chem. Soc., 1936, 58, 370—372).—The abundance ratio K^{39}/K^{41} for Pacific Ocean H_2O is 14.20 for samples obtained from different localities and at depths down to 2500 m. Variations in at. wt. are $< \pm 0.00026$. The derived at. wt. of K is 39.094.

E. S. H.

Isotopic abundance ratios of carbon, nitrogen, argon, neon, and helium. A. L. VAUGHAN, J. H. WILLIAMS, and J. T. TATE (Physical Rev., 1934, [ii], 46, 327).—Relative intensities of the peaks of mass-spectrograph curves give the following abundance ratios with the average deviations indicated:

$\text{C}^{12} : \text{C}^{13}$ 91.6 (2.2), $\text{N}^{14} : \text{N}^{15}$ 265 (8), $\text{A}^{40} : \text{A}^{36}$ 304 (12), $\text{Ne}^{20} : \text{Ne}^{21}$ 337 (20), $\text{Ne}^{20} : \text{Ne}^{22}$ 9.25 (0.08), and $\text{He}^4 : \text{He}^3 < 35,000$.
L. S. T.

Isotopic constitution of rubidium, zinc, and argon. A. O. NIER (Physical Rev., 1936, [ii], 49, 272).—The abundance ratio $\text{Rb}^{85}/\text{Rb}^{87}$ is 2.68 ± 0.02 . The upper limits of abundance relative to Rb^{85} computed for undetected hypothetical isotopes are, Rb^{80} , 81, 82, 89, 90, 1×10^{-5} ; Rb^{83} , $1/60,000$; Rb^{84} , $1/12,000$; Rb^{86} , $1/13,000$; Rb^{88} , $1/22,000$. Zn^{64} , 66, 68, 67, 70 were found. The upper abundance limits relative to Zn^{70} of Zn^{65} , 63, 69 are $1/200$, $1/400$, and $1/300$, respectively. A^{38} was confirmed. $\text{A}^{40}/\text{A}^{36} = 325$, and $\text{A}^{36}/\text{A}^{38} = 5.1$. The upper abundance limits of hypothetical isotopes relative to A^{40} are A^{41} , 39 1×10^{-4} , and A^{42} , 37 0.5×10^{-4} .
N. M. B.

Mass ratios of isotopes from band spectra. W. W. WATSON (Physical Rev., 1934, [ii], 46, 319).—The effect of the perturbing interactions between the various energy states of a mol. on the B consts. should always be investigated in obtaining accurate mass ratios from band spectra. The corrections to be applied in the case of CaH and CaD are discussed.
L. S. T.

Chemical elements and natural atomic types from the viewpoint of the investigation of isotopes. O. HAHN (Ber., 1936, 69, [A], 5—20).—A review of work published between the end of 1934 and of 1935.
H. W.

Properties of ions. I. Electronic homologues in the periodic system. II. Periodic system and the properties of ions. B. V. NEKRASSOV (Bull. Soc. chim., 1936, [v], 3, 151—155, 155—159).—I. A new presentation of the periodic system, based on the electronic structures of the elements in their different states of valency, is given.

II. The properties of ions are discussed in the light of the above classification.
E. S. H.

System of masses of light atoms deduced from nuclear reactions alone. II. L. ISAKOV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 141—143; cf. this vol., 7).—Using the data of nuclear reactions, the at. wts. of the light elements up to Si have been determined and are compared with "chemical" and "physical" at. wts. When deviations of the at. mass vals. from the nearest integer val. are plotted against at. nos. between H and Al the curve is wave-shaped, the amplitudes of the waves rapidly diminishing until ultimately a straight line is obtained.
W. R. A.

Some properties of radioactive series. E. LOPOUKHIN (Compt. rend., 1935, 201, 1361—1363).—The different phases of radioactive disintegration are discussed from the point of view of Perrin's nuclear model (A., 1932, 556).
T. G. P.

Continuous spectra of Ra-E and Ra-P³⁰. A. I. ALICHANOV, A. I. ALICHANIAN, and B. S. DZELEPOV (Nature, 1936, 137, 314—315).—The energy distribution curve of β -particles from Ra-E reveals the emission of a large no. of electrons with low energies. Comparison with the β -spectrum of radio-P, which has a max., shows a considerable

difference in the shape of the β -spectra of elements of low and high at. no.
L. S. T.

Absence of low-energy radiations from potassium and rubidium. W. F. LIBBY (Physical Rev., 1934, [ii], 46, 745—746).—Geiger-Müller counter experiments indicate that no α -particle of range much > 0.05 cm. or β -particle with energy much > 500 e.v. is emitted by K. The emission of any preliminary radiation is improbable. With Rb it is even less likely that a low-energy α - or β -particle is initially emitted.
L. S. T.

Evidence of an excited state in the α -particle. C. C. LAURITSEN and H. R. CRANE (Physical Rev., 1934, [ii], 46, 537—538).—The 12 m.e.v. γ -ray component observed when Li is bombarded with protons (this vol., 402) is ascribed to the process ${}^3\text{Li} + {}^1\text{H} \rightarrow {}^2\text{He}^4$, in which the product of the reaction is presumably the only possible source of the γ -radiation. Analogous cases in which a γ -ray appears to be associated with an excitation level in one of the final products of the reaction are discussed.
L. S. T.

Does the α -particle possess excited states? E. FEENBERG (Physical Rev., 1936, [ii], 49, 328—331).—Evidence from recent experiments (cf. Crane, A., 1935, 1186) is supported by computations on three different nuclear models which indicate definitely a singlet $2p$ level in the discrete eigenvalue spectrum of the α -particle if the range of the intra-nuclear forces exceeds 2.0×10^{-13} cm.
N. M. B.

α -Particles from lithium ions striking hydrocarbon compounds. J. ZELENY, C. J. BRASEFIELD, C. D. BOCK, and E. C. POLLARD (Physical Rev., 1934, [ii], 46, 318).—Bombardment of NH_4Cl and $\text{Al}(\text{OH})_3$ with 24×10^4 volt Li ions yields a small no. of α -particles (approx. 12 and 9 per min. per microamp., respectively) resulting from the disintegration of Li, probably Li^7 .
L. S. T.

Ranges of α -particles in photographic emulsions. H. J. TAYLOR and V. D. DABHOLKAR (Proc. Physical Soc., 1936, 48, 285—298; cf. A., 1935, 910).—From measurements on Ilford R plates of the tracks of a homogeneous group of α -particles of range r , a distribution curve is drawn, from which L , the extrapolated length of the tracks, is calc. The ratio L/r is const. $\pm 1\%$ for α -particles of various ranges, and if L is measured r can be calc. This method, applied to the tracks produced by the disintegration of B and Li under slow-neutron bombardment, gives ranges 1.14 ± 0.02 and 6.64 ± 0.06 cm., respectively, in air. Sm emits α -particles of range 1.13 ± 0.02 cm. in air, and other particles of longer range.
N. M. B.

Scattering of fast β -particles by nitrogen nuclei. F. C. CHAMPION (Proc. Roy. Soc., 1936, A, 153, 353—358).—The scattering of fast β -particles by N nuclei has been examined between 20° and 180° . Over the whole range, the most satisfactory agreement is with Mott's formula (A., 1929, 861). For the large-angle scattering the results support those of Neher (A., 1931, 1347), and for smaller angles those of Chadwick and Mercier (Phil. Mag., 1925, [vi], 50, 208).
L. L. B.

Anomalous absorption of β -rays. D. SKO-BELZYN and (MISS) E. STEPANOVA (Nature, 1936, 137, 234). L. S. T.

Energy of γ -rays excited by slow neutrons. S. KIKUCHI, H. AOKI, and K. HUSIMI (Nature, 1936, 137, 186; cf. this vol., 266).—The energy of γ -rays accompanying the recombination of a proton with a slow neutron to form a deuteron is 2.2×10^6 e.v. Curves showing the energies of γ -rays excited in Cd, Cl₂, Cu, and Fe by slow neutrons are given. The γ -rays from Cd have at least two components, whilst those from Cl₂ appear to be homogeneous.

L. S. T.

Absorption measurements of hard γ -rays from fluorine bombarded by protons. E. McMILLAN (Physical Rev., 1934, [ii], 46, 325).— γ -Rays from various targets bombarded by 1.1×10^6 volt-protons and 2.2×10^6 volt-deuterons have been investigated. With proton bombardment B, Be, Li, and F give strong γ -rays in increasing order of intensity. The F radiation is homogeneous and no neutrons are indicated. With deuteron bombardment F, C, B, Li, and Be give strong ionisation, part of which is due to neutrons.

L. S. T.

Absorption of γ -rays excited in cadmium by slow neutrons. H. HERSZFINKIEL and L. WERTENSTEIN (Nature, 1936, 137, 106—107).—The amount of γ -rays excited in Cd by neutron bombardment is practically independent of the thickness of Cd traversed between 0.1 and 1 mm. and decreases when thicker sheets are used. Further results obtained with screens of Pb, Fe, and Al indicate that the energy of these γ -rays must be of the order of 10^7 e.v.

L. S. T.

γ -Rays from boron bombarded with deuterons. H. R. CRANE, L. A. DELSASSO, W. A. FOWLER, and C. C. LAURITSEN (Physical Rev., 1934, [ii], 46, 1109—1110).—The spectrum of recoil electrons produced by the γ -rays from B bombarded with deuterons consists of components of \leq five different energies.

L. S. T.

High-energy γ -rays from lithium and fluorine bombarded with protons. H. R. CRANE, L. A. DELSASSO, W. A. FOWLER, and C. C. LAURITSEN (Physical Rev., 1934, [ii], 46, 531—533; cf. A., 1935, 1186).

L. S. T.

Nuclear photo-electric effect in deuterium. G. ISING and M. HELDE (Nature, 1936, 137, 273).—The val. obtained for the mass of the neutron is 1.0080 (cf. A., 1935, 1293).

L. S. T.

Existence of resonance levels for the capture of neutrons. H. VON HALBAN, jun., and P. PREISWERK (Compt. rend., 1936, 202, 133—135).—Resonance levels seem to exist.

T. G. P.

Energy distribution of neutrons slowed by elastic impacts. E. U. CONDON and G. BREIT (Physical Rev., 1936, [ii], 49, 229—231).—Mathematical. The energy distribution of particles of mass m , initially of the same energy, which have made n impacts with particles of mass M , all initially at rest, is calc.

N. M. B.

Effect of scattering neutrons on induced radioactivity. J. ROTBLAT and M. ZYR (Nature, 1936,

137, 185—186).—The effect of screens or scatterers of various elements on the radioactivity induced in Ag by neutrons has been investigated. The component of 140 sec. half-period is increased in amount by Si, Fe, Cu, Zn, Ag, Cd, Sn, Hg, and Pb, but not by C or Al. The 22 sec. product is enhanced by C, Al, Cu, Cd, and Sn, and weakened by Hg or Ag.

L. S. T.

Absorption of slow neutrons in carbon. G. A. FRINK, J. R. DUNNING, and G. B. PEGRAM (Physical Rev., 1936, [ii], 49, 340).—In view of uncertainty as to whether C is responsible for some of the absorption of slow neutrons in paraffin (cf. A., 1935, 1186) data are given for neutrons detected per min. by a Li-lined ion chamber from a Rn-Be source surrounded by a paraffin sphere and a C cylinder. Results indicate that if C absorbs any slow neutrons this is $>$ compensated for by neutrons slowed down in the C.

N. M. B.

Capture of slow neutrons. O. R. FRISCH and G. PLACZEK (Nature, 1936, 137, 357).—Cd is an efficient absorber for neutrons of thermal energies, but becomes almost transparent for neutrons of energy \geq 1 volt. The capture probability in Cd has a max. between 1 and 0.03 volt.

L. S. T.

Neutrons of thermal energies. P. B. MOON and J. R. TILLMAN (Proc. Roy. Soc., 1936, A, 153, 476—492).—Experiment shows that a large proportion of the "slow" neutrons formed when fast neutrons pass through H₂O or paraffin wax have thermal velocities. The cross-sections for the absorption of thermal neutrons by the nuclei Cu, V, Dy, Ag, Rh, I, and B increase when the temp. of the neutrons is reduced from room temp. to 90° abs., the increase depending on the geometrical conditions of the experiment. The apparent absorption of neutrons by I and by Ag is greatest when measured with the same element as detector.

L. L. B.

Selective absorption of neutrons by gold. O. R. FRISCH, G. HEVESY, and H. A. C. MCKAY (Nature, 1936, 137, 149—150).—Experiments on the activation of Au by neutrons slowed down by paraffin wax with a Cd filter indicate that there is a group of neutrons of narrow velocity range which are strongly absorbed by Au, but transmitted through Cd. The no. of strongly absorbed neutrons is apparently only a small fraction of the total no. transmitted by Cd.

L. S. T.

Selective scattering of slow neutrons. J. R. TILLMAN (Nature, 1936, 137, 107).—The β -ray activity induced in I, Ag, and Cu by neutrons slowed down by paraffin wax is increased by different amounts when the metals are backed with a further layer of paraffin wax.

L. S. T.

Agreement between the balance of nuclear energy and the experimental masses of light elements. L. CARTAN (Compt. rend., 1935, 201, 1363—1366).—The mass of the H atom (O=16) has been corr. to 1.00810 ± 0.00010 from a study of the reactions $B^{11} + H^1 = 3He^4$, $Be^9 + H^1 = Li^6 + He^4$, $B^{10} + D^2 = 3He^4$, and $B^{10} + D^2 = B^{11} + H^1$, and vals. for D, He⁴, Li⁶, Li⁷, Be⁹, B¹⁰, B¹¹, and C¹² calc. which agree with those of Oliphant *et al.* (A., 1935, 910), excepting

those of Be^9 and C^{12} , which are 9.0152 and 12.0037 ± 0.0010 , respectively.

T. G. P.

Disintegration with the emission of protons induced by neutrons. F. N. D. KURIE (Physical Rev., 1934, [ii], 46, 330).—Disintegration by neutrons from Be bombarded with 3×10^6 volt-deuterons in which a proton or other particle of charge approx. 1 is emitted instead of the usual α -particle is described. Possible reactions are ${}^7\text{N}^{14} + {}^1_0\text{n}^1 \rightarrow {}^6\text{C}^{11} + {}^1_1\text{H}^1$ or ${}^8\text{O}^{16} + {}^1_0\text{n}^1 \rightarrow {}^7\text{N}^{16} + {}^1_1\text{H}^1$.

L. S. T.

Disintegration of nitrogen by neutrons. T. W. BONNER and W. M. BRUBAKER (Physical Rev., 1936, [ii], 49, 223—229).—Disintegrations observed in a cloud-chamber filled with N_2 at reduced pressure are attributed to one of the reactions: ${}^7\text{N}^{14} + {}^1_0\text{n}^1 \rightarrow {}^5\text{B}^{11} + {}^2\text{He}^4$; ${}^7\text{N}^{14} + {}^1_0\text{n}^1 \rightarrow {}^6\text{C}^{14} + {}^1_1\text{H}^1$; ${}^7\text{N}^{14} + {}^1_0\text{n}^1 \rightarrow {}^2\text{He}^4 + {}^2\text{He}^4 + {}^3\text{Li}^7$. The first is valid for slow and fast neutrons, the energy of disintegration for the reaction being 2.33 ± 0.26 m.e.v. The second and third reactions are less frequent. Full data for 91 disintegration forks are tabulated.

N. M. B.

Production of radioactive oxygen. M. S. LIVINGSTON and E. McMILLAN (Physical Rev., 1934, [ii], 46, 437—438).—Bombardment of Pt and Cu targets by 2×10^6 volt deuterons in a modified apparatus (A., 1935, 1441) produces a positron activity of 126 ± 5 sec. half-life in N_2 but not in O_2 , H_2 , or A. This activity is due to activation of N_2 (1 atom. per 10^6 incident deuterons), probably according to the reactions ${}^7\text{N}^{14} + {}^1_1\text{H}^2 \rightarrow {}^8\text{O}^{15} + {}^1_0\text{n}^1$ and ${}^8\text{O}^{15} \rightarrow {}^7\text{N}^{15} + {}^1_1\text{e}^+$. The max. energy of the positrons from the second, radioactive process is approx. 1.7×10^6 volts.

L. S. T.

β -Ray spectra of some induced radioactive elements resulting from neutron bombardment. R. NAIDU and R. E. SIDAY (Proc. Physical Soc., 1936, 48, 332—336).—Preliminary determinations are given of the energies of the end-points, found from block diagrams, of the β -ray spectra of some unstable elements produced by neutron bombardment of F, Si, Rh, Ag, Eu, and Dy, a cloud chamber being used.

N. M. B.

Action of slow neutrons on rare-earth elements. G. HEVESY and H. LEVI (Nature, 1936, 137, 185).—The decay periods and relative intensities of the artificially radioactive rare-earth elements, as determined by various investigators, are summarised, together with new data for the absorption of slow neutrons by the rare-earth elements. Discrepancies in published data appear to be due mainly to the presence of small amounts of impurities.

L. S. T.

Cosmic-ray particles of high penetrating power. L. LEPRINCE-RINGUET (Nature, 1936, 137, 358).—New measurements agree with the assumption that the more penetrating cosmic rays consist of positive and negative electrons and of protons.

L. S. T.

General interpretation of cosmic-ray effects. R. A. MILLIKAN (Physical Rev., 1934, [ii], 46, 329; cf. A., 1935, 560).

L. S. T.

Recovery time of Geiger-Müller counters. W. E. DANFORTH (Physical Rev., 1934, [ii], 46, 1026—1027).

L. S. T.

Artificial radioactivity and the conversion of kinetic into γ -ray energy associated with nuclear disintegration by neutrons. W. D. HARKINS and D. M. GANS (Physical Rev., 1934, [ii], 46, 827—828).—A discussion. The at. nucleus is an efficient converter of large amounts of kinetic into γ -ray energy.

L. S. T.

Transformation of energy. (LORD) RUTHERFORD (Nature, 1936, 137, 135—137).—A lecture.

L. S. T.

Neutron capture and nuclear constitution. N. BOHR (Nature, 1936, 137, 344—348).—A lecture in which new views are presented.

L. S. T.

Nuclear stability and isotope shift. G. BREIT (Physical Rev., 1934, [ii], 46, 319).—Gamow's diagram (A., 1934, 939) is discussed in relation to the observed isotope shifts of Hg and Pb.

L. S. T.

Neutrino theory of radiation and the emission of β -rays. R. DE L. KRONIG (Nature, 1936, 137, 149).—A discussion.

L. S. T.

Does conservation of energy hold in atomic processes? P. A. M. DIRAC (Nature, 1936, 137, 298—299).

L. S. T.

Negative protons in the nucleus? J. H. BARTLETT, jun. (Physical Rev., 1934, [ii], 46, 435; cf. A., 1933, 1226).—Attention is directed to a certain regularity in the isotope pattern which may show how negative protons become incorporated in the nucleus. The case of Zn is discussed. Several elements, including In, Sb, and I, may be found to have 3 odd isotopes.

L. S. T.

Heights of nuclear potential barriers. E. D. EASTMAN (Physical Rev., 1934, [ii], 46, 744).—Barrier heights calc. from Heisenberg's theory are compared with other indications of their magnitude.

L. S. T.

Nuclear moments. S. FRISCH (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 21—22).—The nuclear moments, I , of elements of odd at. no. are given by $I = L \pm S$, where L is the resultant moment of the proton orbit and the nuclear residue, and S is the proton spin. Vals. are tabulated.

H. J. E.

Spin and magnetic moment of the potassium K^{39} nucleus. S. MILLMAN, M. FOX, and I. I. RABI (Physical Rev., 1934, [ii], 46, 320).—Deflexion of a beam of neutral K atoms in a weak magnetic field gives $3/2$ for the spin of K^{39} . The hyperfine structure separation calc. for the ${}^2\text{S}_1$ normal state is 0.0147 cm^{-1} , giving 0.38 unit of the nuclear magneton $\mu_0/1838$ for the nuclear magnetic moment.

L. S. T.

Molecular orientation and the probability of excitation and dissociation of the hydrogen molecule by electron impact. N. SASAKI and T. NAKAO (Proc. Imp. Acad. Tokyo, 1935, 11, 413—415; cf. A., 1935, 1185).—From quantum-mechanical calculations it is deduced that the probability of excitation of the H_2 mol. to the $1^3\Sigma$ -state is a max. when the mol. axis is parallel to the electron beam,

in accord with experimental data on the dissociation of H_2 mols. J. W. S.

Calculation of eigenfunction of metallic electrons. H. BETHE (Helv. phys. Acta, 1934, 7, Suppl. II, 18—23; Chem. Zentr., 1935, i, 2954).—The method of calculation of Wigner and Seitz (A., 1934, 1283) is applied to the calculation of the eigenfunctions of electrons in metals and in free atoms, and to calculations arising therefrom of cohesion, excited electronic terms, and free electrons in alkali metals. J. S. A.

Limits of elementary theory of metallic electrons. L. NORDHEIM (Helv. phys. Acta, 1934, 7, Suppl. II, 3—17; Chem. Zentr., 1935, i, 2954).—The classical theory of Sommerfeld is restated in terms of quantum mechanics, and extended to cover effects at high temp. J. S. A.

Statistical basis of electron theory of metals. R. PEIERLS (Helv. phys. Acta, 1934, 7, Suppl. II, 24—30; Chem. Zentr., 1935, i, 2953—2954).—Theoretical. J. S. A.

Sommerfeld's theory of metals. K. F. NIESSEN (Ned. Tijdschr. Nat., 1935, 2, 71—89; Chem. Zentr., 1935, i, 3765).—An explanatory résumé of the chief features of the Sommerfeld theory. J. S. A.

Errors of approximation in Jeffreys' phases. F. L. ARNOT (Proc. Camb. Phil. Soc., 1936, 32, 161—178).—The errors involved in the use of an approximation method due to Jeffreys of solving the radial wave equation for the motion of an electron in the field of a spherically symmetrical atom are examined with reference to neutral Cl. A. J. M.

Statistical theory of neutral atoms. P. LAL and K. LAL (Indian J. Physics, 1936, 10, 1—6).—A simplified method is given for calculating the binding energy of an atom by making use of the Thomas-Fermi statistical model and neglecting the interaction between electrons. For the lighter atoms the results are in good agreement with those derived by other methods. An expression for the radius of a neutral atom has also been obtained. M. S. B.

Dispersion of light in the region of magnetic dipole lines. B. MILLANCUK (Bull. Acad. Polonaise, 1935, A, 438—444).—Theoretical. The Kramers-Heisenberg formula for dispersion holds for magnetic dipole lines if the corresponding transition probabilities are substituted. A. J. M.

Magnetic dipole radiation. B. MILLANCUK (Bull. Acad. Polonaise, 1935, A, 430—437).—Theoretical. The Zeeman separation and intensity ratios of spectral lines due to magnetic dipole radiation are calc. on Dirac's theory. A. J. M.

Limit to the quantum theory and the avoidance of negative energy transitions. H. T. FLINT (Nature, 1936, 137, 313—314).—The principle of min. proper time, according to which intervals of proper time $< h/m_0c^2$ have no physical significance, eliminates the conception of an electron moving with a high velocity in a strong field of force and sets a boundary to the region to which such a conception may be applied and to the domain where the quantum theory is valid. L. S. T.

Annihilation of positrons. J. C. JAEGER and H. R. HULME (Proc. Camb. Phil. Soc., 1936, 32, 158—160).—Theoretical. A. J. M.

Space quantisation. I. I. RABI (Physical Rev., 1936, [ii], 49, 324—328).—A discussion of the effect of a rapidly varying weak magnetic field on an oriented atom having nuclear spin shows that on the basis of the Phipps-Frisch modification of the Stern-Gerlach experiment nuclear spin can be measured even when the hyperfine structure separation is very small. N. M. B.

Interrelationships of e , h/e , and e/m . R. T. BIRGE (Nature, 1936, 137, 187).—A crit. survey. The existence of a major discrepancy between the grating val. of e , $(4.8029 \pm 0.0005) \times 10^{-10}$ e.s.u., and that obtained by various methods involving e/m and h/e , $(4.7824 \pm 0.0015) \times 10^{-10}$ e.s.u., indicates that either the Bohr formula for the Rydberg const. or the method of calculating e on the assumption of a geometrically perfect calcite crystal is incorrect. L. S. T.

Intensity distribution in band spectra of diatomic molecules. W. WEHRLI (Helv. phys. Acta, 1934, 7, 676—683; Chem. Zentr., 1935, i, 3515).—A discussion of anomalous data for GaI and InI (cf. A., 1934, 1286). H. J. E.

Reversal of a branch in a non-electronic band. A. ADEL (Physical Rev., 1936, [ii], 49, 340).—Attention is directed to the first recorded instances of this phenomenon. N. M. B.

Chemical reactivity and light absorption. N. R. DHAR and P. N. BHARGAVA (Indian J. Physics, 1936, 10, 43—47; cf. A., 1935, 144).—The increase in light absorption of a mixture of undried H_2 and Br, above that of the separate constituents, is not observed when the gases are completely dry and therefore non-reactive. This is in accordance with the view that increased absorption is a measure of the reactivity of the system. M. S. B.

Sodium resonance radiation and the polymerisation of ethylene. J. C. JUNGERS and H. S. TAYLOR (J. Chem. Physics, 1936, 4, 94—96).— C_2H_4 quenches the resonance radiation of Na vapour between 130° and 250° , but no measurable polymerisation of C_2H_4 takes place, contrary to the behaviour with the resonance radiation of excited Hg and Cd. Above 250° , however, the polymerisation of C_2H_4 is catalysed by Na surfaces with an activation energy of 20 kg.-cal. Reasons for the apparently greater efficiency of thermal activation, as compared with photo-activation, are discussed. M. S. B.

Spectrum emitted by a potassium bromide crystal under X-rays. P. W. BURBIDGE and T. G. MOORCRAFT (Nature, 1936, 137, 278).—Bands with centres at 5310, 4520, and 3810 Å. have been photographed. L. S. T.

Ultra-violet spectrum of ammonia. II. Rotational structure of some bands in the Schumann region. A. B. F. DUNCAN and G. R. HARRISON (Physical Rev., 1936, [ii], 49, 211—214; cf. A., 1935, 912).—The seven (0, 2)—(0, 8) bands of the second electronic state above the normal, in the range

1620—1450 Å., have been photographed, and their structure is discussed. N. M. B.

Ammonia bands in the near infra-red. S. K. CHAKRAVORTI (Indian Phys. Math. J., 1934, 5, 25—33).—The fundamental frequencies of NH_3 are calc. from wave mechanics, the mol. being regarded as a symmetrical pyramidal top, with N at the apex and H at each corner of the equilateral base. The calc. electric moment is 3.2 times the observed val. CH. ABS. (e)

Band spectra of LiH, LiD, and NaD. F. H. CRAWFORD and T. JORGENSEN, jun. (Physical Rev., 1934, [ii], 46, 939; cf. A., 1935, 561). L. S. T.

Absorption spectrum of magnesium hydride in the ultra-violet. B. GRUNDSTRÖM (Nature, 1936, 137, 108—109).—The absorption spectrum of MgH from Mg heated in H_2 at 1400° shows, in addition to the band at 2430 Å. (A., 1929, 376), a band in the ultra-violet corresponding with a transition from the ground-level $^2\Sigma$ to a hitherto unknown activated state in MgH . L. S. T.

Intensities in the 3400 band of phosphorus hydride. P. NOLAN and F. A. JENKINS (Physical Rev., 1934, [ii], 46, 327).—Line intensities in the rotational structure of the $^3\Pi$, $^3\Sigma$ band of PH have been measured. L. S. T.

Absorption spectrum of nitrous oxide in Schumann region. P. K. SEN-GUPTA (Bull. Acad. Sci. Agra and Oudh, 1934, 3, 197—202; Chem. Zentr., 1935, i, 2945).—Continuous absorption commences at 1850 Å., with a region of transmission between 1700 and 1580 Å. The absorption is attributed to the formation of excited N atoms according to $\text{N}_2\text{O} + h\nu$ (1850) = $\text{NO} + \text{N}(^2D)$; $\text{N}_2\text{O} + h\nu$ (1580) = $\text{NO} + \text{N}(^2P)$, the calc. excitation potentials agreeing with experiment. J. S. A.

Doublet separation in the normal state of nitric oxide and its thermodynamic quantities. E. E. WITMER (Physical Rev., 1934, [ii], 46, 629). L. S. T.

Pressure broadening in the γ -bands of nitric oxide. O. R. WULF (Physical Rev., 1934, [ii], 46, 316).—An explanation of this effect is discussed. L. S. T.

Spectrum of the first discharge through nitrogen peroxide. L. GRILLET and M. DUFFIEUX (Compt. rend., 1935, 201, 1338—1340).—The emission spectrum of feebly excited N_2O_4 streaming rapidly through a discharge tube consists of (a) the phosphorescent spectrum of NO_2 , (b) O I bands, (c) N I bands, (d) the second positive group of N_2 , (e) the 3 group of NO; three unknown spectra consisting of (f) a vibration-rotation band at 5996 cm^{-1} , (g) 17 bands between 5936 and 5227 cm^{-1} , (h) bands between 5398 and 6547 cm^{-1} degraded towards the violet, between 6405 and 6576 cm^{-1} degraded towards the red, and a band with a max. at 6350 cm^{-1} , and (i) numerous unknown lines in the extreme red and infra-red. T. G. P.

Quantitative data on the absorption spectrum of nitrogen peroxide. M. LAMBREY and J. CORBIÈRE (Compt. rend., 1935, 201, 1334—1335; cf. A.,

1930, 1496).—The absorption coeffs. of N_2O_4 and NO_2 in the region 3200 — 4105 Å. have been measured. T. G. P.

Absorption spectra of monoxides of alkaline-earth metals. P. K. SEN-GUPTA (Bull. Acad. Sci. Agra and Oudh, 1934, 3, 203—208; Chem. Zentr., 1935, i, 2947).—The spectra of CaO, BaO, and SrO show a limit of continuous absorption, corresponding with dissociation into neutral atoms. J. S. A.

Absorption spectrum of sulphur trioxide. E. FAJANS and C. F. GOODEVE (Trans. Faraday Soc., 1936, 32, 511—514).—The absorption spectrum of SO_3 vapour between 3000 and 2200 Å. consists of weak diffuse bands superimposed on a continuous background. The bands are of an unusual type and consist of flat max., with sharp min. separated by an approx. const. frequency distance = 430 cm^{-1} . The bands cannot be measured with certainty above 2500 Å. and are not due to SO_2 . O. J. W.

Absorption spectra of the tellurium oxides TeO_2 and TeO . C. S. PLAW (Compt. rend., 1936, 202, 127—128; cf. this vol., 134).—The absorption spectra of TeO_2 , and of TeO which appears when TeO_2 vapour is heated above 1000° at low pressures, have been studied. T. G. P.

Band spectra of the lead halides, PbF and PbCl . G. D. ROCHESTER (Proc. Roy. Soc., 1936, A, 153, 407—421).—The emission band spectra of PbF and PbCl are described. Their similarity to the corresponding spectra of the Bi halides is shown to be a consequence of the identity of the vibrational consts. Popov and Neujmin's analysis of PbCl (Physikal. Z., Sovietunion, 1932, 2, 394) is incorrect. No definite evidence of Pb isotope effects is obtained, but large Cl isotope effects are observed. The relations of the vibrational consts. of the Pb halides to those of other heavy mols. are considered. L. L. B.

Absorption spectra the halides of fifth group elements. H. TRIVEDI (Bull. Acad. Sci. Agra and Oudh, 1934, 3, 229—238; Chem. Zentr., 1935, i, 2946).—From the absorption spectra of SbCl_5 , AsBr_3 , SbBr_3 , PI_3 , and AsI_3 the heats of formation per atom of halogen have been calc. Vals. so found differ from accepted thermochemical data. AsI_3 and SbBr_3 show a second region of transmission. J. S. A.

Absorption spectra of formaldehyde and hydrogen cyanide in the far ultra-violet. W. C. PRICE (Physical Rev., 1934, [ii], 46, 529; cf. A., 1935, 805).—HCN shows bands extending from 1450 to below 1000 Å. The bands at lower λ probably form an electronic series corresponding with an ionisation potential of HCN at 14.8 volts. Two types of absorption are indicated. L. S. T.

Fluorescence and absorption bands of some derivatives of coumarin. W. CZAPSKA-NARKIEWICZ (Bull. Acad. Polonaise, 1935, A, 445—447).—The fluorescence and absorption spectra of 7-hydroxy-coumarin-3-carboxylic acid (I), Et 7-hydroxy- (II) and 7:8-dihydroxy-coumarin-3-acetoacetate (III) have been investigated. The fluorescence max. are at 4596 , 4727 , and 4679 Å. , and the absorption max. at 3300 , 3414 , and 4517 Å. , for (I), (II), and (III), respectively. A. J. M.

Absorption of ultra-violet light by some organic substances. XL. L. MARCHLEWSKI and B. SKARZYŃSKI (Bull. Acad. Polonaise, 1935, A, 474—478).—The ultra-violet absorption spectrum of PhMe in EtOH solution was investigated. The mol. extinction curve has two max. at 2684 and 2720 Å., respectively. A similar curve was obtained for PhEt (max. at 2683 and 2620 Å., respectively).

A. J. M.

Ergot alkaloids. Ultra-violet absorption spectra of lysergic acid and related substances. W. A. JACOBS, L. C. CRAIG, and A. ROTHEN (Science, 1936, 83, 166—167).—Curves obtained for this acid and some of its derivatives are reproduced and discussed.

L. S. T.

Emission spectra of cholesterol irradiated by sun- and ultra-violet light. A. H. ROFFO and A. E. ROFFO, jun. (Compt. rend., 1935, 201, 1434—1435).—Emission bands at 353.3 and 357.2 mμ occur.

F. O. H.

Carotene. X. Comparison of absorption spectra measurements on α- and β-carotene and lycopene.—See this vol., 460.

Infra-red absorption band of heavy-water vapour. W. V. NORRIS, H. J. UNGER, and R. E. HOLMQUIST (Physical Rev., 1936, [ii], 49, 272).—Data for a band at 1.5291 μ are discussed.

N. M. B.

Vibration-rotation bands of hydrogen fluoride. E. O. SALANT and D. E. KIRKPATRICK (Physical Rev., 1934, [ii], 46, 318).—15 and 11 lines, respectively, of the (3←0) and (4←0) vibration-rotation bands of HF gas have been photographed at 8790 and 6744 Å.

L. S. T.

Infra-red absorption spectra of quartz and fused silica from 1 to 7.5 μ. I. Experimental method. II. Results. D. G. DRUMMOND (Proc. Roy. Soc., 1936, A, 153, 318—327, 328—339).—I. The apparatus is described. Sources of error and the accuracy attainable are discussed. The wave-no. error should be < 5 cm.⁻¹ throughout the range investigated.

II. Results of absorption measurements on a wide range of thicknesses of fused SiO₂ and quartz (ordinary and extraordinary rays) between 1 and 7.5 μ are given. The methods of calculating absorption coeffs. are indicated.

L. L. B.

Infra-red absorption spectra of HCl in benzene. E. K. PLYLER and D. WILLIAMS (Physical Rev., 1936, [ii], 49, 215—217).—Absorption curves are given for the range 2.5—4.2 μ. The C₆H₆ band at 3.38 μ increased in intensity and shifted to longer λ in the solution; bands in the region 2—3 μ were unchanged. When the ratio of the absorption of the solution to the absorption of the C₆H₆ is found, there appears a band with centre at about 3.49 μ. The relation of absorption to dipole moment is discussed.

N. M. B.

Near infra-red absorption spectra of acid and basic solutions. E. S. BARR and E. K. PLYLER (J. Chem. Physics, 1936, 4, 92—93; cf. A., 1934, 829, 1154).—Infra-red absorption spectra of H₂O and aq. HCl, HBr, NaOH, KOH, ZnBr₂, ZnCl₂, and Na₂CO₃

have been measured from 1.5 to 2.5 μ. The hydroxides have bands at 2.30 and 2.45 μ, the acids at 2.30 and 2.55 μ, and the salts at 2.30, 2.45, and 2.55 μ. The band at 2.30 μ is produced by hydration and at 2.45 μ by OH⁻.

M. S. B.

Residual rays of magnesium oxide. M. PARODI (Compt. rend., 1936, 202, 302—304).—Born's method of calculation for cubic crystals of the NaCl type is applied to MgO. The calc. λλ were 15.85 and 14.47 μ, corresponding with observed vals. of 15.3 and 14.8 μ, respectively.

H. J. E.

Infra-red absorption spectra of liquefied gases. Methane. C. CORIN and J. HERRY (Compt. rend., 1936, 202, 41—44).—Data are recorded for the absorption bands of liquid CH₄ and of its solutions in liquid N₂ (< 1 to 50%). Eleven bands were observed at λλ 0.8—2.7 μ, in positions agreeing with vals. for the gas. The data are compared with those for C₆H₁₄.

H. J. E.

Effects of isomerism on infra-red absorption spectra. W. GORDY and D. WILLIAMS (J. Chem. Physics, 1936, 4, 85—87; cf. this vol., 9).—The spectra of MeCN, EtCN, BuCN, PhCN, MeCNS, EtCNS, and their isomerides, and also of PhCNS, have been determined between 1.0 and 6.5 μ. The characteristic CN band near 4.6 μ is shifted to longer λλ by about 0.2 μ for NC, and its intensity is approx. doubled. This shift agrees with chemical data indicating C⁺ and hence weaker binding forces in the NC compounds. The corresponding shift for the SCN isomerides is smaller, but the intensity difference is greater. No other bands in these compounds are appreciably modified by isomerism. This is a further indication of a simple type of binding between C and N atoms modified only slightly by associated groups in the mol. In the absorption spectra of aq. HCN there is an intense band at 4.75 μ and one less intense at 4.95 μ probably attributable to a small amount (2—4%) of HNC.

M. S. B.

Constitution of oximes and their near infra-red absorption spectra. (MME.) M. FREYMANN and R. FREYMANN (Compt. rend., 1936, 202, 312—314).—The two forms of oximes, CRAr·N·OH (I) and CRAr· $\begin{smallmatrix} \text{NH} \\ \diagup \text{O} \end{smallmatrix}$ (II), proposed by Ramart-Lucas (A., 1933, 159, 1278) are distinguishable by the infra-red absorption bands at 0.96 and 1.04 μ, associated, respectively, with (OH) and (NH). In the oximes from COEt₂, COMePr, and COMeBu^s the (OH) infra-red frequency is observed, and form (I) predominates. In the oximes of dimethylbutylacetophenone and dimethyltetralone both the (OH) and (NH) frequencies occur. The intensity of the (OH) band increases with rising temp., showing that at low temp. these oximes are associated.

H. J. E.

Infra-red absorption spectra of anthracene hydrocarbons. M. P. LAMBERT and M. J. LE COMTE (Ann. Office nat. Combust. liq., 1934, 9, 979—993; Chem. Zentr., 1935, i, 3532—3533; cf. A., 1933, 113).—The infra-red absorption spectra of anthracene, diethyl-, di-*n*-butyl-, diisobutyl-, diisomyl-, tetrahydro-, hexahydro-, decahydro-, and

perhydro-anthracene are described and discussed; they are quite different from those of the C_6H_6 , $C_{10}H_8$, and phenanthrene series. Infra-red spectra of 3 oil samples are discussed. H. N. R.

Infra-red absorption spectra of nuclear halogenated hydrocarbons. J. LECOMTE (Compt. rend., 1935, 201, 1340—1342; cf. A., 1934, 238).—The bands corresponding with the C-halogen linkings in nuclear monosubstituted benzenes and *m*- and *p*-toluenes have been identified. Their relationships with the Raman spectra are discussed. T. G. P.

Raman spectrum of crystalline ammonium chloride. F. T. HOLMES (J. Chem. Physics, 1936, 4, 88—90).—A method of growing cylindrical crystals of NH_4Cl stable at room temp. is described. The vibrational frequencies of this form are 3146, 3041, 2824, 2010, 1768, 1709, and 1407 cm^{-1} , and subsidiary frequencies 3300 and 3232 cm^{-1} . The high-temp. modification has frequencies 3102, 2801, 1931, 1655, and 1400 cm^{-1} . The results indicate that the NH_4 in cryst. NH_4Cl has not the geometrical structure of a tetrahedron of cubic symmetry unless it is strongly perturbed in a non-geometric sense. M. S. B.

Acetylene linking frequency in heavy acetylene (C_2D_2). G. GLOCKLER and H. M. DAVIS (Physical Rev., 1934, [ii], 46, 535).—Raman scattering in C_2D_2 at 2 atm. by 4358 Hg line gave one frequency at 1761 cm^{-1} , which is ascribed to the triple linking vibration. L. S. T.

Raman effect of neutral alkyl sulphates. L. MÉDARD and R. MARCHAND (Compt. rend., 1936, 202, 320—321).—Data for Me_2SO_4 and Et_2SO_4 are recorded. The characteristic frequencies 391—433, 564, 1142, and 1370 cm^{-1} of H_2SO_4 are observed with small modifications in the spectra of Me_2SO_4 and Et_2SO_4 . The frequency 391—433 cm^{-1} is associated with the $:S(O)_2$ group. The alkyl sulphates have no frequency corresponding with the 917 cm^{-1} frequency of H_2SO_4 . The former have a strong frequency at approx. 775 cm^{-1} which does not occur in H_2SO_4 . H. J. E.

Wing accompanying the Rayleigh line in liquid mixtures. I. S. C. SIKKAR (Indian J. Physics, 1936, 10, 75—82; cf. this vol., 9).—The distribution of intensity in the wing accompanying the Rayleigh line in the Raman spectra of solutions of 40% C_6H_6 in cyclohexane and 20% C_6H_6 in MeOH has been compared with that due to pure C_6H_6 . The results are discussed on the basis of existing theories. Differences in the distribution of intensity between liquid and gaseous C_6H_6 can be explained by assuming that the wing originates partly in the rotational Raman effect and partly in the widening of the Rayleigh line, due to the fluctuation of the internal field caused by non-periodic and abrupt impacts of neighbouring mols. on the scattering centres. M. S. B.

Comparison of the Raman spectra of Δ^8 -octen- α -ols and some of their *cis*- and *trans*-derivatives. (MLLE.) B. GREDY (Compt. rend., 1936, 202, 322—323).—Data are recorded for amylvinylcarbinol, *trans*- α -bromo- Δ^8 -octene, and for the *cis*-

and *trans*-forms of Δ^8 -octen- α -ol, Me Δ^8 -octenyl ether, and octyl acetate. H. J. E.

Raman spectra and constitution of ozonides. E. BRINER and E. PERROTTET (Arch. Sci. phys. nat., 1935, [v], 17, Suppl., 283—287; cf. A., 1935, 1446).—Raman frequencies of methyleugenol, methylisoeugenol (I), alone and in CCl_4 , methylvanillin, and (I) ozonide in CCl_4 are tabulated. The lines associated with the $\cdot CH:CHMe$ group disappear on ozonisation and become replaced by lines characteristic of ozonides. R. S.

Raman spectra in the eugenol and estragol group. B. SZUSZ and E. PERROTTET (Arch. Sci. phys. nat., 1935, [v], 17, Suppl., 227—230; cf. A., 1935, 807).—The frequencies and intensities of the Raman lines of eugenol, isoeugenol, vanillin, estragol, and natural and synthetic anethole are given. R. S.

Raman spectra of terpenes and camphors. S. K. K. JATKAR and R. PADMANABHAN (Indian J. Physics, 1936, 10, 55—63).—Dipentene (I) gives a Raman spectrum showing all the characteristics of limonene (II) with that of another compound having a strong frequency at 1610 cm^{-1} , probably due to α -terpinene. It is suggested that both (I) and (II) contain mixtures of different amounts of the products of intramol. isomerisation. The shifts 1412—1450 cm^{-1} , in the spectrum of camphor and not of fenchone, are due to the reactive $\cdot CH_2 \cdot CO \cdot$ group present in the former only. M. S. B.

Raman spectrum of rubber and related hydrocarbons. S. D. GEHMAN and H. J. OSTERHOF (J. Amer. Chem. Soc., 1936, 58, 215—218; cf. A., 1935, 1054).—The most intense frequency in the spectra for rubber (I) (using a conc. solution in CS_2-CCl_4) and balata (II) is at 1670 cm^{-1} and is considered to be due to the double linking. Comparison of the frequencies for (I) and (II) with those for $CHMe:CMMe_2$ (III), myrcene (IV), isoprene (V), and limonene shows that the primary linkings in (I) are similar to those in (III), thus supporting the view that (I) consists of a long chain of isopentene units. The differences in the spectra of (I) and (II) are consistent with *cis-trans* isomerism. The spectrum of (IV) is largely a superposition of those of (III) and (V). H. B.

Raman spectra of quinoline, quinaldine, isoquinoline, and α - and β -picolines. S. K. K. JATKAR (Indian J. Physics, 1936, 10, 23—30).—A comparative study of the Raman spectra of the above compounds has been made. The structures are in harmony with the chemical evidence which indicates a variable stability of the C_6H_6 and C_5H_5N rings according to whether they form fused-ring compounds containing both rings or one kind of ring only. M. S. B.

Kinetics theory of liquids and diffusion of light. J. YVON (Compt. rend., 1936, 202, 212—214).—Theoretical. T. G. P.

Spectral region of the emission of chemical reactions. R. AUDUBERT (Compt. rend., 1936, 202, 131—133; cf. A., 1933, 764).—With the aid of photon counters the ultra-violet emissions of the following reactions have been studied: (1) NaOH

+HNO₃, (2) NaOH+H₂SO₄, (3) pyrogallol+O₂, (4) glucose+KMnO₄, (5) Na₂S₂O₄+O₂, (6) O₂+K₂SO₃, (7) O₂+Na₂SO₃, (8) Mg-Hg+H₂O, (9) Na-Hg+H₂O, (10) Al-Hg+H₂O, (11) EtOH+H₂CrO₄, (12) 2Br+K₂C₂O₄, (13) 2Br+Na₂C₂O₄, (14) 2I+Na₂C₂O₄. Reactions (1)–(3), (5), (8)–(10) are shown by counters with cathodes of Al or CuI, (11)–(14) only by the former, and (4), (6), and (7) only by the latter.

T. G. P.

Heterogeneity in crystals and phosphorescence. M. CURIE (Compt. rend., 1935, 201, 1352–1353; cf. A., 1932, 560).—The rôle of impurities is discussed.

T. G. P.

Fluorescent power and experimental study of fluorescent power as a function of concentration. J. BOUCHARD (J. Chim. phys., 1936, 33, 51–71).—At const. p_H the fluorescent power of uranine solutions follows Perrin's law $\Phi = \Phi_0 e^{-kc}$ (c = concn.). The const. k , measured by the light re-emitted in the direction of the exciting ray and laterally, decreases with increasing $[H^+]$ and for p_H 6–12, $\log_{10} k \propto p_H$. The results are related to the degree of ionisation of the fluorescent substance.

J. W. S.

Becquerel effect and photochemical sensitivity of some fluorescent dyes. (Mlle.) C. STORA (Compt. rend., 1936, 202, 48–50).—Vals. are recorded for the photo-potentials of uranine, eosin, and erythrosin. They are lowered by hydrosulphides, phenols, amines, or by TiCl₃. The relation between the photo-potential, the fluorescence, and the effect of oxidising and reducing agents is discussed.

H. J. E.

Photometric investigation and measurements of spectral intensity distribution of fluorescent screens, especially on irradiation with electron rays. M. VON ARDENNE (Z. tech. Phys., 1935, 16, 61–67; Chem. Zentr., 1935, i, 3884).—The intensity and spectral distribution of light from a variety of fluorescent materials when excited by 4000 volt-electrons, X-rays, and ultra-violet light are recorded.

J. S. A.

Connexion between illumination and strength of current in the barrier-layer photo-cell. E. ELVEGÅRD (Physikal. Z., 1936, 37, 129–133).—An equation is given which expresses the variation of current obtainable from such cells with intensity of illumination, when connected with different external resistances. The equation can be used for the determination of light intensities.

A. J. M.

Rectifying effect in chrome cast iron. L. G. HALL (Physical Rev., 1934, [ii], 46, 1109).—Such an effect is described.

L. S. T.

Molecular theory of the dielectric constant of non-polar liquids. J. YVON (Compt. rend., 1936, 202, 35–37).—Mathematical.

H. J. E.

Influence of a magnetic field on the dielectric constants of gaseous and liquid nitrogen and oxygen. A. C. YOUNG (Canad. J. Res., 1935, 13, A, 111–119).—A balanced resonance method was used with gases and a special bridge with liquids. The only positive result was with gaseous O₂ at 100 atm. and room temp., when there was a change of 1.1×10^{-6} in the dielectric const. This can be accounted for

quantitatively by the increased pressure of the O₂ in the magnetic field.

E. E. A.

Polarity of nitrogen tetroxide and nitrogen dioxide molecules. J. W. WILLIAMS, C. H. SCHWINGEL, and C. H. WINNING (J. Amer. Chem. Soc., 1936, 58, 197–203).—The electric moments of NO₂ and N₂O₄ mols. have been calc. from measurements of dielectric const. of their gaseous equilibrium mixtures at 298–398° abs. and 150–760 mm. The polarity of NO₂ decreases with rising temp., probably due to the passage of the mols. into more symmetrical higher vibrational states. The dipole moment of N₂O₄ does not differ greatly from zero.

E. S. H.

Permanent electric moment and structure of phosphorus pentachloride. P. TRUNEL (Compt. rend., 1936, 202, 37–39).—Simons and Jessop's results are contradicted (A., 1931, 669). PCl₅ has a permanent dipole moment ($\mu=0.8$ at 25°) in CCl₄ or CS₂ solution. The mol. is unsymmetrical. The 5 Cl may not be all identical. Alternatively they are not co-planar.

H. J. E.

Electrical moment of tantalum pentachloride and the structure of the compounds AX₅. H. MOUREU (Compt. rend., 1936, 202, 314–316).—TaCl₅ has a permanent moment of 1.2. The formulation of compounds of the type AX₅ is discussed. The formula cannot be symmetrical.

H. J. E.

Dielectric constants of mercuric halides. H. BRAUNE and R. LINKE (Z. physikal. Chem., 1935, B, 31, 12–17).—Measurements of the dielectric const. of HgI₂, HgBr₂, and HgCl₂ vapours at various temp. have shown zero dipole moments. The Hg-halogen linking moments are only $\frac{1}{4}$ – $\frac{1}{3}$ of the val. corresponding with an ideal heteropolar linking.

R. C.

Magnetic changes [$\Delta\epsilon$] of the dielectric constant of liquids in a field of 20.4 k.-gauss. A. PIEKARA (Compt. rend., 1936, 202, 206–207; cf. A., 1935, 1192).— $\Delta\epsilon$ has been measured for hexane, CS₂, C₆H₆, and PhNO₂, but no appreciable change was detected.

T. G. P.

Polar properties of hydrogenation products of naphthalene. M. PUCHALIK (Acta phys. polon., 1933, 2, 305–310; Chem. Zentr., 1935, i, 3914).—The following moments are recorded (in C₆H₆ solution): *cis*- and *trans*-deca-, 0; tetra-hydronaphthalene, 1.66×10^{-18} e.s.u. The finite moment of the last is due to its unsymmetrical structure.

H. N. R.

Dielectric polarisation of concentrated solutions. A. JAGIELSKI and J. WESOŁOWSKI (Bull. Acad. Polonaise, 1935, A, 260–269).—Dipole moments of *o*-NO₂·C₆H₄·NH₂, *o*-C₆H₄Me·NO₂, *o*- and *p*-C₆H₄Cl·NO₂, and Et₂O, determined in C₆H₆ solution, are 4.01, 4.22, 4.82, 3.12, and 0.74 ($\times 10^{-18}$) e.s.u., respectively. The vals. differ from those recorded by other workers.

T. G. P.

Dielectric polarisation. XIV. Dipole moments of ethyl-, phenyl-, and α - and β -naphthyl-carbimides. XV. Dipole moments of five-membered nitrogen ring compounds: indole, skatole, carbazole, isatin, phthalimide, and succinimide. E. G. COWLEY and J. R. PART-

INGTON. XVI. Dipole moments of some acid halides and of phosphorus oxychloride. G. T. O. MARTIN and J. R. PARTINGTON (J.C.S., 1936, 45—47, 47—50, 158—163).—XIV (cf. A., 1935, 916). The dipole moments (μ) in *D*, at 20°, in C_6H_6 solution, of ethyl-, phenyl-, α - and β -naphthylcarbimide are 2.81, 2.28, 2.30, and 2.34, respectively. These vals. agree with those for the corresponding thio-carbimides (A., 1933, 1230), allowing for μ for :C:S being $>$ for :C:O, and indicate similar linear structure for the :N:C:O, in agreement with the Raman spectra (Goubeau, A., 1935, 851). The possibility of resonance between three possible structures is discussed.

XV. Indole and skatole in C_6H_6 at 20° give μ 2.05 and 2.08, respectively; carbazole, isatin, phthalimide (I), and succinimide (II), in dioxan, give μ 2.09, 5.72, 2.10, and 1.54, respectively. μ for indole is $>$ for pyrrole (A., 1933, 1230), the change in μ being paralleled by the vals. for quinoline and C_5H_5N . In the case of isatin, μ agrees with the diketonic formula. Since μ for (II) is $<$ for (I), the five-membered ring with N and two :CO must have a large polarising influence on the C_6H_4 ring.

XVI. μ for $AcCl$ (in C_6H_6 at 20°) is 2.45, and for the series $EtCOCl$, Pr^iCOCl , Bu^iCOCl , and Bu^sCOCl is const. at 2.61—2.63. The large val. of μ for $AcCl$ (calc. 2.25) may be due to induction in the C-C linking. Vals. for $AcBr$ (2.43) and AcI support this view. $CH_3Cl \cdot COCl$ (in C_6H_6 and CS_2) and $CCl_3 \cdot COCl$ (in C_6H_6) give μ 2.22, 2.06, and 1.19, respectively. Free rotation about the C-C linking does not occur, and the $\cdot COCl$ moment acts at 16° to the C-C axis. For $POCl_3$, μ is 2.40, giving 3.56 for the $P \rightarrow O$ moment.

L. J. J.

Dielectric loss characteristics of a chlorinated diphenyl. W. JACKSON (Proc. Roy. Soc., 1935, A., 153, 158—166).—A study has been made of the dielectric behaviour of a chlorinated diphenyl from -20° to 80° over the frequency range 50—10⁷ cycles per sec. The Debye power factor max. has been followed through this range from 40° to -5°.

L. L. B.

Application of Debye's theory of polar molecules to solid dielectrics. B. J. O'KANE (Phil. Mag., 1936, [vii], 21, 369—383).—Curves are given for the variation of power factor and permittivity with temp. at const. frequency and with frequency at const. temp. for palmitic, oleic, and stearic acids and mixtures of these. If the expression for the viscosity ratio of liquids at different temp. is applied in the Debye expression for the power factor of a dielectric, in terms of the internal viscosity of the medium in which the dipole is assumed to move, the calc. and experimental power factor-temp. curves agree closely. Results indicate that the Debye theory of liquid dielectrics can be applied to solid dielectrics on the assumption that they possess some property analogous to the macroscopic viscosity of liquids and obeying the same temp. variation rules.

N. M. B.

Refractive index and molecular refraction of hydrogen selenide and deuterium selenide. O. E. FRIVOLD, O. HASSEL, and T. SKJULSTAD (Physikal. Z., 1936, 37, 134—136; cf. A., 1935,

148).—Vals. of $(n_0 - 1) \times 10^6$ for H_2Se and D_2Se , respectively, at pressures about 20 mm. are for λ 6562.8 Å., 798.3 and 795.1; for 5893.0 Å., 803.9 and 801.2; for 5460.7 Å., 809.8 and 807.6.

A. J. M.

Measurements of dispersion in the ultra-violet. M. BAYEN (Compt. rend., 1936, 202, 207—209).—A previous arrangement has been improved (Duclaux, J. Physique, 1921, 2, 346). Between 2250 and 5900 Å., for heptane at 23° $n^2 = 1.89729 + 0.8886 \times 10^6/\lambda^2 - 1,195,060$; for heptene at 23° $n^2 = 1.92364 + 1.0301 \times 10^6/\lambda^2 - 1,877,300$; for heptinene at 22.5° $n^2 = 1.95065 + 1.0556 \times 10^6/\lambda^2 - 1,583,500$.

T. G. P.

Refractive dispersion of organic compounds. VII. Refractive indices of hexane and the refractivities of hydrogen and carbon. Significance of the dispersion constants. VIII. Isomerides of the formula $C_4H_8O_2$: dioxan, ethyl acetate, isobutyric acid, and acetoin. C. B. ALLSOPP and H. F. WILLIS (Proc. Roy. Soc., 1936, A, 153, 379—391, 392—406).—VII. The law of additivity of at. refractivities is discussed in the light of the first of the two fundamental observations on which it is based, viz., the constancy of the increment of mol. refraction in homologous series. The refractivity of a mol. may be expected to be the sum of the refractivities of its constituent atoms (or electrons) only when its refractive dispersion can be represented by an equation containing only one variable term with a characteristic frequency in the Schumann region of the spectrum. Vals. of n for hexane are recorded at 57 μ between 6708 and 2450 Å. and the at. refractivities of H and C over the same range are deduced with the help of data previously given for cyclohexane. Characteristic frequencies deduced by means of the Ketteler-Helmholtz equation are subject to errors of the order of 100 Å., and trustworthy vals. can be derived only from the Lorentz-Lorenz equation; the error from experimental inaccuracy is < 10 Å.

VIII. Mol. extinction coeffs., refractive indices, and mol. refractivities over a wide range of visible and ultra-violet λ are recorded for dioxan, $EtOAc$, Pr^iCO_2H , and $CH_3AcMe \cdot OH$ (I), and at. refractivities are deduced for ethereal, carbonyl, and hydroxyl O. If allowance be made for the variations in the refractivity of O, according to the manner in which it is linked in the mol., the law for additivity of at. refractivities is valid at all λ for these compounds of which the refractive dispersions can be represented by equations containing only one variable term with a characteristic frequency in the Schumann region of the spectrum. The f -val. of the ketonic absorption band of (I) is almost identical with that of the corresponding band of cyclohexanone. The partial refractions of the absorption bands of org. mols. are not necessarily \propto the f -vals.

L. L. B.

Dispersion. K. F. HERZFELD and (Miss) M. G. MAYER (Physical Rev., 1936, [ii], 49, 332—339).—Mathematical. In interpreting measurements in the infra-red and the absorption of hot gases account must be taken of the fact that the measured absorption is the difference between absorption and forced

emission. For a gas, the paramagnetic part of the susceptibility depends on the frequency in the same way as the electric part, but is determined by the magnetic absorption lines; the diamagnetic part is almost independent of the frequency up to X-ray frequencies. N. M. B.

Werner complexes. Optical activity and configuration of ions of the type MA_3 . J. P. MATHIEU (J. Chim. phys., 1936, 33, 78—96).—The optical absorption and rotation of $[Co en_3]Br_3 \cdot 2H_2O$, $[Rh en_3]I_3 \cdot H_2O$, $[Ir en_3]Br_3 \cdot 2H_2O$, and $[Cr en_3]I_3 \cdot H_2O$ are compared with those of $K_3[Cr(C_2O_4)_3] \cdot H_2O$, $K_3[Rh(C_2O_4)_3] \cdot 2H_2O$, $K_3[Ir(C_2O_4)_3] \cdot 2H_2O$, and $K_3[Co(C_2O_4)_3]$. The oxalates have the higher optical activities, but compounds containing the same metal show close analogies. A parallelism exists between the factor of dissymmetry in the active bands and the chemical stability of the compounds. J. W. S.

Optical activity dependent on co-ordinated bivalent ruthenium.—See this vol., 485.

Theory of optical activity. III. Regular tetrahedron twisted through a small angle about a binary axis. B. Y. OKE (Proc. Roy. Soc., 1936, A, 153, 339—352; cf. A., 1935, 917).—A system of 4 identical vibrators, mutually interacting, at the corners of a tetrahedron gives 5 characteristic frequencies. If one pair of vibrators is rotated through a small angle about the line of centres, the distorted system becomes optically active. The rotatory power is calc. by a method of approximation; it is \propto the third power of the small angle of twist. L. L. B.

Absolute configuration of lactic acid. Assumptions made in calculation of optical rotation.—See this vol., 454.

Magnetic rotatory power and dispersion of alkali mercuritetra-iodides. R. LUCAS and F. GALLAIS (Compt. rend., 1936, 202, 129—131).—The exceptional rotatory properties of K_2HgI_4 , which have been measured, are due to a broad absorption band. T. G. P.

Electrical birefringence of compressed nitrogen. H. BIZETTE (Compt. rend., 1936, 202, 304—305).—Measurements were made at 150 kg. per sq. cm. and with a field of 160,000 volts per cm. The val. of the Kerr const. found was approx. half that given by Bruce and Breazeale (cf. A., 1933, 1232; 1935, 1192). H. J. E.

Electro-optic effect in zinc blende. C. SCHRAMM (Ann. Physik, 1936, [v], 25, 309—336).—The double refraction and inhomogeneity of the crystals are due to cutting or polishing. Kerr consts. for Tl, Na, and K light are given and compared with the piezo-electric consts. ZnS has "light" voltage of 1240 or about one third the val. of $PhNO_2$. W. R. A.

Constitution of thioether compounds of platinum. II. K. A. JENSEN (Z. anorg. Chem., 1936, 226, 168—172).—An explanation of the results of Lifschitz *et al.* (A., 1935, 1335), different from that of the authors, is given. M. S. B.

Planar configuration of quadricovalent compounds of bivalent copper and nickel. E. G.

COX, E. SHARRATT, W. WARDLAW, and K. C. WEBSTER (J.C.S., 1936, 129—133).— $Cu(C_5H_5N)_2Cl_2$ (I) has been prepared under various experimental conditions with the object of identifying *cis*- and *trans*-isomerides. Only the *trans*-form was obtained, even by the action of C_5H_5N on *Cu alkylglyoxime dichlorides*, which must form *cis*-(I) initially. The cell dimensions of *cryst.* (I), determined by X-ray methods (*c*-axis 3.84 Å.), show that it can only have *trans*-planar configuration, in agreement with previous work (A., 1935, 920). *Cu* and *Ni bismethylethylglyoximes* are isomorphous, and occur in one form only. L. J. J.

Significance of non-localised linkings ("p]-electron cloud") of aromatic hydrocarbons in formation of their molecular compounds with dipolar molecules. G. BRIEGLEB (Z. physikal. Chem., 1935, B, 31, 58—78).—The secondary valency in the above mol. compounds depends chiefly on a dipole induction of the polar groups of the dipolar mol. on the polarisable charge of the unsaturated hydrocarbon. In mol. compounds of polar mols. with C_6H_6 or condensed ring systems the polar groups of the dipoles induce moments in the localised σ -linkings of the hydrocarbon (σ -polarisation) and also perturb the charge distribution of the non-localised [p]-electrons ([p]-electron polarisation) (cf. A., 1932, 901). The induction effect changes the absorption spectrum of the hydrocarbon considerably, which is responsible for the characteristic colour of the mol. compound. Both polarisations can be estimated from spectroscopic data. Calc. heats of formation of compounds of unsaturated ring systems with NO_2 -compounds agree satisfactorily with the observed vals. If a dipolar mol. forms a 1:1 compound with an unsaturated aromatic hydrocarbon with two Ph nuclei linked by saturated or unsaturated hydrocarbon chains, it adds itself to a Ph nucleus and an induction perturbation initially localised at that nucleus may be transmitted by the non-localised [p]-electrons to the other nucleus. Such spreading of the perturbation is stopped, however, by a CH_2 group. R. C.

Concepts of "resonance" and "intermediate stages" for organic substances with multiple linkings, and electronic formulæ. F. ARNDT and B. EISTERT (Z. physikal. Chem., 1935, B, 31, 125—131).—The modern concept of "resonance between two mol. states" is equiv. to the authors' "intermediate stage" theory (A., 1925, i, 57; A., 1935, 324). Modifications in the representation of electronic formulæ are suggested. R. C.

Formation of mercury molecules. F. L. ARNOT and J. C. MILLIGAN (Proc. Roy. Soc., 1936, A, 153, 359—378).—Mainly a detailed account of work already noted (A., 1935, 1917). The ionisation potential of the mol. is 9.65 volts. A max. is observed in the mol. ionisation at 11.5 volts, due to triplet excitation, and a second max. at 40 volts, due mainly to singlet excitation of the atom which goes to form the mol. ion. L. L. B.

Motions exhibited by anisotropic liquids under the influence of an electric field. V. FREDERICKS and V. TZVETKOV (Compt. rend. Acad. Sci., U.R.S.S., 1935, 4, 131—133).—The motions

of *p*-azoxyanisole in an electric field depend on the field strength and the thickness of the layer of liquid. The mol. axes of the turbulently streaming particles lie parallel to the force lines of the applied field.

W. R. A.

"Gas mists." V. NJEGOVAN (Z. Physik, 1935, 98, 415—416).—Correction of earlier work (this vol., 14).

A. B. D. C.

Association of liquids at the b.p. K. BILLIG (Ber., 1936, 69, [B], 434—436; cf. A., 1935, 815).—Mathematical relationships are developed between the association factor and surface tension at the b.p., sp. cohesion, and elevation of the b.p. by dissolved substances.

H. W.

Pressure effect on predissociation. W. LOCHTE-HOLTGREVEN (Nature, 1936, 137, 187—188).—The dependence of predissociation on pressure is discussed for S.

L. S. T.

Kinetics of dense fluids in two or three dimensions. E. FAHIR (Rev. Fac. Sci. Univ. Istanbul, 1936, 1, 8—13).—Mathematical. The electrostatic potential and field on a mol. partly immersed in an ideal fluid are examined.

N. M. B.

Dissociation of SnCl and SnCl_2 . H. LESSHEIM and R. SAMUEL (Indian J. Physics, 1936, 10, 7—12).—The covalent character of the SnCl and SnCl_2 linkings is reaffirmed (cf. A., 1933, 996; 1934, 477; cf. Trivedi, A., 1935, 913).

M. S. B.

Calculation of linking energies. W. LASAREFF (Physica, 1936, 3, 61—64).—From the dissociation energy of CO, vals. of 108 or 124 kg.-cal. are calc. for the transition $\text{C}_{\text{diamond}} \rightarrow \text{C} (^3P)_{\text{gas}}$ at 0° abs., giving 51 or 59 kg.-cal., respectively, for the C-C linking in aliphatic hydrocarbons. A correction term to account for the discrepancy with the observed val. (> 70 kg.-cal.) is suggested. Gershinowitz' criticism (A., 1935, 1448) is rejected.

L. J. J.

(A) Calculation of energy of H_3 molecule. (B) Calculation of energy of H_3^+ ion. J. HIRSCHFELDER, H. EYRING, and N. ROSEN (J. Chem. Physics, 1936, 4, 121—130, 130—133).—Mathematical.

M. S. B.

Zero point energy in determination of structure of solids. A. R. UBBELOHDE (Trans. Faraday Soc., 1936, 32, 525—529).—Substitution of one isotope for another in a solid compound will lead to differences in vibrational and rotational frequencies which, in certain cases, should be large enough to afford information on the structure of the solid.

F. L. U.

Constants of the methane molecule. T. NEUGEBAUER (Z. Physik, 1936, 98, 638—656).—Assuming the nucleus C^4 and externally the Ne proper function, the polarisation energy in the inhomogeneous field of the four protons, the C-H separations, and vibration frequencies are calc.

A. B. D. C.

Normal vibration frequencies of the molecule XYZ_3 . (Miss) J. E. ROSENTHAL and H. H. VOGEL (J. Chem. Physics, 1936, 4, 134—136).—A general expression is derived for the potential energy of the tetrahedral mol. XYZ_3 and the normal vibration frequencies are given as functions of the consts.

The mode of application of these general formulæ to special types of potential energy functions is indicated.

M. S. B.

Potential functions of molecular groups and the vibrations of the halogen derivatives of methane. H. H. VOGEL and (Miss) J. E. ROSENTHAL (J. Chem. Physics, 1936, 4, 137—143).—Assuming that, in a series of mols. YZ_4 , XYZ_3 , ZYX_3 , and YX_4 , the potential energy of the YZ_3 is the same whether it is attached to an X or to another Z and the force between Y and X is not changed by the nature of the other atoms in the mol., formulæ connecting the potential energy consts. of these mols. are given. Application to the series CH_4 , MeCl , CHCl_3 , and CCl_4 gives satisfactory results. Frequencies calc. for CHCl_3 and CDCl_3 from those of CH_4 , MeCl , and CCl_4 are in good agreement with observed data. Vals. for the frequencies of CD_3Cl are predicted. The CH_4 consts. are discussed and it is shown that, although individual consts. may vary with the method of determination, certain linear combinations of them, to which a definite physical meaning can be attached, are practically invariant. The C_2H_6 consts. calc. from the CH_4 consts. are entirely different from those given by Sutherland *et al.* (A., 1935, 569), but account equally well for the observed frequencies.

M. S. B.

Dipole attraction and hydrogen bond formation in their relation to solubility. J. H. HILDEBRAND (Science, 1936, 83, 21—24).—An address.

L. S. T.

Rotation of dipoles in elastic and viscous media. N. L. YATES-FISH (Phil. Mag., 1936, [vii], 21, 226—233).—The couple acting on a rigid sphere when this is rotated through a small angle in a medium possessing relaxing elasticity has been calc. The result is applicable to the rotation of a dipole in a solid (cf. this vol., 21).

R. S. B.

Applications of astrophysics to physics and chemistry. W. NERNST (Oesterr. Chem.-Ztg., 1936, 39, 34—36).—A lecture.

Evaporation of small drops and the relationship between surface tension and curvature. J. L. SHERESHEFSKY and (Miss) S. STECKLER (J. Chem. Physics, 1936, 4, 108—115).—Rates of evaporation of $o\text{-C}_6\text{H}_4(\text{CO}_2\text{Bu}^n)_2$ droplets of radius 3—0.5 μ have been determined for different v.p. in a Hoag type of Millikan's oil-drop apparatus. Two interpretations are given. According to one the surface tension of a droplet decreases with increasing curvature. The other assumes a vapour film surrounding the droplet and leads to Kelvin's equation.

M. S. B.

Parachor, surface tension, and density of substituted phenols and phenolic ethers. A. BURAWOY and I. MARKOWITSCH-BURAWOY (J.C.S., 1936, 36—39).—Data are recorded for the hydroxy- and methoxy-azobenzenes and -benzaldehydes, and compared with vals. for the nitro-phenols and -anisoles. For the *o*-OH-compounds, but not the *o*-ethers, the parachor is $<$ both calc. val. and vals. for the *m*- and *p*-compounds. Surface tensions and d for each set of isomeric ethers agree among themselves, but the vals. for *o*-OH-compounds are $<$ for *m*-

and *p*-isomerides. *m*- and *p*-Nitrophenol and *p*-OH·C₆H₄·CHO are associated (as calc. from Ramsay-Shields const.), but the *o*-compounds and the Me ethers are normal. The anomalies of the *o*-compounds are probably due to interaction between the two *o*-substituents, which reduces their polarity, and those of *o*-hydroxyazobenzenes are not necessarily due to quinonoid structure. L. J. J.

Parachor and ring structure. II. Spatial configuration of bridged-ring compounds. S. K. RAY (J. Indian Chem. Soc., 1935, 12, 764—767; cf. A., 1934, 1058).—Data are given for cyclohexane, cyclohexanone, 3-methylcyclohexanone, cyclohexanol, cyclohexyl acetate, menthol, menthyl acetate, dipentene, camphoroxime, bromocamphor, camphene, bornyl acetate, fenchone, camphor benzoate, and α -pinene. The structures are discussed. E. S. H.

Parachor and chemical constitution. IV. Structure of aliphatic diazo-compounds. S. K. RAY (J. Indian Chem. Soc., 1935, 12, 780—782; cf. A., 1935, 1306).—Data are given for the Me, Et, Prⁿ, and *n*-amyl diazoacetates between about 0° and 100°. The variation of parachor with temp. shows that these compounds are equilibrium mixtures of two forms. Low temp. favours the ring form, high temp. the open-chain structure. E. S. H.

Constitution of formic acid and formates. R. M. HALASYAM (J. Indian Chem. Soc., 1935, 12, 813—814).—Published work is discussed. Parachor determinations support the annexed formula as the most probable for the constitution of HCO₂H. E. S. H.

Interpolation equation for photo-densitometer charts of X-ray diffraction patterns. W. SOLLER (Physical Rev., 1934, [ii], 46, 331). L. S. T.

Influence of the slit on the distribution of intensities in the lines of a powder diagram. A. ROGOZINSKI (Compt. rend., 1935, 201, 1354—1356).—Theoretical. T. G. P.

Equation for X-ray crystal curves. R. C. SPENCER (Physical Rev., 1934, [ii], 46, 1108—1109). L. S. T.

X-Ray diffraction with calcite in several orders of reflexion. L. G. PARRATT and F. MILLER (Physical Rev., 1936, [ii], 49, 280—288; cf. A., 1932, 1184).—Theoretical and experimental vals. of the four properties of reflexion, *i.e.*, width of the (*n*, $-n$) rocking curve, % reflexion, coeff. of reflexion, and a factor determined by the shape of the (*n*, $-n$) curve, are compared for calcite crystals in the $\lambda\lambda$ ranges 0.71 < λ < 5.83 Å. in first order, 0.71 < λ < 2.75 Å. in second order, and at 0.71 and 1.54 Å. in third order, and 0.71 Å. in fourth and fifth orders. N. M. B.

X-Ray examination of atomic vibrations in zinc and cadmium. G. W. BRINDLEY (Nature, 1936, 137, 315—316).—The observed anomalous X-ray scattering of Zn and Cd is due to a greater lattice vibration along the *c* axis of the crystals than normal to it. L. S. T.

Vacant positions in crystal lattice of ferriiferous zinc blende. H. BRAEKKEN (K. Norske Vid. Selsk. Forh., 1935, 7, 119—120; Chem. Zentr., 1935,

i, 3887).—Up to 25 at.-% of Fe, the ZnS lattice shows no expansion. From the observed X-ray intensities the presence of empty spaces in the lattice is inferred. J. S. A.

Properties of graphite derived from the transformation of diamond. P. CORRIEZ (Compt. rend., 1936, 202, 59—61).—Measurements of the X-ray spectrum, electrical resistance, and magnetic susceptibility are recorded for graphite prepared by heating diamond for 10 min. in vac. at 1900°. The X-ray spectrum differs from that of sugar C heated to 2000°. The differences are discussed. The resistance is < that of sugar C, but > that of natural graphite. The susceptibility was approx. the same. H. J. E.

X-Ray interference in diamond as a wave-mechanical problem. P. P. EWALD and H. HÖNL (Ann. Physik, 1936, [v], 25, 281—308).—Mathematical. The appearance of the forbidden diamond reflexions (222) is caused by a "zwischenladung" between the atoms which is inactive for higher interferences because of their considerable spread. W. R. A.

(A) Changes of structure of crystals in an electric field. (B) Compensation apparatus and quantum fluctuation. A. NÉMET (Helv. phys. Acta, 1935, 8, 97—116, 117—151; Chem. Zentr., 1935, i, 3517).—(A) X-Ray intensity measurements in electric fields are recorded for NaCl, calcite, quartz, mica, K Na and Na Rb tartrate, ice, (HCO₂)₂Ba, MgSO₄, and tartar. The polarisability in various crystal directions is discussed.

(B) The experimental method is described. H. J. E.

Electrolysis, dendritic growth, and discharge in alkali halide crystals. A. VON HIPPEL (Z. Physik, 1936, 98, 580—596).—The movement of electrons and Cu ions through alkali halide crystals has been studied at 570°, and mobilities of the ions determined. Dendritic growths appear on reversal of the applied potential, and in NaCl the type of growth may change from the (100) to the (110) direction. A. B. D. C.

Dendritic growth of crystals. A. PAPAPETROU (Z. Krist., 1935, 92, 89—130).—Partly mathematical, partly a descriptive illustrated account under the following heads: part played by diffusion; effect of surface potential; observations on particular substances (especially inorg. halides); processes at the tip of the crystal; development near the tip and formation of branches; crystallisation from the melt. B. W. R.

Growing and testing large single crystals of ice. W. LEWIS (Physical Rev., 1934, [ii], 46, 328). L. S. T.

Crystal structure of ice at low temperatures. E. F. BURTON and W. F. OLIVER (Proc. Roy. Soc., 1935, A, 153, 166—172; cf. A., 1935, 686).—Details are given of the apparatus and method used. If the ice is formed above -80° , the mols. have sufficient energy to arrange themselves into the highly organised state of a cryst. solid; at -90° , the energy of the mols. is just enough to build up crystals along certain planes, whilst just below the crit. temp., -110° , there are sufficient mols. arranged in parallel planes

to give rise to two diffuse diffraction max., the size of the particles probably being of the order of 10^{-7} cm.

L. L. B.

Magnetic powder experiments on rolled nickel iron. J. L. SNOEK (Physica, 1936, 3, 118—124).—Powder patterns (cf. Bitter, A., 1932, 1077) on isotropic and anisotropic samples are described. L. J. J.

Crystal structure of cristobalite, SiO_2 . W. NIEUWENKAMP (Z. Krist., 1935, 92, 82—88).—The cell is pseudo-cubic, a_0 7.02 b_0 6.92 Å., with 8 mols. SiO_2 , d (X-ray) 2.33, space-group $P 4_2 2_1$. Parameters are determined. B. W. R.

Anomalous structures of fine crystalline silica. N. A. SCHISCHAKOV (Compt. rend. Acad. Sci. U.R.S.S., 1936, 1, 19—22).—Structures of SiO_2 have been studied by the electron-diffraction method. Fused vitreous SiO_2 is not amorphous, but consists of deformed crystals of cristobalite, a 6.87 Å., c/a 1.06. Fine-grained sand (α -quartz) also shows a deformation in its crystallites, a 4.735, c 5.210 (quartz a 4.903, c 5.393). Pumice gives a 6.82, c 7.23 Å. R. S. B.

X-Ray investigation of the glassy state. N. VALENKOF and E. PORAI-KOSCHITZ (Nature, 1936, 137, 273—274).—Photographs showing gradual changes in the X-ray pattern on transition from vitreous SiO_2 to a mixture of cristobalite and tridymite are reproduced. Similar transition patterns are obtained when $\text{Na}_2\text{O-SiO}_2$ glasses are subjected to a rising temp. and increased time of heating, leading to the gradual appearance of the cryst. pattern. The lack of a sharp boundary between the glassy and cryst. states and the gradual growth of crystallites are thus demonstrated. L. S. T.

Crystal structure of boron carbide. F. LAVES (Nachr. Ges. Wiss. Göttingen, 1934, [ii], 1, 57—58; Chem. Zentr., 1935, i, 2944).—The lattice is trigonal, a 5.62, c 12.12 Å., giving 2.19 mols. of B_6C per unit cell. It is considered that the compound must be B_4C . J. S. A.

Structure of aluminium boride, AlB_2 . W. HOFMANN and W. JANICHE (Z. physikal. Chem., 1936, B, 31, 214—222).—A detailed account of work already noted (this vol., 143). R. C.

Crystal structure of the high-temperature form of silver iodide, $\alpha\text{-AgI}$. L. W. STROOK (Z. physikal. Chem., 1935, B, 31, 132—136).—In $\alpha\text{-AgI}$ the Ag^+ ions are "molten," i.e., are distributed at random over the gaps between the I^- ions, which form a body-centred cubic lattice. In $\alpha\text{-Ag}_2\text{HgI}_4$ three cations occupy a four-fold point position (A., 1934, 1056). The intensities of the X-ray diagram of $\alpha\text{-AgI}$ have been recalculated. R. C.

Cubic high-temperature modifications of cuprous and silver sulphides, selenides, and tellurides. P. RAHLFS (Z. physikal. Chem., 1936, B, 31, 157—194).— $\alpha\text{-Ag}_2\text{S}$ and $\alpha\text{-Ag}_2\text{Se}$ have a body-centred cubic lattice with 2 mols. in the unit cell, whilst $\alpha\text{-Ag}_2\text{Te}$, $\alpha\text{-Cu}_{1.8}\text{S}$, and $\alpha\text{-CuSe}$ are face-centred cubic, with 4 mols. in the unit cell. The lattice structures of $\alpha\text{-Ag}_2\text{S}$ and $\alpha\text{-Ag}_2\text{Se}$ are similar, the Ag^+ ions being statistically distributed among the gaps between the anions, which form a somewhat distended body-centred cubic packing. With $\alpha\text{-Ag}_2\text{Se}$

more anions occupy large gaps than smaller gaps, but with $\alpha\text{-Ag}_2\text{S}$ the anions are distributed uniformly over all the gaps. Cubic $\alpha\text{-Cu}_2\text{S}$ is obtained only if there is a deficiency of Cu, corresponding with $\sim\text{Cu}_{1.8}\text{S}$. The lattice of $\alpha\text{-Cu}_{1.8}\text{S}$ is apparently similar in structure to that of $\alpha\text{-Cu}_2\text{Se}$. In $\alpha\text{-Ag}_2\text{Te}$ and $\alpha\text{-Cu}_2\text{Se}$ 4 cations per unit cell form with the anions a Zn blende structure, whilst the remaining 4 are statistically distributed in gaps. In the above compounds the lattice changes from body-centred to face-centred when the ratio of the radius of the cation to that of the anion changes from 0.637 to 0.57. R. C.

Crystal structure of potassium, rubidium, caesium, and thallium silicofluorides and of $\text{LiMnO}_4 \cdot 3\text{H}_2\text{O}$. J. A. A. KETELAAR (Z. Krist., 1935, 92, 155—156).—The silicofluorides are isomorphous with $(\text{NH}_4)_2\text{SiF}_6$; their lattice consts. and parameter vals. are tabulated. Lattice consts. are also given for $\text{LiMnO}_4 \cdot 3\text{H}_2\text{O}$. B. W. R.

Crystal structure of thallium fluoride. J. A. A. KETELAAR (Z. Krist., 1935, 92, 30—38).—The cell is rhombic, space-group V_{2h}^{23} , a_0 5.18, b_0 5.495, c_0 6.080 Å., 4 mols. in cell, d (X-ray) 8.48. This is a new type of AB structure and may be regarded as a deformed NaCl lattice. The high polarisability of Tl^+ is discussed. B. W. R.

Anhydrous sulphates of the magnesium series. F. HAMMEL (Compt. rend., 1936, 202, 57—59).—Comparative X-ray data are recorded for the anhyd. sulphates of Mg, Mn, Fe, Co, Ni, Cu, and Zn. H. J. E.

Symmetry of tetragonal nickel sulphate. A. SCHOER (Natuurwetensch. Tijds., 1936, 17, 233—242).—Corrosion figures obtained by etching the (111) and (001) faces of $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$ crystals indicate that they are holohedral, but those on the (112) and (101) faces correspond with a hemihedral structure. $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$ belongs to the enantiomorphic class of the tetragonal system, and single crystals are either dextro- or laevo-rotatory, with α 1.55° per mm. for λ 5893 Å. (cf. A., 1932, 986). D. R. D.

Crystal structure of tetramminocadmium perchlorate, $\text{Cd}(\text{NH}_3)_4(\text{ReO}_4)_2$. K. S. PITZER (Z. Krist., 1935, 92, 131—135).—The cell is face-centred cubic, a_0 10.53 Å., 4 mols. in cell, space-group T_h^h . Approximations to the parameters are made. B. W. R.

Configuration of bisdimethylglyoximoammine cobaltic chloride.—See this vol., 460.

Crystal structure of tetrahydrated nickelous acetate. R. B. HULL (Physical Rev., 1934, [ii], 46, 329).— $a : b : c = 0.7216 : 1 : 0.4143$ have been confirmed goniometrically, and β 93° 25' by Laue photographs. Rotation photographs give a_0 8.49 \pm 0.03, b_0 11.77 \pm 0.05, c_0 4.87 \pm 0.03 Å. The unit cell contains 2 mols. of $\text{Ni}(\text{OAc})_2 \cdot 4\text{H}_2\text{O}$; d^{20} is 1.717 \pm 0.001. L. S. T.

Cell dimensions and space-group of calcium tartrate. R. C. EVANS (Z. Krist., 1935, 92, 154—155).—The cell is orthorhombic, a_0 9.20, b_0 10.54, c_0 9.62 Å., space-group $P 2_1 2_1 2_1$, 4 mols. in cell. B. W. R.

Crystallised *p*-toluidine. J. WYART (Bull. Soc. franç. Min., 1935, 58, 281—293).—The crystals, d 1.120 ± 0.003 , are orthorhombic with n_x 1.68 and n_y 1.58. X-Ray measurements give a 5.95, b 9.05, and c 23.3 Å., with 8 mols. per unit cell. Details of mol. structure are given. L. S. T.

Crystal structure of *p*-dinitrobenzene. R. W. JAMES, G. KING, and H. HORROCKS (Proc. Roy. Soc., 1935, A, 153, 225—246).—The crystal structure of p -C₆H₄(NO₂)₂ has been determined by the method of double Fourier series. Projections of the electron density on the 3 axial planes have been made, and the 18 independent parameters of the structure measured. The unit cell has a 11.05, b 5.42, c 6.56 Å., and contains 2 mols. Space-groups, $P 2_1/n$; d_{calc} 1.64. The C₆ ring, although nearly a regular hexagon of side 1.40 Å., is slightly distorted, the length of one of each of the pairs of sides adjacent to the C-N linking being shortened to 1.32 Å. The distortion is due to the displacement of the C linked to the NO₂. The C-N linking lies nearly in the plane of the ring, but is inclined at about 25° to the plane of the NO₂. The N-O distances are 1.10 and 1.25 Å., respectively, and the O-O distances 2.14 Å. L. L. B.

X-Ray investigations of the molecular structure of chitin. A. N. J. HEYN (Proc. K. Akad. Wetensch. Amsterdam, 1936, 39, 132—135, and Nature, 1936, 137, 277—278).—The lattice structure of chitin is based on an arrangement of cellulose chains along the b axis of the unit cell with protein side-chains along the a axis. The c axis agrees with the side distance of the protein chains. A. G. P.

X-Ray analysis of the orthorhombic crystalline modification of 1 : 2 : 5 : 6-dibenzanthracene. J. IBALL (Nature, 1936, 137, 361; cf. this vol., 17).—The unit cell has a 8.22, b 11.39, c 15.14 Å., giving d 1.295 assuming 4 mols. of C₂₂H₁₄ per unit cell; space-group Q_1^{15} - $Pcab$. L. S. T.

Liquid crystals of some cholesterol compounds.—See this vol., 467.

X-Ray study of the absorption of cyclopentanone by cellulose trinitrate. M. MATHIEU and (MLLE.) T. PETITPAS (Compt. rend., 1936, 202, 46—47).—Changes in the X-ray diagram of cellulose nitrate, due to treatment with cyclohexane and cyclohexanone, are recorded. The results for treatment with the liquids or vapours resemble those for COMe₂ (cf. B., 1935, 1039). H. J. E.

Electrical orientation of wool cells. H. J. WOODS (Proc. Leeds Phil. Soc., 1935—1936, 3, 132—134).—A method of obtaining films of oriented wool cells, 20—30 μ thick, by sedimentation from an aq. suspension in an alternating electric field is described. The X-ray fibre photograph from such films was identical with that of normal α -keratin in the untreated fibres. H. J. E.

Supercrystalline organic compounds. D. VORLÄNDER (Naturwiss., 1936, 24, 113—117).—A supercryst. compound is one in which the crystal forces are so strong that it does not fuse to give an amorphous melt, but decomposes on heating. This indicates that the mols. are held more firmly in the

crystal lattice than the atoms are held within the mol. The connexion between mol. structure and supercrystallinity is discussed. Compounds possessing this property usually have long chains of atoms in the mol., but this is not necessarily the sole cause of the phenomenon. In aromatic compounds it is more probably due to the cryst. association of rod-like units of medium length. The supercrystallinity of starch, cellulose, and proteins is due to the existence of both long chains and cryst. association of mols.

A. J. M.
X-Ray investigations of liquid crystals. V. K. HERRMANN (Z. Krist., 1935, 92, 49—81).—Nine substances are investigated for liquid crystal behaviour with rising and falling temp., optically and with X-rays, especially in the neighbourhood of the optical transition points. For several a new interference effect, the "wide sharp ring," is found, ascribed to a closest hexagonal packing of nearly cylindrical mols. The ring does not vanish abruptly; its disappearance is discussed. B. W. R.

"Extra" rings in graphite electron diffraction patterns. G. I. FINCH and H. WILMAN (Nature, 1936, 137, 271—272).—Prominent "extra" electron diffraction rings have been obtained with natural and artificial graphite powders of high C content. The rings are due to planes, the spacings of which have no counterpart in the X-ray structure assigned to graphite. The thin crystals contain certain Bragg spacings not exhibited by thicker graphite. The formation of the "extra" rings is illustrated diagrammatically. L. S. T.

Electron distribution in (NH₄)₂C₂O₄·H₂O and the structure of the oxalate group. S. B. HENDRICKS and M. E. JEFFERSON (J. Chem. Physics, 1936, 4, 102—107).—More accurate vals. of at. separations in the C₂O₄ group of (NH₄)₂C₂O₄·H₂O have been obtained from a Fourier analysis of the electron distribution on the (001) plane, using X-ray scattering data: C-C 1.581 ± 0.01 , C-O 1.25 ± 0.02 , and C-O 1.23 ± 0.02 Å. with the angle O-C-O $129 \pm 2^\circ$. The O-C-O parts of the C₂O₄ group are in planes at an angle of 28°, whilst in H₂C₂O₄·2H₂O, α - and β -H₂C₂O₄ the parts are coplanar. M. S. B.

Study of the structure of chloroform by electron diffraction. C. DEGARD (Bull. Soc. chim. Belg., 1936, 45, 15—20).—Electron diffraction measurements are in accord both with the tetrahedral model and with Urbain's model of the CHCl₃ mol. J. W. S.

Contact difference of potential between barium and silver. External work function of silver. P. A. ANDERSON (Physical Rev., 1936, [ii], 49, 320—323).—A method for measuring const. and reproducible contact p.d. between metal surfaces, in which both surfaces are prepared by thermal vaporisation in a "gettered" vac., is described. The contact p.d. at liquid air temp. between microcryst. Ba and Ag is 1.94 ± 0.02 volts; this, with the val. 2.39 volts for the work function of Ba, gives 4.33 ± 0.05 volts for the work function of microcryst. Ag. This val. is compared with results from thermionic and photo-electric studies. N. M. B.

Ferrites. III. R. S. HILPERT and R. SCHWEINHAGEN (Z. physikal. Chem., 1935, B, 31, 1—11; cf. A., 1933, 1234).—The graph of magnetisability, σ , against composition, x , for $\text{CuO-Fe}_2\text{O}_3$ mixtures exhibits a max. corresponding with $2\text{CuO} : 3\text{Fe}_2\text{O}_3$. The d - x curve of slowly cooled mixtures has min. at $2\text{CuO}, 3\text{Fe}_2\text{O}_3$ and $\text{CuO}, 3\text{Fe}_2\text{O}_3$, and a max. at $\text{CuO}, 2\text{Fe}_2\text{O}_3$, but if the mixture has been quenched the first min. is absent. Zn ferrites have a max. σ and min. d at $2\text{ZnO}, 3\text{Fe}_2\text{O}_3$, but the min. d is absent in quenched mixtures. The d suggests the existence of three series of Zn ferrites having, however, the same X-ray diagram. The d - x curves of Sr ferrites and $\text{Fe}_2\text{O}_3\text{-PbO}, \text{Fe}_2\text{O}_3$ mixtures have no max. or min. For all these ferrites the property-composition curves show no indication of metaferrites. R. C.

Mathematical expression of the [magnetic] hysteresis curve. J. NEUFELD (Compt. rend., 1936, 202, 125—126).—Theoretical. T. G. P.

Analysis of dynamic curves for the magnetic permeability and losses in iron. V. ARKADIEV (Compt. rend., 1936, 202, 39—41). H. J. E.

Non-orthogonality and ferromagnetism. J. H. VAN VLECK (Physical Rev., 1936, [ii], 49, 232—240).—Mathematical. N. M. B.

Curie point of nickel. E. C. STONER (Proc. Leeds Phil. Soc., 1935—1936, 3, 127—131).—A discussion of the derivation of the Curie point from experimental data. H. J. E.

Discontinuities of magneto-resistance. C. W. HEAPS (Physical Rev., 1934, [ii], 46, 1108; cf. A., 1934, 480).—A reply to criticism (A., 1935, 287). L. S. T.

Method of investigating the Hall effect. H. S. HATFIELD (Proc. Physical Soc., 1936, 48, 267—276).—An improved method, avoiding thermo-electric and other disturbing effects, is described and checked approx. for Al, Cu, Pb, Ni, Ag, Zn, and Sn. N. M. B.

Method for determining the optical constants of crystals and its application to certain organic compounds. R. G. WOOD and S. H. AYLIFFE (Phil. Mag., 1936, [vii], 21, 321—336; cf. A., 1935, 434).—Using the immersion method with a polarising microscope and a special microscope stage-goniometer, measurements were made of the principal refractive indices and orientation of the indicatrix of red and yellow picryl-*p*-toluidine, picrylaniline, Ph_2O , and Ph_2SO_2 . N. M. B.

Superficial optical properties of spar. R. DE MALLEMANN and F. SUHNER (Compt. rend., 1935, 201, 1344—1346).—The results of an examination of the optical properties of a beam of rectilinearly polarised monochromatic light after reflexion at a cleavage surface of spar indicate the existence of an isotropic surface layer 70 Å. thick. T. G. P.

Crystallochemical relations between germanium and silicon. W. SCHÜTZ (Z. physikal. Chem., 1936, B, 31, 292—308).—The pairs Zn_2SiO_4 and Zn_2GeO_4 , Be_2SiO_4 and Be_2GeO_4 , and Cs_2SiF_6 and Cs_2GeF_6 are probably isomorphous. The lattice constns. have been determined. In the heaviest

flint glass of the type *S* 231 the SiO_2 may be replaced by an equal wt. of GeO_2 , giving a glass corresponding approx. with Pb_2GeO_4 and having d 6.92, n_D 2.100, and $n_F - n_G = 0.073$. The optical constns. of various PbO-GeO_2 glasses have been measured (cf. B., 1927, 42). R. C.

Rock-salt structure of Li_2TiO_3 and its formation of mixed crystals with MgO and $\text{Li}_2\text{Fe}_2\text{O}_4$. E. KORDES (Z. Krist., 1935, 92, 139—153).—Lattice constns., d , and n of Li_2TiO_3 are determined; the intensities indicate a statistical distribution of Li^+ and Ti^{4+} . A continuous series of mixed crystals is formed with MgO , the lattice constns. and n of which alter continuously with the composition. A more complicated mixed crystal of MgO , $\text{Li}_2\text{Fe}_2\text{O}_4$, and Li_2TiO_3 is prepared and examined; its constns. can be deduced by an additive law. Possible applications to ceramics and refractories are discussed. B. W. R.

Refractive indices of metallic films showing Newton's rings. K. PROSAD and B. N. GHOSH (Indian J. Physics, 1936, 10, 49—53).—Previous work (*ibid.*, 1933—1934, 3, 425) on the coloured concentric rings, similar to Newton's rings, obtained on the Al cathode of a Hadding's X-ray tube with a Cu anti-cathode, has been extended to the examination of the rings obtained using a Pt anti-cathode. M. S. B.

Rotation of the plane of polarisation by oblique crystalline refraction. G. BRUNAT and L. WEIL (Bull. Soc. franç. Min., 1935, 58, 294—313).—Measurements on quartz and calc spar verify, for small angles of incidence, Potier's theory and MacCullagh's formula. L. S. T.

Plastic deformation of cadmium single crystals. R. ROSCOE (Phil. Mag., 1936, [vii], 21, 399—406).—Measurements were made on the bending of single-crystal wires of very pure Cd, and of Cd containing 0.11% Pb and 0.03% Zn. Results indicate that, when the stress over the glide-planes is not uniform, slip begins when the max. val. of the resolved shear stress reaches the crit. val. for deformation under uniform stresses. Surface oxidation produces, in resistance to plastic deformation, an increase that cannot be due to the cohesion of the oxide film, but probably arises from the healing of submicroscopic cracks in the film. N. M. B.

Plasticity of deformed metals. D. V. KONVISAROV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 139—140).—For Al, Cu, and Fe the plasticity diminishes as the torsional angles increase. W. R. A.

Determinative elastic and deformation constants of crystals, with applications to isotropic substances. P. BECHTEREV (Z. Krist., 1935, 92, 1—29).—Theoretical. A classification of elastic constns. on a suggested scale of "gradation." The terms hygro-, ortho-, plagio-, and sclero-morphic are given to extreme concepts of elastic behaviour; e.g., a fully hygomorphic substance has liquid fluidity, and a fully scleromorphic one resists changes of form without limit, but does not oppose vol. alteration. Published elasticity figures for many

substances (some isotropic) are summarised and classified on this "gradation" scale. B. W. R.

Akulov's theory of coercivity. V. S. MESSKIN and B. E. SOMIN (Z. Physik, 1936, 98, 610—623).—Experiment disproves Akulov's theory (A., 1931, 898). A. B. D. C.

Abrasion hardness of dolomite. H. TERTSCH (Z. Krist., 1935, 92, 39—48).—The amount of wear of a dolomite crystal by an abrasive plate is recorded for various directions and planes. The cleavage plane gives an asymmetric hardness figure; the basis plane gives threefold symmetry. B. W. R.

Polymorphic transformation of simple ionic lattices. I. Transformation of caesium chloride into sodium chloride lattice by heating. G. WAGNER and L. LIPPERT (Z. physikal. Chem., 1936, B, 31, 263—274).—At $445 \pm 5^\circ$ the lattice of ordinary CsCl changes into a lattice of the NaCl type, with lattice const. 7.02×10^{-8} cm., the heat of transition being 1.8 kg.-cal. Between 20° and 580° CsBr, CsI, TlCl, TlBr, and TlI exhibit no transition points. R. C.

Transition in aluminium at 79° . W. BAND (Physical Rev., 1934, [ii], 46, 934—935).—The variety of hysteresses observed on heating an Al wire show that there is a transition of some kind at $79 \pm 0.5^\circ$. L. S. T.

Distortion of β -brass and iron crystals. (Miss) C. F. ELAM (Proc. Roy. Soc., 1936, A, 153, 273—301).—A comparison of the results obtained from experiments on the distortion in tension of the body-centred cubic metals, Fe and β -brass, indicates that there is no essential difference between them. Stress-strain curves of the crystals are given, and the fracture of β -brass crystals in tension and in rolling is described. The direction of slip is not always a crystal direction, and it is suggested that the deformation is brought about by movements of a complex nature, and not by slip on any definite crystal plane. L. L. B.

Mott's theory of liquid metals, and the transition points of metals and other solids. R. H. FOWLER (Helv. phys. Acta, 1934, 7, Suppl. II, 72—80; Chem. Zentr., 1935, i, 3386).—Mott's theory (A., 1934, 1300) is discussed in relation to the changes in state of metals, alloys, NH_3 halides, and other substances. H. J. E.

Hume-Rothery conception of the metallic state. C. D. NIVEN (Phil. Mag., 1936, [vii], 21, 291—299).—The Hume-Rothery relation is restated for the periodic groups IIIB—VIIB in the form "in crystallising each atom has $6-N$ near neighbours, where N is the no. of electrons in the p system." The bearing of the relation on conduction and superconductivity is discussed. R. S. B.

Electrical resistance of aluminium at low temperatures. H. A. BOORSE and H. NIEWODNICZAŃSKI (Proc. Roy. Soc., 1936, A, 153, 463—475; cf. A., 1935, 814).—The electrical resistances of 6 polycryst. Al wires were measured at 0° and liquid N_2 and liquid H_2 temp., and those of 4 wires drawn from 99.995% pure Al at the temp. of liquid

He. Reduced resistivities computed by means of the Mathiessen-Nernst formula were in agreement with these calc. from the Grüneisen formula (A., 1933, 452) for liquid N_2 temp., but not for liquid H_2 temp. L. L. B.

Tension coefficients of resistance of the hexagonal crystals zinc and cadmium. (Miss) M. ALLEN (Physical Rev., 1936, [ii], 49, 248—253; cf. A., 1933, 559).—The coeffs. have been measured, and are independent of secondary orientation. The curves correspond with those representing the points as functions of the primary orientation. Results are discussed in relation to the Bridgman-Cookson theory (cf. *ibid.*, 1935, [ii], 47, 194). N. M. B.

Mean free electronic path in silver from electrical conductivity of very thin silver threads. A. EUCKEN and F. FÖRSTER (Nachr. Ges. Wiss. Göttingen, 1934, [ii], 1, 129—137; Chem. Zentr., 1935, i, 2954).—A résumé of and additions to published work (A., 1935, 153). J. S. A.

Variations in current in a conductor. L. BRILLOUIN (Helv. phys. Acta, 1934, 7, Suppl. II, 47—67; Chem. Zentr., 1935, i, 2954).—Current variations are calc. from the distribution of electrons by a probability method. Magnetic interaction between the electrons is assumed. J. S. A.

Temperature variation of the susceptibility of oxygen. H. LÜES (Z. Physik, 1936, 98, 537—547).—The susceptibility of O_2 shows increasing deviation from $\chi T = \text{const.}$ with rise of temp. from 286° to 600° abs. A. B. D. C.

Susceptibility measurements for oxygen and inert gases. K. E. MANN (Z. Physik, 1936, 98, 548—560).—The susceptibility of O_2 is independent of density and field strength from 90 to 750 mm. Hg, and from 1800 to 15,000 oersted. Vals. obtained for the inert gases are compared with theoretical vals. A. B. D. C.

Magnetic studies on graphite and graphitic oxides. N. GANGULI (Phil. Mag., 1936, [vii], 21, 355—369).—The principal susceptibilities of cryst. graphite along the vertical axis and along directions in the basal plane are -22×10^{-6} and -0.5×10^{-6} per g., respectively. By treating with conc. H_2SO_4 and HNO_3 to form "blue graphite" the abnormal diamagnetism along the vertical axis is nearly destroyed, and that along the basal plane is almost unchanged; the anisotropy is of the same order of magnitude as in aromatic mols. containing several condensed C_6H_6 nuclei: 1.3×10^{-6} per g. content of C. A diminution in the particle size of graphite has nearly the same effect as oxidation as above. These effects are attributed to a breaking up of the metallic linkings in graphite responsible for abnormal diamagnetism. N. M. B.

Explosive antimony. III. Magnetic susceptibility. C. C. COFFIN (Canad. J. Res., 1935, 13, A, 120—125; cf. A., 1934, 1297).—Explosive Sb is less diamagnetic than the ordinary polycryst. metal. magnetic susceptibilities being -0.38×10^{-6} and -0.88×10^{-6} , respectively. Explosive or amorphous Sb should be regarded as a true glass of supercooled liquid. E. E. A.

Temperature variation of [magnetic] susceptibility of solid nitric oxide. E. LIPS (Helv. phys. Acta, 1935, 8, 247—263; Chem. Zentr., 1935, ii, 189).— χ for solid NO between 63° and 90° abs. is const., and much < the theoretical val. The difference is attributed either to the formation of double mols., or to alterations in the electronic levels due to electric fields in the crystal lattice. J. S. A.

Magnetic susceptibility of vapours of some organic substances. J. SHUR and S. SIDOROV (Nature, 1936, 137, 317).—A redetermination of the magnetic susceptibility of CS₂ showed no change in the vals. for the vapour and liquid states (cf. A., 1935, 14).

L. S. T.

Magnetic behaviour of alums of the iron group. A. SIEGERT (Physica, 1926, 3, 85—90).—Theoretical. For Cr⁺⁺⁺, Mn⁺⁺⁺, and Fe⁺⁺⁺, the Bose-Stoner relation can be explained on the basis of the known lattice structure. For Ti⁺⁺⁺ and V⁺⁺⁺, deviations from cubic symmetry must be taken into account. L. J. J.

Paramagnetic relaxation. C. J. GORTER (Nature, 1936, 137, 190).—The relaxation time of the magnetic vector is approx. 10⁻¹⁰ sec. for Fe⁺⁺⁺ alum.

L. S. T.

Symmetry of the thermo-electric effects in single crystals. H. P. STABLER (Physical Rev., 1934, [ii], 46, 938).

L. S. T.

Variation with temperature of the absorption of ultrasonic waves by liquids. E. BAUMGARDT (Compt. rend., 1936, 202, 203—204).—The absorption of ultrasonic waves $\nu = 7.9578 \times 10^6$ by H₂O at 18—40° has been measured. The coeff. of absorption $\propto \eta \rho_0 V_0^3$, where η is the coeff. of viscosity, ρ_0 the density, and V_0 the velocity of sound. T. G. P.

Existence of diffusion of ultrasonic waves in liquids. P. BIQUARD (Compt. rend., 1936, 202, 117—119).—The existence of diffusion in ultrasonic waves (Lucas, this vol., 148) $\nu = 7.96 \times 10^6$ sec.⁻¹ in PhMe has been confirmed experimentally. T. G. P.

Ultrasonic experiments. H. SACK (Helv. phys. Acta, 1934, 7, 657—658; Chem. Zentr., 1935, i, 3767—3768).—Relative velocities of propagation of ultrasonic waves in H₂O, C₆H₆, and aq. ZnSO₄ are recorded. Measurements of absorption in solids show a greater absorption in imperfect NaCl crystals than in perfect crystals, and reveal considerable differences in the vol. absorption of different metals. J. S. A.

Ultrasonic waves and chemical investigation. G. SCHMID (Angew. Chem., 1936, 49, 117—127).—A review. A. J. M.

Transition temperature. R. PEIERLS (Helv. phys. Acta, 1934, 7, 81—83; Chem. Zentr., 1935, ii, 184).—Theoretical. The phenomena of transition and melting are considered from the viewpoint of displacements of mutually coupled, regularly arranged atoms, held by cohesive forces, the m.p. being that temp. above which the magnitude of the induced displacement increases with distance. J. S. A.

Specific heat of solid helium and melting heat of helium. W. H. KEESOM and (Miss) A. P. KEESOM (Physica, 1936, 3, 105—117).—Data for c_v of solid He are recorded in the region 1.2—3.0° abs. and d 0.20—

0.22. c_v increases more rapidly with T than would follow from Debye's relation. Θ_D is > the val. given by Kaischew and Simon (A., 1934, 589), and changes from 37 at 1.2° and d 0.218 to 25 at 2.18° and d 0.201, the Θ - T relation being linear. The heats of fusion at 2.5°, 3.0°, and 3.5° abs. are 0.835, 1.089, and 1.365 g.-cal. per g., respectively. Data for co-existing solid and liquid densities are also recorded. L. J. J.

Effect of dissolved air on the specific heat of water over the range 15—20°. E. O. HERCUS (Proc. Physical Soc., 1936, 48, 282—284; cf. *ibid.*, 1935, 47, 1003).—The effect is calc. thermodynamically from the solubility data for the case when no air is liberated. The sp. heat of H₂O saturated with air at 20° and atm. pressure is > that of air-free H₂O by 6×10^{-6} g.-cal. per g. N. M. B.

Atomic heat of nickel at low temperatures. K. CLUSIUS and J. GOLDMANN (Z. physikal. Chem., 1936, B, 31, 256—262; cf. A., 1935, 574).—Measurements at 10—30° abs. show an anomalous fall of sp. heat with temp., which is reconcilable with neither Bloch's $T^{3/2}$ law for ferromagnetism nor Sommerfeld's T law for free electrons (cf. this vol., 148). R. C.

Specific heat of Seignette salt. I. Anomaly at upper Curie point. A. A. RUSTERHOLZ (Helv. phys. Acta, 1935, 8, 39—54; Chem. Zentr., 1935, i, 2957).—Work reported previously (A., 1935, 1454) is described in detail. Anomalies in the Curie point, calc. from C_p and from the dielectric const., and in the inner field are discussed. J. S. A.

Heat capacity, entropy, and free energy of rubber hydrocarbon. N. BEKKEDAH and H. MATHESON (J. Res. Nat. Bur. Stand., 1935, 15, 503—515).—Vals. of heat capacity at 14—320° abs. are given for the cryst. and amorphous forms of rubber, prepared by digesting latex with steam at 190° and extracting resins and hydrolysis products with EtOH and H₂O. There was a transition temp. at approx. 190° abs. The cryst. form fuses at 284° abs. The entropy and standard free energy of formation were calc. H. J. E.

Thermal properties of an incompletely degenerate Fermi gas. N. F. MOTT (Proc. Camb. Phil. Soc., 1936, 32, 108—111).—Mathematical. The sp. heat and paramagnetic susceptibility of an electron gas obeying the Fermi-Dirac statistics are calc. for all temp. including those for which the gas is partly degenerate. A. J. M.

Aggregative states. II. Ratio of the temperature interval of existence of substances in the solid and liquid states. E. I. ACHUMOV (J. Gen. Chem. Russ., 1935, 5, 1445—1454; cf. this vol., 21).—Theoretical. The aggregative coeff., $\phi = (T_b - T_m)/T_m$, where T_b is the b.p. and T_m the m.p. (abs.), is evaluated for a no. of elements and compounds, and certain regularities are pointed out. R. T.

Density of liquid phosphorus. S. DOBRIŃSKI (Bull. Acad. Polonaise, 1935, A, 253—259).—Data are recorded at 7—68°: $d = 1.78685 - 0.0009386t$. T. G. P.

Density of mercury at 0°. T. BATUECAS and E. L. CASADO (J. Chim. phys., 1936, 33, 41—50).—

d_4^0 for Hg cleaned chemically, doubly distilled, and fractionated is 13.59539 ± 0.00001 g. per ml.

J. W. S.

Carbon monoxide [rectilinear diameter] and helium. E. MATHIAS and C. A. CROMMELIN (Ann. Physiq., 1936, [xi], 5, 137—166).—Densities of liquid and saturated vapour for CO between 132.91° (T_c) and 68.13° abs. have been measured. The law of the rectilinear diameter is approx. obeyed, giving d_c 0.3010 and crit. coeff. (K) 3.394; earlier vals. for other gases are corr. The true diameter has a point of inflexion, and gives d_c 0.3050 and K 3.440. The difference between the true and rectilinear diameters is discussed. The temp. variations of p , L , and internal and external heats of vaporisation are calc. by Clapeyron's equation. The density curve of He (cf. A., 1926, 774) is corr. Application of Clapeyron's equation as above shows that the sp. heat of the saturated vapour is negative, in agreement with theory.

L. J. J.

Vapour pressure of silicon tetrachloride. K. KEARBY (J. Amer. Chem. Soc., 1936, 58, 374—375).—Data for the range 0 — 60° can be expressed by $\log p = 7.6414 - 1572.3/T$, from which it follows that the b.p. at 760 mm. is 57.0° .

E. S. H.

Vapour pressures of metals. A. EUCKEN (Metallwirts., 1936, 15, 27—31, 63—68).—A crit. survey of existing information on both experimental and theoretical aspects of the subject.

C. E. H.

Free energies and vapour pressures of the alkali metals. A. R. GORDON (J. Chem. Physics, 1936, 4, 100—102).—From spectroscopic data, the free energies of the diat. vapours of K_2 , Na_2 , and Li_2 , and the equilibrium consts. for dissociation into the monat. forms, have been calc. From these consts. and v.-p. data, equations for the partial pressures of atoms and mols. in the saturated vapour, for temp. up to the normal b.p., have been deduced. The entropies of solid Na and K have also been calc. from the v.-p. equation.

M. S. B.

Isotherms of CO_2 . I. Between 0° and 150° and pressures from 16 to 250 atm. (Amagat densities 18—206). A. MICHELS and (Mrs.) C. MICHELS. II. Between 70 and 3000 atm. (Amagat densities 200—600). A. MICHELS, (Mrs.) C. MICHELS, and H. WOUTERS (Proc. Roy. Soc., 1935, A, 153, 201—214, 214—224).—I. The technique and results of isotherm measurements up to densities of 200 Amagat units are described. The vals. of $[(pv)_t - (pv)_{75}]/(t - 75)$ are calc. and plotted against t , and from the slope of the curves it can be seen that the sp. heat c_p increases with increasing density d .

II. The method has been modified for higher densities (200—600 Amagat units). c_p increases with increasing d to a max. for $d = 226.7$, then decreases and passes through a min. for d 390—460 Amagat units. The position of the max. coincides with the density of the crit. point.

L. L. B.

Data of state of phosphine at low pressures and from 190° to 300° abs. E. A. LONG and E. A. GULBRANSEN (J. Amer. Chem. Soc., 1936, 58, 203—205).—Apparatus and technique for comparing

directly the properties of a gas at low temp. and pressure with the known behaviour of He are described. Data have been determined for PH_3 , and the second virial coeff. B calc. The dependence of B on temp. is well represented by a power series in $1/T$.

E. S. H.

Internal pressure in gases. VII. K. JABE CZYŃSKI (Rocz. Chem., 1935, 15, 450—459; cf. A., 1934, 952).—Van der Waals' equation is expressed as $(p + P)(w - b) = RT$, where p is the external pressure, and P , the internal pressure, is the resultant of the cohesive and repulsive forces between the mols., and $= \{a - f(w)T\}/w^2$. The vals. of P for various gases at different p , T , and w have been evaluated, and it is shown that P rises abruptly with transition from the gaseous to the liquid state, showing that this process is not continuous.

R. T.

Constants in the equation of state for the rare gases. E. BRANDER and K. TAMMINEN (Soc. Sci. Fenn., Comm. phys.-math., 1935, 8, No. 5, 6 pp.; Chem. Zentr., 1935, i, 3519).—Vals. for van der Waals' a are calc., using the Wasastjerna equations (cf. A., 1935, 691).

H. J. E.

Thermal expansions of alloyed bismuth crystals in the region of the eutectic m.p. A. GOETZ, J. W. BUCHTA, and T. L. HO (Physical Rev., 1934, [ii], 46, 538; cf. A., 1935, 156).

L. S. T.

Thermal conductivity of carbon dioxide. T. L. IBBS (Phil. Mag., 1936, [vii], 21, 508—509).—An examination of Archer's conductivity-temp. curve for CO_2 (cf. A., 1935, 691) appears to indicate an effect due to a change in the nature of the intermol. field at 140° .

N. M. B.

Thermal conductivities of metals and alloys. J. W. DONALDSON (Metallurgia, 1936, 13, 159—160).—A review of recent work.

Method of determining the state of degeneration of a gas. A. VAN ITTERBEEK (Nature, 1936, 137, 109).—The method consists in determining η at different temps. and then calculating the mean velocity of the mols. from Stokes' formula. With O_2 at 293° , 90° , and 72° abs. the val. obtained for the mean velocity agrees with that deduced from classical theory.

L. S. T.

Influence of an electric field on the viscosity of liquids. P. T. SOKOLOV and S. L. SOSINSKI (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 135—138).—The variation in the time of flow through the capillary of an Ostwald viscosimeter with and without an applied electric field has been investigated for $COMe_2$, EtI , $MeOH$, Et_2O , $CHCl_3$, C_6H_{14} , and C_6H_6 at different temp. Non-polar mols. are uninfluenced; polar mols. show the greatest variations at higher field strengths, the ratios of the times of flow with the applied field to the times of flow with no applied field increasing as the field strengths are increased. The higher is the dipole moment of the mol., the greater is the extent to which it is influenced.

W. R. A.

Viscosity of liquid gallium over an extended range of temperature. K. E. SPELLS (Proc. Physical Soc., 1936, 48, 299—311).—Using a special technique to overcome surface-film difficulties, measurements are given for η over the temp. range 30 —

1100°, and are compared with vals. calc. on Andrade's theory of variation with temp. At 1100° the decrease of η is 2% per 100°. N. M. B.

***p-v-T* relations of gaseous mixtures.** E. R. GILLILAND (Ind. Eng. Chem., 1936, 28, 212—215).—The isometric (*p-T* curve, *v* const.) for a pure gas approximates closely to a straight line at $T > \text{crit. temp.}$ The slope of the isometric for a mixture can be obtained from the molal average of the slopes of the isometrics for the constituents, all measured at the same mol. concn. This fact, in addition to a simple method for obtaining the internal pressure from the isometrics, enables the *p-v-T* relationships for a mixture to be calc. more accurately than by the use of Dalton's or Amagat's laws. The theory is applied to $A-C_2H_4$, H_2-CO , and CH_4-N_2 mixtures. A. J. M.

Viscosities of deuterium-hydrogen mixtures. A. B. VAN CLEAVE and O. MAASS (Canad. J. Res., 1935, 13, B, 384—389; cf. A., 1935, 432, 691, 1455).—Further measurements at 22° have shown that the diameters of D_2 , HD, and H_2 mols. are identical. Variation of η with the temp. has been derived from measurements at -78.5° and -183.4°. Jeans' temp.-viscosity relation holds approx. for the mixtures. A comparison has been made of various equations which are said to express the dependence of η on the composition of mixtures. E. E. A.

Description of binary solutions. F. O. KOENIG (J. Amer. Chem. Soc., 1936, 58, 317—318).—Theoretical. The changes associated with different modes of description (*i.e.*, the formula assigned to each component) are discussed. E. S. H.

Densities and refractive indices of bromoform-benzene mixtures. J. L. WHITMAN and L. CLARDY (J. Amer. Chem. Soc., 1936, 58, 237—239).—Data at 30° are recorded. The *d*-composition relation conforms closely to that for an ideal system. E. S. H.

Viscosity formula for binary mixtures, the association degrees of constituents being taken into consideration. XII. T. ISHIKAWA and T. BABA (Bull. Chem. Soc. Japan, 1936, 11, 8—18).—The Ishikawa viscosity formula has been applied to the experimental data for binary mixtures such as C_6H_6 with alcohols or AcOH, in which one component shows marked association. The calc. and observed vals. of η are in close agreement. A comparison is made with the Thiesen formula for gaseous mixtures (cf. A., 1929, 500). Where there is a max., η calc. from the latter is not quite coincident with the observed η , but no such divergence occurs with the Ishikawa formula (cf. A., 1929, 387). M. S. B.

Viscosities of liquid mixtures. K. E. SPELLS (Trans. Faraday Soc., 1936, 32, 530—540).—Viscosities of mixtures of $PrOH$, Bu^iOH , CH_2Bu^iOH , and CH_3CH_2OH with C_6H_6 have been measured at 22°. The results, together with other data, are used to test the validity of a single-const. expression connecting η with the composition. The curves for the two amyl alcohols show no anomalies corresponding with those shown by the dielectric const. F. L. U.

Investigation of equilibrium between a boiling liquid and its vapour by thermal analysis. L.

MEYER (Z. physikal. Chem., 1936, 175, 275—283).—The determination of the b.p. of a liquid mixture and the condensation point of a mixture of vapours by heating and cooling curves, respectively, is described. The apparatus is suitable for determining the proportion of condensable constituents in a gas mixture. R. C.

Ferromagnetism and liquid mixtures. C. ZENER (Physical Rev., 1934, [ii], 46, 824—825).—Analogies between the development of magnetisation below the Curie point and the separation of two phases from a homogeneous liquid mixture of two types of atoms are discussed. L. S. T.

Crystal structure of beryllium alloys. L. MISCH (Metallwirts., 1936, 15, 163—166).—Alloys of Be with several metals of the transition series have been examined, the majority being of the type AB_2 ($B=Be$). The results are discussed in relation to the Hume-Rothery rule (cf. A., 1935, 926). C. E. H.

Solidification diagram of copper-tin alloys. W. BRONIEWSKI, J. T. JABLONSKI, and S. MAJ (Compt. rend., 1936, 202, 305—307).—A complete fusion diagram is given. Formation of the compounds Cu_3Sn , Cu_2Sn , and Cu_3Sn_2 is indicated. H. J. E.

Zinc-indium alloy system. C. L. WILSON and E. A. PERETTI (Ind. Eng. Chem., 1936, 28, 204—205).—Thirty alloys have been examined, and the equilibrium diagram has been obtained. The eutectic contains 96% In and 4% Zn, and the eutectic temp. is 143.5°. The alloys become softer as the proportion of In is increased. A. J. M.

Phase diagram of the system silver-gallium. F. WEIBKE, K. MEISEL, and (FRL.) L. WIEGELS (Z. anorg. Chem., 1936, 226, 201—208).—Thermal, microscopic, and X-ray observations have been made. The data for the Ag-rich alloys agree with those of Hume-Rothery *et al.* (A., 1934, 725). Five series of mixed crystals are indicated. The system is compared with other systems containing Ag and Ga. The at. vol. of Ga in Ag, like that of Al, is $>$ in Cu. M. S. B.

Velocity of transformation in cadmium-magnesium alloys in the region of composition $MgCd$. N. L. STEPANOV and S. A. BULACH (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 147—151).—The electrical conductivity of alloys tempered from above the transition points and also of annealed alloys has been measured at 25°, 50°, 75°, and 100°. The annealed alloys, stable at low temp., have the highest conductivity. Transition velocities have been determined at 100°. W. R. A.

(A) **Platinum-antimony alloys.** (B) **Platinum-rhodium alloys.** V. A. NEMILOV and N. M. VORONOV (Z. anorg. Chem., 1936, 226, 177—184, 185—191; cf. A., 1935, 440).—(A) The presence of a solid solution on the Pt side seems to be indicated.

(B) The thermoelectric power of systems of chemically pure Pt with different Pt-Rh alloys increases with the concn. of Rh, but more rapidly at low than at high concn. Pt-Rh alloys are not readily attacked by acids. By heating at 750° a slight surface oxidation takes place on alloys con-

taining $>10\%$ Rh. At 1150° the oxide is dissociated leaving a bright metallic surface. M. S. B.

Transformation in the copper-gold alloy Cu_3Au . C. SYKES and H. EVANS (J. Inst. Metals, 1936, 58, Advance copy, 443–472).—From X-ray examination and from measurements of the electrical resistance and sp. heat of the Cu–Au alloy with 25 at.-% Au it is shown that the general character of the transformation is similar to that predicted by Bragg and Williams (A., 1934, 954); it takes place continuously from the crit. temp. to a very low temp. and the equilibrium is a dynamic one. The at. rearrangement proceeds first by the formation of nuclei having a relatively high degree of order and then, at const. temp., by the growth of these nuclei to a size approximating to that of the individual crystals, or, at gradually falling temp., by growth of the nuclei accompanied by an increase in their degree of order due to the fall in temp. Since nuclei formation is not taken into account in the statical theory of super-lattices it follows that the actual rate of relaxation into the equilibrium state differs considerably from that predicted by the theory. Very appreciable differences in the properties of the alloy can be effected by variations in the heat-treatment, but all are strictly reproducible, which confirms the conclusion that the transformation is an intra-cryst. phenomenon almost independent of grain-boundary effects. A. R. P.

I. Paramagnetism of nickel alloys. C. MANDERS. **II. Magnetic properties of the metallic state and energy of interaction between magnetic atoms.** L. NÉEL (Ann. Physique, 1936, [xi], 5, 167–231, 232–279).—I. Vals. for the sp. susceptibilities of dil. solid solutions of Ag, Au, Al, Ti, Zr, Si, Sn, Pb, V, As, Sb, Cr, Mo, W, Mn, Ru, Pd, and Pt are recorded for various temp. above the Curie point. The Curie point (0) and Curie const. (c) are calc. for each alloy. Deviations from the Curie-Weiss law are observed, due to a superimposed paramagnetism (a), which is independent of temp.

II. Theoretical. The variation of c with concn. of added metal, considered in relation to the results of Sadron (A., 1932, 679) for saturation magnetisation below 0, shows that in passing from the ferromagnetic to the paramagnetic state, there is no change in the no. of electrons (0.61 per Ni atom) responsible for the magnetic properties. The superimposed paramagnetism α is due to the antiparallel arrangement of added atoms in the Ni lattice. The energy of interaction between magnetic atoms is discussed, and shown to depend only on the distance between their magnetic layers. L. J. J.

Photo-electric effect of metallic alloys. I. L. BELLADEN and G. GALLIANO (Annali Chim. Appl., 1936, 26, 30–34).—The photo-electric sensitivity (reciprocal of time required to produce unit charge on the electrometer, as compared with Cu) of Cu–Sn alloys has been measured in a new form of apparatus permitting the simultaneous examination of four samples; when plotted against Sn content the photo-electric sensitivity gives a graph with singular points at Cu_4Sn , Cu_3Sn , and Cu_3Sn_2 . E. W. W.

Laws of valency electron concentration in binary intermetallic alloys. H. PERLITZ (Acta Comm. Univ. Tartu., 1933, A, 24, No. 2, 16 pp.; cf. A., 1934, 22).—The Westgren and Hume-Rothery rule applies to β -, γ -, and ϵ -alloys, the vals. of the ratio of the no. of valency electrons to the no. of atoms being 3:2, 21:13, and 7:4, respectively. A necessary condition for the existence of these structures is that one of the metals should contribute ≤ 2 , and the other ≥ 1 , valency electrons to the lattice structure. Various examples are discussed. CH. ABS. (e)

Formation of spherical eutectic inclusions in alloys. W. GELLER (Metallwirts., 1936, 15, 141–142).—Spherical eutectic inclusions have been observed in several Fe and Al alloys. The conditions for their formation are a narrow freezing range and rapid cooling just above the solidus. C. E. H.

The system Mg–Cu–Al, particularly across the section MgCu_2 – MgAl_2 . F. LAYES and H. WITTE (Metallwirts., 1936, 15, 15–22).—Cu may be replaced by Al in MgCu_2 without change of cryst. structure up to approx. 35% MgAl_2 . With higher MgAl_2 contents, hexagonal phases appear, but there are no definite limits of stability for the various structures. For the Al corner of the system previous results are not fully confirmed. Two compounds, $\text{Mg}_2\text{Cu}_2\text{Al}_3$ and $\text{Mg}_3\text{Cu}_7\text{Al}_{10}$, are reported. C. E. H.

System iron–aluminium–carbon. R. VOGEL and H. MADER (Arch. Eisenhüttenw., 1935–1936, 9, 333–340).—The system contains six primary crystal phases: α -Fe containing Al and Fe, ternary γ -Fe, graphite, ternary ϵ (FeAl) $_n$, ternary δ (FeAl_3) $_n$, and Al_4C_3 . There are four 4-phase equilibria during solidification, viz., (1) liquid (Fe 83.1, Al 14.5%) + α (Fe 85.1, Al 14.8%) + γ (Fe 91.7, Al 7.5%) \rightleftharpoons ϵ (Fe 85.2, Al 13%) at 1335° ; (2) liquid (Fe 83.35, Al 13.5%) + γ (Fe 90.3, Al 7.2%) \rightleftharpoons ϵ (Fe 83.5, Al 13%) + graphite at 1132° ; (3) liquid (Fe 56.7, Al 43%) + δ (Fe 54.8, Al 45%) \rightleftharpoons ϵ (Fe 55.8, Al 44%) + Al_4C_3 at 1135° ; (4) liquid (Fe 69.92, Al 29%) \rightleftharpoons ϵ (Fe 70.65, Al 29%) + graphite + Al_4C_3 at 1120° . In the solid state three points of 4-phase equilibria exist, thus (5) ϵ (Fe 71.7, Al 28%) + Al_4C_3 \rightleftharpoons δ (Fe 58.8, Al 41%) + graphite at 1115° ; (6) ϵ (Fe 80, Al 17.5%) + γ (Fe 92.5, Al 6.9%) \rightleftharpoons α (Fe 92.3, Al 7.6%) + graphite at 1111° ; (7) ϵ (Fe 72.85, Al 27%) + graphite \rightleftharpoons α (Fe 91.45, Al 8.5%) + δ (Fe 71.3, Al 28.5%) at 1100° . Addition of Al to Fe–C alloys lowers the ledeburite eutectic temp., raises the pearlite transformation temp., extends the pearlite field, and favours the pptn. of graphite. A. R. P.

System iron–cobalt–cobalt silicide–iron silicide. R. VOGEL and K. ROSENTHAL (Arch. Eisenhüttenw., 1935–1936, 9, 293–299).—Microscopic and thermal examination of the system shows that FeSi and CoSi form a continuous series of solid solutions with one another and that a ternary compound FeCoSi exists below 980° . In the Fe–Co–Co $_2$ Si–FeCoSi–FeSi section there are five planes of 4-phase equilibria, viz., liquid + α \rightleftharpoons γ + FeSi at 1185° , liquid + Co $_2$ Si solid solution \rightleftharpoons ternary α -Fe + ternary α -Co $_2$ Si at 1180° , liquid \rightleftharpoons ternary α -Fe + ternary

γ -Fe+Co-rich solid solution at 1165° and liquid \rightleftharpoons ternary β -Co₂Si solid solution+ternary γ -FeSi at 1170°; at 985° α -Fe reacts with FeSi to form Fe₃Si₂ and γ -Fe. The compounds Co₂Si and FeCoSi form a continuous series of solid solutions and hence the 3-phase equilibria in the system Co₂Si-CoSi merge into those of FeSi-FeCoSi. Diagrams for const. Fe-Co ratios from 8:1 to 1:13 and for the equilibria at 20° and 1160° together with photomicrographs are given. A. R. P.

Diffusion of carbon, silicon, and manganese in solid and liquid iron. M. PASCHKE and A. HAUTTMANN (Arch. Eisenhüttenw., 1935—1936, 9, 305—309).—The diffusion of C in solid Fe is given by $\log D = 4.6248 - 7.95 \times 10^3/T$, where T is abs. temp. The rate of diffusion of Mn into Fe at 1400° appears to be about 0.01 times that of C. The diffusion coeff. of Mn in liquid Fe at 1530° is 9.1 and at 1570° 8.7 sq. cm. per 24 hr.; that of Si at 1540° is 3.3 sq. cm. per 24 hr. A. R. P.

Structure of solid solutions of Fe₂O₃ in Mn₂O₄. E. J. W. VERVEY and M. G. van BRUGGEN (Z. Krist., 1935, 92, 136—138).—The system Mn₂O₄-Fe₂O₃ has been studied by powder photographs. B. W. R.

Piezometric researches. II. Mutual solubility of liquids. G. POPPE (Bull. Soc. chim. Belg., 1935, 44, 640—657; cf. A., 1935, 1314, 1457).—The crit. solution temp. and their variation with pressure have been determined for 36 binary mixtures, including 5 mixtures containing D₂O. Replacement of H₂O by D₂O increases the range of incomplete miscibility. Glycerol and guaiacol are completely miscible, but small amounts of H₂O cause separation. The salting-out action of KCl on α -picoline-D₂O mixtures is > with α -picoline-H₂O mixtures. J. W. S.

Comprehensive $\log p$ -1/ T diagram for binary system methylamine-water. W. MEHL [with FELSING and THOMAS] (Z. ges. Kälte-Ind., 1935, 42, 13—14; Chem. Zentr., 1935, i, 3021).—B.p.-concn., $\log p$ -1/ T , and solubility-temp. data at 1 atm. are recorded. J. S. A.

Solubility relationships of 96% alcohol and glyceryl nitrate. D. A. COPEMAN (J. S. African Chem. Inst., 1936, 19, 17—18).—The miscibility has been studied between 15° and 40°. J. S. A.

Solubility of sulphur dioxide in sulphuric acid. J. MILBAUER (Bull. Soc. chim., 1936, [v], 3, 221—224).—Data are recorded for H₂SO₄ (d 1.824) at 23—237° and H₂SO₄ (d 1.53) at 25—100°. E. S. H.

Solubility and activity of the halogenates of some bivalent metals. Solubility and activity of (I) barium iodate and (II) lead iodate in water and in solutions of electrolytes. A. POLESSITSKI (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 193—196, 197—200).—The solubility of Ba(IO₃)₂ and of Pb(IO₃)₂ in H₂O between 0° and 100°, and the solubility and activity coeffs. at 25° in solutions containing KNO₃, Cu(NO₃)₂, and KIO₃, have been determined. R. S.

Salts of higher alkylsulphonic acids. R. M. REED and H. V. TARTAR (J. Amer. Chem. Soc.,

1936, 58, 322—332).—The solubilities of Ca, Mg, and Na alkylsulphonates (n -octyl, n -decyl, lauryl, myristyl, cetyl, and n -octadecyl) in H₂O have been determined at 25° and 60°. Data for surface tension, interfacial tension against C₆H₆, and electrical conductivity of these solutions are recorded. The interfacial tension changes with time. The conductivity relations are analogous to those of soap solutions. E. S. H.

Solubility of arsenious oxide in aqueous solutions of certain halides of alkali metals and ammonium. E. JOSEFOWICZ (Rocz. Chem., 1935, 15, 460—467).—Solubility data are recorded at 25° for solutions of Li, Na, K, and NH₄ chlorides and bromides, and of KI and NaI. The existence of mol. compounds is said to be indicated. R. T.

Influence of NH₄Cl on the solubility of CoHg(SCN)₄. B. V. J. CUVELIER (Z. anorg. Chem., 1936, 226, 197—200).—By a method previously described (A., 1934, 1323), the solubility has been determined at temp. up to 80° and concns. of aq. NH₄Cl up to 3*N*. The solubility increases with temp., and more rapidly for higher [NH₄Cl]. M. S. B.

Solubility of benzoic and salicylic acids in mixtures of organic solvents. P. G. DESAI and A. M. PATEL (J. Indian Chem. Soc., 1935, 12, 808—812).—In mixtures of non-polar solvents (C₆H₆ with PhMe, xylene, or hexane) the solubility-composition curves are straight lines. The solubility in mixtures of polar and non-polar solvents (CHCl₃ or COMe₂ with aromatic hydrocarbons) gives a curve which is concave or convex to the composition axis; in mixtures of C₆H₆ with MeOH, EtOH, PrⁿOH, or BuⁿOH the solubility curve passes through a max. E. S. H.

Fractionation of barium salts containing radium. (MME.) B. E. MARQUES (J. Chim. phys., 1936, 33, 1—40; cf. A., 1934, 22, 343, 726).—The distribution of Ra between solid and liquid phases (cf. A., 1925, ii, 381) is found to be the same whether the solid phase is obtained by crystallisation of supersaturated solutions, cooling of saturated solutions, or pptn., and whatever be the anion present (Br⁻, Cl⁻, NO₃⁻, SO₄²⁻, or CO₃²⁻). J. W. S.

Adsorption isotherms. Critical conditions. R. H. FOWLER (Proc. Camb. Phil. Soc., 1936, 32, 144—151).—Mathematical. A. J. M.

Chemisorption on charcoal. VII. Adsorption of water vapour. C. G. LAWSON (Trans. Faraday Soc., 1936, 32, 473—478; cf. A., 1935, 27).—Earlier work has been repeated and extended using a sorption balance designed to measure adsorption of H₂O on charcoal covered with various surface oxides, small quantities of desorbed gases being continuously removed. Isotherms are given for charcoals activated at different temp. The mean time of sojourn of H₂O mols. on the surface is increased in the presence of the surface oxide formed at about 400°, but decreased by the oxide formed at high temp. The extent of hysteresis has been examined for two charcoals. Chemisorption is not observed with ash-free charcoal. Adsorption on graphite is of the same type and cannot be attributed to capillary condensation. O. J. W.

Adsorption isotherm of heavy water on charcoal. A. KING and C. G. LAWSON (Trans. Faraday Soc., 1936, 32, 478—481).—The isotherms of D_2O and of H_2O on outgassed charcoal at 110° are shown to be very similar. No special theoretical significance can be attached to the slightly greater adsorption of D_2O . O. J. W.

Sorption of bromine and iodine by activated charcoal. L. H. REYERSON and A. E. CAMERON (J. Physical Chem., 1936, 40, 233—237; cf. A., 1935, 696).—Equilibrium data for the sorption of Br by activated C at 58° , 98.1° , 137.6° , and 178.4° and of I at 178.4° and 218.8° , and also rates of adsorption and desorption of Br and I at 137.6° , are given. M. S. B.

Dissociation equilibrium of hydrogen and its adsorption on tungsten. J. K. ROBERTS (Proc. Camb. Phil. Soc., 1936, 32, 152—157).—The application of a formula derived from a kinetic treatment of the process of desorption in which a const. evaporation coeff. for desorbing particles is assumed (this vol., 155) leads to vals. for the rate of evaporation of H from W which do not agree with the dissociation equilibrium, if the results of Langmuir *et al.* (A., 1931, 782) are used. The nature of the surface reactions occurring is discussed. It would appear that measurements of the rate of removal of the adsorbed film of O_2 on W do not afford a measure of the rate of evaporation of O atoms, or that it is not possible to obtain a general first approximation formula for the rate of evaporation of adsorbed atoms in terms of the heat of adsorption. A. J. M.

Sorption of hydrogen and deuterium by copper and palladium. I. Behaviour of copper and copper oxides. II. Sorption by palladium and diffusion through copper. H. W. MELVILLE and E. K. RIDEAL (Proc. Roy. Soc., 1935, A, 153, 77—88, 89—103).—I. CuO is reduced by at. H and D at 20° with the same velocity. It is more rapidly reduced by mol. H_2 than D_2 at 156 — 269° , the difference in energy of activation being 0.4 kg.-cal. H_2 and D_2 are sorbed by, and desorbed from, Cu with the same velocity at 71 — 200° ; at higher temp., however, H_2 is sorbed slightly more rapidly. The results indicate that the process of activated diffusion of H_2 into Cu is composite, including a true activated diffusion. There is also another process independent of the nature of the two gases which determines the rate at low temp.

II. H_2 diffuses more rapidly than does D_2 through Pd and through thin films of Cu and Ni supported on Pd, at temp. from 150° to 350° and pressures 1 — 200 mm. In Cu it has been shown by using composite films, Cu-Pd-Cu and Pd-Cu-Pd, that the rate-determining step is not due to any process connected with the gas-metal interface. H_2 is more sol. than D_2 in Pd, the difference in diffusion velocities being due partly to this, and partly to the greater mobility of H_2 in Pd. Potential barriers have been constructed from diffusion and solubility data. L. L. B.

Active oxides. XCVIII. Changes in sorptive power of mixtures of calcium oxide with ferric oxide, and of calcium oxide and beryllium oxide with chromic oxide, during chemical combin-

ation. J. HAMPEL (Z. anorg. Chem., 1936, 226, 132—140).—The oxide mixtures were prepared by the method previously described (A., 1934, 490; 1935, 440), heated at various temp. up to 1000° , and the sorptive power (s) measured for Congo-red, acid fuchsin, and eosin (cf. A., 1935, 930). The s -temp. curves fall with rise in the temp. at which the preliminary heating takes place, but there are many irregularities resulting in max. and min. and points of inflexion. The curves are compared with those for the variation of other physical properties with temp. M. S. B.

Sorption of gases and vapours by aerosol particles. A. KRASSILCHIKOV (Kolloid-Z., 1936, 74, 138—147).—The concn. of a sorbable gas or vapour is determined in the presence or absence of aerosol particles by measuring its diffusion into a long narrow tube, the vol. of which is small compared with that of the experimental vessel with which it is connected. By this means the sorption of Br vapour by paraffin oil, resin, and NH_4Cl particles has been determined. The sorption isotherms for the oil indicate dissolution rather than adsorption. With resin, bromination occurs. NH_4Cl shows purely surface effects, and the adsorption can be expressed by Langmuir's equation. With increasing [Br] the adsorption per sq. cm. reaches a max. and thereafter decreases, apparently owing to rapid coagulation and desorption at high [Br]. F. L. U.

Adsorption and diffusion in zeolite crystals. A. TISELIUS (J. Physical Chem., 1936, 40, 223—232).—The adsorption of NH_3 by analcite follows the Langmuir law and the heat of adsorption is const. over a wide range, indicating a lack of interaction between adsorbed mols. When NH_3 is adsorbed by a Cu chabasite, prepared by cationic exchange in aq. $CuSO_4$, the crystal has the absorption spectrum of a solution containing $CuNH_4$ ions, showing that co-ordination valencies play a part in adsorption. The diffusion const. of H_2O in a dehydrated heulandite crystal has been determined by following, with the polarising microscope, the changes in double refraction during adsorption of H_2O . The diffusion is anisotropic. It follows the ordinary diffusion laws of solutions for small concn. differences, but for larger is largely dependent on concn. Since concn. at the surface remains const. and equal to the saturation val., during adsorption, diffusion in the crystal must be the rate-determining factor. M. S. B.

Adsorption of electrolytes on crystal surfaces. (MISS) L. DE BROUCKÈRE (Chem. Weekblad, 1936, 33, 104—109).—A reply to criticism by Kolthoff (A., 1934, 727; cf. A., 1933, 457; 1934, 359). D. R. D.

Adsorption at crystal-solution interfaces. IX. Concentration of foreign substances in solution relative to the quantity adsorbed by the host crystal. W. G. FRANCE and (MISS) P. P. DAVIS (J. Physical Chem., 1936, 40, 177—185).—There is no relation between the no. of colloidal particles of dye in solution and the amount of dye adsorbed by a given host crystal. Crystals containing adsorbed impurities have the same lattice consts. as the pure crystals. The dichroism frequently observed in

crystals containing adsorbed dye appears to be due to orientation of the dye mols. with respect to the adsorbing surface. The colour effects observed, when crystals of NH_4 alum containing Pontamine Sky Blue 6B are examined under a polarising microscope, indicate that the long axes of the adsorbed dye mols. are probably perpendicular to the cube faces of the crystals. The data for the adsorption of dye by alum and nitrate crystals are not in accordance with either the Langmuir or adsorption isotherm equations, but are reproduced over nearly the whole range by $a = kc^{1/n} - k'c^{-1/n}$, where a is the mol. ratio of impurity to host crystal and c the ratio in the solution. The cause of the failure of the adsorption curves to pass through the origin is discussed. M. S. B.

Adsorption of anions by precipitated calcium oxalate. T. P. CHAO, D. K. WU, W. P. CHIANG, and T. F. CHAO (J. Chinese Chem. Soc., 1936, 4, 6-19).—The adsorption of anions by CaC_2O_4 occurs in the order $\text{Fe}(\text{CN})_6''' > \text{NO}_3' > \text{Fe}(\text{CN})_6''' > \text{SO}_4''' > \text{NO}_2' > \text{ClO}_3' > \text{Cl}' > \text{Br}' > \text{CNS}'$, i.e., except for NO_3' in the order of decreasing ionic charge. The order is slightly different from that with BaSO_4 (cf. this vol., 154) and adsorption is much less. Adsorption is usually in the same order as the solubility of the Ca salts; the different behaviour of the univalent anions indicates that a sp. factor is involved. Special methods for the analysis of adsorbed ions are described. R. S. B.

[Theory of coprecipitation.] L. DE BROUCKÈRE (Bull. Soc. chim. Belg., 1935, 44, 625-636; cf. A., 1934, 359).—A reply to Kolthoff (*ibid.*, 727).

Sorption of lime by cellulose and wood. G. L. LABOQUE and O. MAASS (Canad. J. Res., 1935, 13, B, 380-383).—The adsorption of CaO is $>$ that of NaOH . Considerable time is required for saturation adsorption to take place. The adsorption on similar woods is the same but much $>$ that on cotton cellulose. E. E. A.

"Apparent" and "true" adsorption functions. K. S. G. DOSS and B. S. RAO (J. Mysore Univ., 1935, 8, 49-61).—Adsorption on SiO_2 gel from $\text{C}_5\text{H}_5\text{N}-\text{H}_2\text{O}$ and $\text{CCl}_4-\text{H}_2\text{O}$ mixtures is discussed. C. W. G.

Reversible adsorption in the surface of soap solutions. J. W. MCBAIN and D. A. WILSON (J. Amer. Chem. Soc., 1936, 58, 379-380).—The fact that several hr. are required to complete the adsorption of solutes at the surface of their solutions throws doubt on many recorded surface tension measurements. E. S. H.

Sorption of acid sodium oleate. R. F. NICKERSON (J. Physical Chem., 1936, 40, 277-286).—The kinetics of the sorption at the interface between aq. Na oleate (I) and hydrocarbon oils—both aliphatic and aromatic—have been studied by a method previously employed (A., 1932, 803). Relative sorption potentials are tabulated. The results support the view that energy transfers in colloid systems involve chemical and electrochemical processes. In the case of the systems considered, free interfacial energy is stored as electrochemical potential through the ionisation of H_2O as a result of the hydrolysis of

(I) when acid (I) is adsorbed at the interface. The causes of the failure of Gibbs' adsorption equation are discussed. M. S. B.

Direct measurement of absolute amount of adsorption in liquid surfaces. T. F. FORD and J. W. MCBAIN (J. Amer. Chem. Soc., 1936, 58, 378).—An interferometer method is described. E. S. H.

Kinetics of sorption. A. V. LYKOV (Kolloid-Z., 1936, 74, 179-183).—The distribution of temp. in a sphere of cellulose during sorption of H_2O vapour has been determined. Curves showing change of H_2O content with time for different temp. are given. F. L. U.

Adsorption and pyknometry. P. G. NUTTING (J. Washington Acad. Sci., 1936, 26, 1-6).—A review of technique and errors in pyknetric determinations of d for highly adsorptive clays and similar materials. H. J. E.

Adsorption by diatomaceous filters. E. J. HOAGLAND and J. E. RUTZLER, jun. (J. Physical Chem., 1936, 40, 215-221).—A comparison of the adsorption of different liquids or solutions by Berkeley "N" diatomaceous candles has been made by comparing the rates of flow of air through candles wetted by the different liquids. Different filters of the same rating show great variations in behaviour, probably because of different degrees of crushing of the diatoms during manufacture. Salts are adsorbed to a variable extent and MeOH , EtOH , and CCl_4 are less readily adsorbed than H_2O . The significance of these results in the methods of pore size determination is discussed. M. S. B.

Binding of water by inorganic materials. I. R. BULL (Angew. Chem., 1936, 49, 145-153).—Bound H_2O is classified as discontinuous or continuous according as dehydration does or does not produce a new phase. Discontinuously bound H_2O may be determined by treating the solid with dioxan (I), the H_2O removed being calc. from the change in dielectric const. of (I). With varying amounts of material and (I), a stepped dehydration curve is obtained. Attainment of equilibrium in the removal of hydration H_2O is slow; mechanically held H_2O is rapidly extracted and may be so determined. Adsorbed H_2O is determined by extraction with a small proportion of moist (I). J. S. A.

Surface tension of calcium amalgam. L. CONVERS (Compt. rend., 1936, 202, 289-291; cf. this vol., 142).—Measurements in vac. by the drop-wt. method with amalgams containing 0-0.0033% of Ca are described. The measurements are affected by traces of O_2 . H. J. E.

"Pockeling" of freshly swept surfaces of solutions. D. A. WILSON and T. F. FORD (Nature, 1936, 137, 235-236).—The sudden appearance and expansion of circular patches on fresh surfaces of dil. solutions of surface-active material are described and explained. Drastic sweeping eliminates this effect. L. S. T.

Composition of fatty acid films on water containing calcium or barium salts. I. LANGMUIR and V. J. SCHAEFER (J. Amer. Chem. Soc., 1936, 58, 284-287).—Technique for the removal and analysis of

unimol. films on H_2O is described. In presence of Ca^{++} or Ba^{++} (about $10^{-4}M$) the films formed by stearic acid are nearly pure neutral soaps when the solution has p_H 11, and free fatty acid films at p_H 3; they are half converted into neutral soaps at p_H 5.1 for Ca^{++} and p_H 6.6 for Ba^{++} . The presence of Ca or Ba increases the rigidity of the films and affects the ease with which multimol. films can be formed on metal or glass.

E. S. H.

Action of potassium *n*-amylxanthate on chalcocite. A. M. GAUDIN and R. SCHUHMAN, jun. (J. Physical Chem., 1936, 40, 257—275).—The results show that the collecting action of xanthates in the flotation of chalcocite (I) is due to an oriented adsorbed film formed by the reaction of xanthate ions with impurities, produced by grinding, on the surface of the mineral, and subsequent reaction with the Cu of the (I) to give Cu^I xanthate. The film cannot be leached off by ordinary solvents until sufficient of the xanthates is formed to give a complete unimol. film. Only a relatively small fraction of a unimol. film of uncatchable product, however, is necessary for efficient flotation. Malachite (II) also abstracts xanthates from the aq. K *n*-amylxanthate, but the film is removed by leaching and the (II) is non-floatable. Adsorption-reaction curves, calc. on a kinetic basis, are in good agreement with the experimental results for (I).

M. S. B.

Stream potentials and d.c. surface conductivities in small capillaries. H. L. WHITE, (Miss) B. MONAGHAN, and F. URBAN (J. Physical Chem., 1936, 40, 207—214).—The streaming potential, E/P , of glass capillaries diminishes with decreasing capillary diameter, due mainly to increasing sp. conductance as a result of the relatively larger surface conductance. E/P also decreases with time, probably due to a decrease in ζ . The normal d.c. sp. surface conductance of $0.0001M$ - KCl at a Pyrex surface is approx. 1.5×10^{-9} mho, and of $0.0005M$ - KCl 1.7×10^{-9} mho (cf. A., 1932, 699). Variations in ζ for a given capillary, as shown by variations in E/P , are also reflected in the sp. surface conductance.

M. S. B.

Influence of size, symmetry, and concentration of ions and dipoles on the dielectric potential of the solution-dielectric interface. B. KAMIENSKI (Bull. Acad. Polonaise, 1935, A, 309—318).—It is argued that (a) small ions have little effect on the dielectric potential at the interface solution-dielectric when the dielectric const. is small, (b) H_2O dipoles are preferentially adsorbed at the solution-air interface, and (c) large mols. and ions of weak electrolytes displace H_2O dipoles at the interface. These conclusions are supported by the dielectric potentials of quinine solutions in relation to p_H , and by previous data.

T. G. P.

Simplified dynamical method of measuring dielectric potentials at the solution-air interface. B. KAMIENSKI and W. GOSLAWSKI (Bull. Acad. Polonaise, 1935, A, 319—322).—The reference electrode is a vertical Cu tube moistened on the inside with aq. $CuSO_4$, through the centre of which the solution under investigation flows in a fine stream.

T. G. P.

Influence of hydrogen ions on the dielectric potential of the stereoisomerides quinine and quinidine. B. KAMIENSKI and W. GOSLAWSKI (Bull. Acad. Polonaise, 1935, A, 323—326).—Dielectric potentials at the solution-air interface of quinine and quinidine solutions have been measured at p_H 2—9. $0.01M$ -Quinidine is more sensitive to p_H than $0.01M$ -quinine; at lower concn. the quinine solutions are the more sensitive.

T. G. P.

Behaviour of water held in fine-pored media. B. H. WILSDON, D. G. R. BONNELL, and (Miss) M. E. NOTTAGE (Trans. Faraday Soc., 1936, 32, 570).—Errors in a paper previously published (A., 1935, 1316) are corr.

F. L. U.

Influence of an inert solid phase on the f.p. of water and dilute aqueous solutions. II. Starch-water. A. V. RAKOVSKI, D. N. TARASENKOV, and A. V. KOMANDIN (J. Gen. Chem. Russ., 1935, 5, 1441—1444; cf. this vol., 156).— H_2O adsorbed on starch (up to 33%) does not freeze at -180° ; H_2O in excess of 33% freezes at 0° to -3.16° according to the ratio of starch surface to excess of H_2O . The presence of low concns. of solutes does not specifically affect the results. The action of surface forces is not apparent at a distance of $> 10,000$ mol. diameters of H_2O .

R. T.

Microcataphoresis. I. Technique. H. C. BROWN and J. C. BROOM (Proc. Roy. Soc., 1936, B, 119, 231—244).—An experimental cell and important details of technique are described. Komagata's correction of the calculation of the stationary layer in cells with a width/depth ratio of < 20 is verified.

F. A. A.

Rate of diffusion through membranes. S. MIYAMOTO (Kolloid-Z., 1936, 74, 194—196; cf. A., 1933, 233).—Theoretical. Under certain conditions, which are specified, the expression deduced reduces to $\lambda\sqrt{M} = \text{const.}$ (λ =dialysis const., M =mol. wt. of solute).

F. L. U.

Diffusion of water vapour through membranes of cellulose acetate and cellulose nitrate. S. VOSNESSENSKI and L. M. DUBNIKOV (Kolloid-Z., 1936, 74, 183—194).—The rate of diffusion of H_2O vapour through membranes of cellulose acetate (Ac no. = 56) and nitrate has been measured under varying conditions of v.p., temp., thickness and character of membrane, and is related in a simple manner to the first three variables (expressions given). Membranes formed by evaporation of a solution in contact with a polished surface are less permeable when vapour enters at the "free" (matt) surface than for the reverse direction.

F. L. U.

Ebullioscopic constants. C. DUVAL (Compt. rend., 1936, 202, 660—662).—It is shown that Trouton's rule may be utilised in the calculation of ebullioscopic consts.

L. J. J.

Refractions of electrolyte solutions. IV. Complete refraction curve of potassium chloride. A. E. BRODSKI and N. S. FILIPPOVA (Z. physikal. Chem., 1936, B, 31, 227—236; cf. A., 1934, 131).—The refraction curve has been determined from 0.001 to 1.4*N* and agrees with published data for

conc. solutions, and with the conclusions previously reached.

R. C.

Dielectric constants of dilute solutions of strong electrolytes at various temperatures. M. JEZEWSKI, M. WIERZBICKI, and J. KAMECKI (Bull. Acad. Polonaise, 1935, A, 417—429).—The dielectric consts. (ϵ) of solutions of NaCl, KCl, MgSO_4 , CuSO_4 , and $\text{Ba}_2\text{Fe}(\text{CN})_6$ at 0° , 10° , 18° , and 25° , determined by a resonance method, agree with the Debye-Falkenhagen theory at low concns. but in the more conc. solutions ϵ is $<$ the theoretical val. This is probably due to orientation of dipoles in the strong ionic fields at higher concn. The relaxation times are also calc.

A. J. M.

Dielectric constants of solutions of electrolytes. G. FISCHER and W. D. SCHAEFFELD (Ann. Physik, 1936, [v], 25, 450—466; cf. Orthmann, A., 1931, 786).—The variation of dielectric const. (ϵ) with concn. (c) in aq. solutions of NaCl, NaI, NaNO_3 , KNO_3 , AgNO_3 , HCl, HNO_3 , and H_2SO_4 has been determined. There is a decrease in ϵ with increasing c , expressed by a formula of the type, $\epsilon = \epsilon_0(1 + ac^b - bc)$, where a and b are consts. For NaI and NaCl, $a = 0.095$, $b = 1.45$. For $c < 0.01$ g.-mol. per litre, the results accord with the Debye-Falkenhagen theory, a being 0.047 and b , 1.0 over this concn. range. For NaNO_3 , KNO_3 , and AgNO_3 , $a = 0.051$, $b = 1.1$. For HCl and HNO_3 ($c < 0.03N$), $a = 0.55$, $b = 8$, and for H_2SO_4 , $a = 0.2$, $b = 5$.

A. J. M.

Optical behaviour of dissolved ions and its significance for the structure of solutions of electrolytes. II. Optical rotation of phenylbenzylmethylpropylammonium ion. G. KORTUM (Z. physikal. Chem., 1935, B, 31, 137—151; cf. this vol., 285).—Some salts increase the sp. rotation of the above ion, whilst others depress it, but there is no simple relation between the magnitude and sign of the effect and the charge, size, or polarisability of the foreign anion. It is inferred that the optical properties of ions are affected by solvation forces far more than by Coulomb forces. In general the rotation is influenced by change in solvent much more than by the presence of salts. The results obtained agree with the view that in their aq. solutions at low and moderate concns. strong electrolytes are completely dissociated into fully solvated ions.

R. C.

Faraday effect of strong electrolytes in aqueous solutions. III. A. OKAZAKI (Mem. Ryojun Coll. Eng., 1935, 8, 1—29; cf. A., 1935, 1318).—Data at 29° are recorded for aq. $\text{Sr}(\text{NO}_3)_2$, $\text{Zn}(\text{NO}_3)_2$, and $\text{Pb}(\text{NO}_3)_2$ with λ 3514 Å., and for aq. MgCl_2 , CaCl_2 , SrCl_2 , BaCl_2 , ZnCl_2 , CdCl_2 , AlCl_3 , CaBr_2 , BaBr_2 , H_2SO_4 , MgSO_4 , ZnSO_4 , CdSO_4 , and $(\text{NH}_4)_2\text{SO}_4$ with λ 3441 Å. For most electrolytes $[z]$ is independent of, or decreases with, increasing concn. For H_2SO_4 and $\text{Zn}(\text{NO}_3)_2$ it increases with concn.

CH. ABS. (e)

Ionic susceptibilities of rubidium from its different salts in the solid and in the dissolved state. S. S. BHATNAGAR, M. B. NEVGI, and M. L. KHANNA (J. Indian Chem. Soc., 1935, 12, 799—807).—Data for RbCl , RbBr , RbI , and Rb_2SO_4 have been obtained at different temp. The ionic

diamagnetism of Rb^+ is the same in the solid and dissolved states. The calc. ionic radius is 1.875×10^{-8} cm.

E. S. H.

Crystalline structure and physicochemical properties in the colloidal state. T. S. BHATNAGAR (Current Sci., 1936, 4, 570—571).—A review.

Magnetic properties of colloidal powders of metallic elements. S. R. RAO (Current Sci., 1936, 4, 572—576).—A review.

Disperse gases. I. Thermodynamics and preparation. R. AUERBACH (Kolloid-Z., 1936, 74, 129—138).—Relations between bubble size in gas-liquid systems, and surface tension, density, and external pressure are discussed. In preparing systems of varying dispersity gas is dispersed in a liquid by mechanical means while subject to a low total or partial pressure. Restoration of the system to atm. pressure then yields a dispersion of the required fineness.

F. L. U.

Diffusion coefficients and velocities of fall in air of atmospheric condensation nuclei. J. J. NOLAN and V. H. GUERRINI (Proc. Roy. Irish Acad., 1936, 43, A, 5—24).—Methods for the determination of the diffusion coeff. D and the velocity of fall in air V_f of atm. condensation nuclei are described. For Dublin air $D = 18 \times 10^{-6}$ sq. cm. per sec. and $V_f = 7.5 \times 10^{-5}$ cm. per sec. The mass calc. from these vals. is 1.68×10^{-16} g. and the radius 2.85×10^{-6} cm. In stored air there is a progressive increase in size, but the wt. of the nucleus decreases with time. Comparison of the nuclei in town and country air suggests that when nuclei are fresh from the place of production they are small and numerous, but as the source becomes more remote the concn. falls and the size increases whilst D diminishes. The relation between concn. and size of nuclei may help to explain the anomalies in the equilibrium between small ions and nuclei.

M. S. B.

Emulsification by ultrasonic waves. C. BONDY and K. SÖLLNER (Trans. Faraday Soc., 1936, 32, 556—567; cf. A., 1935, 820).—The influence of various experimental conditions on the extent of emulsification and the degree of dispersion of emulsions produced by ultrasonic waves has been investigated in the systems H_2O +org. liquid, Hg +aq. solution, and Hg +org. liquid. In the first group the concn. of the emulsion reached in a given time increases with increase of the energy of radiation. The degree of dispersion is the greater, the smaller is the energy and the shorter the time of radiation. Prolonged irradiation always leads to progressive coarsening of an emulsion already formed. The Hg systems behave differently, as is to be expected from the different mechanism involved in their emulsification.

F. L. U.

Production of highly disperse states. B. CLAUS (Z. tech. Physik, 1935, 16, 80—82; Chem. Zentr., 1935, i, 2958).—When the cathode is subjected to the action of supersonic radiation in the electrolysis of metallic salt solutions coherent deposition of metal is inhibited, and highly disperse metal sols are formed. Factors influencing the degree of dispersion have been investigated.

J. S. A.

Perchlorates as solvents for cellulose and its derivatives. (MME.) A. DOBRY (Bull. Soc. chim., 1936, [v], 3, 312—318).—Cellulose acetate dissolves in saturated aq. solutions of Ca, Mg, Cu, and Zn perchlorates in the cold, and in Li and Ag perchlorates and basic Pb perchlorate when hot. $\text{Mg}(\text{ClO}_4)_2$ is the most active. The dissolution is not accompanied by chemical degradation. Cellulose nitrates and butyrate and benzylcellulose are insol. in these salt solutions. Cellulose dissolves practically unchanged in basic Be perchlorate solutions. E. S. H.

Viscosity of suspensions and solutions. I. Viscosity of suspensions. E. GUTH. **II. Theory of electro-viscosity.** W. KRASNY-ERGEN (Kolloid-Z., 1936, 74, 147—172, 172—178).—I. Introductory and mathematical.

II. Mathematical. Von Smoluchowski's formula is shown to be an approximation formula suitable for relatively good conductors. It is not valid for non-conducting liquids. F. L. U.

Viscosity and lyotropic numbers. J. H. C. MERCKEL (Rec. trav. chim., 1936, 55, 82—84).—A reply to Bruins (this vol., 285). D. C. J.

Viscosity of organic colloids. W. PHILIPPOFF and K. HESS (Z. physikal. Chem., 1936, B, 31, 237—255; cf. A., 1935, 31, 822).—The determination and variation of the consts. of the flow curve (cf. *ibid.*, 692) are described. For various solutions at concns., c , of 0.01—30% the variation of η_0 with c is given by $\eta_{rel} = (1 + c/c_0)^8$, where c_0 is a const. for a given solvent and solute. For solutions of cellulose nitrate (I) in BuOAc η_{∞} is $\propto c$. Chemical and mechanical treatment of the solute, change of temp., and variation of the solvent and particle size distribution shift the η_0 - c curve along the c axis without altering its form, i.e., the above equation remains valid, with variation in c_0 . With rise in temp. η_{rel} usually falls. For mixed solutions of several varieties of (I) $\eta = (1 + \sum c_i/c_{0i})^8$, where c_i are the concns. of the components in the mixture and c_{0i} the vals. of c_0 for the components. It appears that η_0 is a function of the space demand of the solute only in the sense that the flow of the solvent is impeded by the vol. of the solute. R. C.

Lyophilic colloids. II. Interaction of agar fractions. A. A. MOROZOV (J. Gen. Chem. Russ., 1935, 5, 1359—1372; cf. A., 1935, 932, 1320).—The fractions (I) of agar of smaller mol. wt. are extractable with cold H_2O , and are shown to exert a stabilising action on sols of the fractions (II) of higher mol. wt., and to augment imbibition of H_2O by gels of the latter, to an extent commensurate with difference in osmotic pressure between intra- and extra-micellar (I). *The η of sols of (II) is $<$ that of the original product, owing to their smaller structural η , and to the smaller vol. of the dispersed phase. R. T.

Stability of colloids. II. Negative silver iodide colloid. A. BASINSKI (Rocz. Chem., 1935, 15, 430—440; cf. A., 1935, 297).—The coagulating action of cations on dialysed negatively charged AgI sol diminishes in the series $\text{Li} > \text{Na} > \text{K} > \text{NH}_4 > \text{H} > \text{Ag}$; $\text{Cd} > \text{Mg} > \text{Mn}^{II} > \text{Co} > \text{Zn} > \text{Ni} > \text{Ca} > \text{Sr} > \text{Cu} > \text{Ba} > \text{Pb}^{II}$; $\text{Fe}^{III} > \text{La}^{III} > \text{Ce}^{III} > \text{Al}$; $\text{Zr}^{IV} > \text{Th}^{IV}$.

The action of univalent cations is antagonistic to that of bi- and ter-valent ions; when uni- and quadri-valent ions are present together antagonism is observed only with LiCl . An interpretation of the above phenomena, based chiefly on considerations of exchange adsorption, is advanced. R. T.

Zonal effect in the electrolytic coagulation of manganese dioxide. S. S. JOSHI and S. J. RAO (Current Sci., 1936, 4, 481—482).—In > 80 cases n during slow coagulation varies discontinuously with the time, in disagreement with Smoluchowski's theory. R. S. B.

Coagulation of solvated sols by organic substances and salts. VI. Temperature-stable albumin sols which coagulate on cooling. B. JIRGENSONS (Kolloid-Z., 1936, 74, 205—208; cf. A., 1933, 461).—Sols of ovalbumin containing 45—55 vol.-% of Pr^{OH} or Pr^{OH} and 0.05—0.5M with respect to NaBr , KCl , CaCl_2 , or $\text{Ca}(\text{NO}_3)_2$, are stable at room temp. or at 40° , and coagulate at -8° to -10° . The coagulum can be re-dispersed at 65° . An explanation is put forward. F. L. U.

Ionic structure, solubility, and coagulation of proteins. F. HAUROWITZ (Kolloid-Z., 1936, 74, 208—218; cf. A., 1935, 822).—Solubilities at different p_H have been determined for products formed by coupling albumin or globulin with diazotised m - $\text{NH}_2 \cdot \text{C}_6\text{H}_4 \cdot \text{SO}_3\text{H}$, p - $\text{NH}_2 \cdot \text{C}_6\text{H}_4 \cdot \text{AsO}(\text{OH})_2$, or o - $\text{NH}_2 \cdot \text{C}_6\text{H}_4 \cdot \text{CO}_2\text{H}$. Data are recorded for the pptn. of various proteins by elupein (which ppts. only the protein anion), and by ovalbumin into which SO_3H have been introduced as above until the isoelectric point is at $p_H < 1$, whereby only the protein cations are pptd. The results are discussed theoretically. F. L. U.

Mitogenetic radiations and Liesegang rings. A. E. ROFFO (Rev. soc. argentina biol., 1934, 10, 297—305).—Small amounts of rat tissue supported close above a gelatin film cause an outward distortion and some thickening of $\text{AgNO}_3 \cdot \text{K}_2\text{Cr}_2\text{O}_7$ rings formed on the film. The action of sarcoma tissue is $>$ that of normal tissue. CH. ABS. (p)

Thixotropy and rheopexy of V_2O_5 sols. F. JULIUSBURGER and A. PIRQUET (Trans. Faraday Soc., 1936, 32, 445—452).—The relation between thixotropy and rheopexy (cf. A., 1935, 933) has been investigated in more detail for V_2O_5 sols. Freshly prepared V_2O_5 sols with amiconic particles are only thixotropic, but as soon as large needle-shaped particles are formed the sols become rheoplectic. Rheoplectic sols can be made with Li salts or with acids, but not with K or NH_4 salts, although the latter can produce thixotropic V_2O_5 sols. Li salts and acids are weak coagulants for V_2O_5 sols. Rheopexy appears to be an intermediate state between a stable sol and one coagulated by stirring, just as thixotropy is in many cases an intermediate state between a stable sol and one coagulated by electrolytes. O. J. W.

Mechanism and kinetics of thixotropic solidification. W. HELLER (Compt. rend., 1936, 202, 61—64).—Data are recorded for the rate of gel formation of $\text{Fe}(\text{OH})_3$ sols containing NaCl , after centrifuging. This is determined by the rate at

which nuclei form, by the rate of growth of these nuclei, and by the rate of their association.

H. J. E.

Structure and properties of thixotropic gels. B. S. KANDELAKY (Kolloid-Z., 1936, 74, 200—205).—Sols of Fe_2O_3 made by hydrolysis of $\text{Fe}(\text{OEt})_3$ can set to thixotropic gels when containing as little as 6.3 g. of Fe_2O_3 per litre. With increasing val. of $\text{EtOH}/\text{H}_2\text{O}$ in the sol the particle size increases and the stability decreases. The time needed for the first setting is $>$ for subsequent settings, owing to the incomplete breaking up of the aggregates on shaking. No thixotropic gels can be obtained from sols made from recryst. $\text{Fe}(\text{OEt})_3$ and containing no excess electrolyte, whence it is inferred that at least some stabilising charge is necessary. Ultramicroscopic observations establish the existence of a network of aggregates in which the liquid is enmeshed. That the intracellular liquid does not "set" is shown by the appearance in it of small particles in Brownian movement when the system as a whole is gelatinised.

F. L. U.

Sol-gel transformations. II. Dilatometric investigations on iron hydroxide, gelatin, methylcellulose, silicic acid, and viscose. E. HEYMAN (Trans. Faraday Soc., 1936, 32, 462—473; cf. A., 1935, 822).—Changes associated with sol-gel transformations have been studied with a sensitive Hg dilatometer. With methylcellulose the vol. increases, with gelatin it decreases, whilst no vol. change occurs during the thixotropic sol-gel transformation of $\text{Fe}(\text{OH})_3$ sol. It is suggested that a vol. increase corresponds with a decrease in hydration, since the bound H_2O has a smaller sp. vol. than that of the free H_2O . In the formation of silicic acid gels from Na silicate and HCl, the vol. increase is about 10—20 times as large. There is, moreover, a further increase in vol. which continues for many months. Chemical dehydration due to polymerisation may be the cause of these large vol. changes. The maturing of viscose solutions is also discussed.

O. J. W.

Structures of precipitates. I. Influence of hydrogen, lithium, sodium, and potassium ions on peptisability of secondary particles of barium sulphate precipitates. B. TEŽAK (Z. physikal. Chem., 1936, 175, 284—293).—The peptisability with H_2O of a BaSO_4 ppt. varies with the cation of the pptg. sulphate according to the lyotropic series $\text{Li}^+ > \text{Na}^+ \approx \text{H}^+ > \text{K}^+$. It is inferred that the reversibility of the aggregation of the primary particles is determined by the hydration of the adsorbed foreign ions. There may be differences in magnitude and sign of charge between different fractions of a peptised system. For a BaSO_4 dispersion the dispersity quotient falls linearly with increasing particle size.

R. C.

Atomically divided silver. A. TOPOREK (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 27—30).—The absorption spectra of Ag dispersed in KCl, KBr, and KI are recorded. The colloidal nature of the colour centres is discussed.

H. J. E.

Swelling solution temperature of cassava starch. A. J. OPHOF (Chem. Weekblad, 1936, 33,

91—93).—The percentage (P) of cassava starch granules remaining undissolved in H_2O at any temp. has been determined microscopically with Congo-red as stain. P reaches an equilibrium val. in < 30 min. which increases with temp., following an S-curve reaching 50% at 61.07° (by definition, the swelling solution temp.) and 95% at about 65° . The results are similar to those of Arzichovski (Bull. Acad. Sci. U.R.S.S., 1918, 12, 349) for potato starch. Samec's method (A., 1912, ii, 144) gives vals. of 55.6 — 59° for cassava starch and 59.1 — 60.3° for potato starch, but these depend on the concn.

D. R. D.

Vapour pressure-water content relations for certain typical soil colloids. L. T. ALEXANDER and M. M. HARRING (J. Physical Chem., 1936, 40, 195—205).—The colloids have been extracted from four different types of soil representing a wide range of progressive weathering, and the variations of v.p. with different H_2O content of the colloids have been determined. The curves are characteristically different for the different types of soil. The variation of free energy with H_2O content has been calc. and the free energy of wetting determined approx. The relation of v.p. to colloid composition is discussed. A theory of the nature of hygroscopic H_2O in soil colloids is given.

M. S. B.

Equilibrium constants of the exchange reactions $\text{HCl} + \text{HD} = \text{DCl} + \text{H}_2$ and $\text{HBr} + \text{HD} = \text{DBr} + \text{H}_2$. K. WIRTZ (Z. physikal. Chem., 1936, B, 31, 309—318).—Assuming that the rotation of the mols. concerned is fully excited and the vibration unexcited the equilibrium consts. are calc. to be $([\text{HD}][\text{HCl}])/([\text{H}_2][\text{DCl}]) = 2.362e^{-186.77/T}$ and $([\text{HD}][\text{HBr}])/([\text{H}_2][\text{DBr}]) = 2.414e^{-128.11/T}$. These agree with the observed equilibrium consts., using Pt to catalyse the exchange. In each case the partition ratio of D approximates to 1 and is practically independent of the temp. From these data and the equilibrium const. of $\text{H}_2 + \text{D}_2 = 2\text{HD}$ (cf. A., 1934, 30) the equilibrium consts. of all the other exchange reactions possible in the systems H-D-halogen may be calc.

R. C.

Equilibrium of exchange reactions with deuterium. K. WIRTZ (Physikal. Z., 1936, 37, 165).—The exchange of D and H in HCl, HBr, and NH_3 has been studied by determining the equilibrium isotopic ratio for mixtures of D_2 and the above gases in presence of a Pt catalyst by the thermal conductivity method. The results are in good agreement with those calc. from spectroscopic data (cf. A., 1935, 1460).

A. J. M.

Equilibria of the reactions between acetylene and heavy water at 25° . L. H. REYERSON and B. GILLESPIE (J. Amer. Chem. Soc., 1936, 58, 282—284).—Equilibrium consts. for the reactions involving H_2O , HDO , D_2O , C_2H_2 , C_2HD , and C_2D_2 have been determined.

E. S. H.

Concentration maximum of endothermic compounds at high temperatures. Application to ozone and nitric oxide. E. BRINER, B. SUSZ, and E. ROD (Arch. Sci. phys. nat., 1935, [v], 17, Suppl., 198—200).—Previous results (A., 1931, 910) have been recalcd. using recent experimental data.

The max. concn. of O_3 in O_2 at 1 atm. is $2.2 \times 10^{-5}\%$ at 3500° abs. and that of NO in air at 1 atm. is $4.7-7.5\%$ at 3500° abs. R. S.

Relative values of the four butane-butene-hydrogen equilibrium constants. L. S. KASSEL (J. Chem. Physics, 1936, 4, 144).—The method of Eidinoff *et al.* (A., 1935, 1064) has been developed and applied to calculate the vals. of the sum of the translational and the rotational entropies of the following compounds at 25° : *n*-butane 75.366, isobutane 71.249, Δ^a -butene 72.98, *cis*- Δ^b -butene 68.225, *trans*- Δ^b -butene 67.800, isobutene 68.215. The possibility of determining vibrational entropy is discussed.

M. S. B.

Activity of water in solutions of barium chloride. R. F. NEWTON and E. A. TIPPETTS (J. Amer. Chem. Soc., 1936, 58, 280–282).—V.p. of $BaCl_2$ solutions at 25° have been measured and the activity of H_2O has been calc.

E. S. H.

Vapour pressures and activity coefficients of aqueous solutions of calcium and aluminium nitrate at 25° . J. N. PEARCE (J. Amer. Chem. Soc., 1936, 58, 376–377).—Corr. data are given (cf. A., 1935, 302).

E. S. H.

Calculation of activity coefficients and molal volumes. O. REDLICH, P. ROSENFELD, and W. STRICKS (J. Amer. Chem. Soc., 1936, 58, 375–376).—A criticism (cf. Pearce and Blackman, A., 1935, 302).

E. S. H.

Equilibrium and free energy relationships in the system acetone-diacetone alcohol. G. L. DAVIS and G. H. BURROWS (J. Amer. Chem. Soc., 1936, 58, 311–312).—The partial pressures of $COMe_2$ at 25° show that the mixture forms a perfect solution. The v.p. of diacetone alcohol (I) has been determined at 25° , 35° , and 45° . The free energy change and heat of reaction of transformation of $COMe_2$ into (I) have been calc.

E. S. H.

Condition of iodic acid and iodates in aqueous solution. N. R. DHAR and R. N. MITTRA (J. Indian Chem. Soc., 1935, 12, 771–773).—The coagulating power of aq. HIO_3 and KIO_3 on sols of $Be(OH)_2$, $Cr(OH)_3$, and $Th(OH)_4$, and the variation of mol. conductivity of aq. KIO_3 on dilution, indicate partial polymerisation. Evidence from Raman spectra is inconclusive.

E. S. H.

Mannitoldimolybdic acid.—See this vol., 453.

Strength of isomeric bases of the type $[Pt(NH_3)_2(OH)_2]$. A. A. GRÜNBERG and D. I. RJABTSCHIKOV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 259–262).—Titration of the *cis*-compound with 0.1N-HCl at room temp. gives a colour change with Mc-red when 80% of the theoretical amount of acid has been added owing to the formation of the weak acid $[Pt(NH_3)_2(H_2O)_2]^{++}$. The change $[Pt(NH_3)_2(H_2O)_2]Cl_2 \rightarrow [Pt(NH_3)_2Cl_2] + 2H_2O$ occurs on warming and the theoretical end-point may be attained. The *trans*-compound gives an end-point at room temp. corresponding with 50% of the theoretical amount of acid and this is attributed to the formation of $[Pt(NH_3)_2(H_2O)(OH)]Cl$. The final titration val. is obtained on warming.

R. S.

Colorimetric researches on naphthazarin and dibromonaphthazarin. L. BRÜLL and P. GIROTTI (Annali Chim. Appl., 1936, 26, 19–24).—The dissociation consts. of naphthazarin determined colorimetrically with KH_2PO_4 -NaOH and H_3BO_3 -KCl-NaOH buffers, and with NaOH, are $K_1 = 6.3 \times 10^{-9}$, $K_2 = 2.5 \times 10^{-11}$; those of dibromonaphthazarin, m.p. 163° (Ac_2 derivative, m.p. $212-213^\circ$), are $K_1 = 3.2 \times 10^{-7}$, $K_2 = 2.5 \times 10^{-10}$. The possibility of using naphthazarin as indicator in the colorimetric determination of p_H from 7 to 12 is considered; the quantities of naphthazarin in 0.1N-HCl and 0.1N-NaOH required to match the colour of a given solution at each p_H are tabulated.

E. W. W.

Application of the phase rule to systems containing distant phases. F. J. TROMP (J. Chem. Met. Soc. S. Africa, 1935, 36, 143–145; cf. A., 1934, 1307).—When the phase rule is applied to systems such as H_2O vapour in contact with separate solutions of different salts, the no. of components must be taken as $>$ the no. of constituents in the system and so the ordinary statement of the phase rule is inapplicable. The author's treatment can be extended to such systems without introduction of special assumptions.

J. W. S.

Crystalline varieties of the hydrated nitrites of barium and strontium: the hydrate $Sr(NO_2)_2 \cdot 4H_2O$. J. BUREAU (Compt. rend., 1936, 202, 307–309).— $Ba(NO_2)_2 \cdot H_2O$ exists in hexagonal and rhombic forms. The equilibrium diagram for $Ba(NO_2)_2 \cdot H_2O$ is described. $Sr(NO_2)_2$ forms the hydrate $Sr(NO_2)_2 \cdot 4H_2O$ (cubic), which undergoes a peritectic transformation into the hexagonal monohydrate at 15° .

H. J. E.

Decomposition pressures of the ammoniates of sodium and ammonium chlorides. S. ABE, K. WATANABE, S. SIGETOMI, and R. HAVA (J. Soc. Chem. Ind. Japan, 1936, 39, 18–20B).—The compounds $NaCl \cdot 5NH_3$ and $NH_4Cl \cdot 3NH_3$ have been prepared. Apparatus and methods for studying the decomp. are described. Results are given for the change $NaCl \cdot 5NH_3 \rightleftharpoons NaCl + 5NH_3$ over the temp. range -10° to -30° and for $NH_4Cl \cdot 3NH_3 \rightleftharpoons NH_4Cl + 3NH_3$ over the range 5° to -53° . Heats of formation are computed.

T. W. P.

Volatilisation of lead oxide from lead oxide-silica mixtures. E. PRESTON and W. E. S. TURNER (J. Soc. Glass Tech., 1935, 19, 296–311T).—Measurements at $900-1200^\circ$ for mixtures containing 53.96–99.8% of PbO show that the rate of volatilisation exhibits discontinuities which are attributed to the presence of $PbO \cdot SiO_2$, $2PbO \cdot SiO_2$, and $4PbO \cdot SiO_2$. The heats of decomp. and evaporation of these compounds are $-56,000$, $-49,000$, and $-30,000$ g.-cal. per mol., respectively. The v.p. of pure PbO at 1100° is 70 mm. of Hg. The general results confirm those previously obtained for the Na_2O-SiO_2 and K_2O-SiO_2 systems.

J. A. S.

Fusion curve of the system *o*- and *p*-cresols. S. TSURUTA (J. Chem. Soc. Japan, 1935, 56, 429–432).—Dawson and Mountford's results are confirmed (cf. J.C.S., 1918, 113, 923).

CH. ABS. (c)

The system: *p*-nitrotoluene-2-chloro-4-nitrotoluene-2 : 6-dichloro-4-nitrotoluene. O. J. MAGIDSON and V. A. SCHEVELEV (J. Appl. Chem. Russ., 1935, 8, 1431—1434).—The m.-p. diagrams afford no evidence of compound formation. R. T.

Equilibria in saturated solutions of salts occurring in sea-water. I. Ternary systems $\text{MgCl}_2\text{-KCl-H}_2\text{O}$, $\text{MgCl}_2\text{-CaCl}_2\text{-H}_2\text{O}$, $\text{CaCl}_2\text{-KCl-H}_2\text{O}$, and $\text{CaCl}_2\text{-NaCl-H}_2\text{O}$ at 0° . I. IGELSRUD [with T. G. THOMPSON] (J. Amer. Chem. Soc., 1936, 58, 318—322).—Equilibria have been determined at 0° . The KCl content of solutions saturated with $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ is very small. There is no evidence for double salt formation in the system $\text{CaCl}_2\text{-KCl-H}_2\text{O}$. E. S. H.

Thermodynamic study of systems of the type $\text{PbCl}_2\text{-RCl-H}_2\text{O}$ at 25° . V. E. HUNTER and A. J. ALLMAND (Trans. Faraday Soc., 1936, 32, 502—511; cf. A., 1933, 906).—The v.p. at 25° of solutions containing KCl and PbCl_2 in equilibrium with various solid phases and also of certain unsaturated solutions have been determined. The results do not agree with vals. calc. from electrometric data, which are probably not sufficiently accurate. Over a narrow concn. region abnormally high v.p., approaching that of pure H_2O , are obtained. In the region of normal v.p. there is evidence of the presence of complexes in the solution. O. J. W.

Ternary system $\text{NaCl-NaI-H}_2\text{O}$. J. E. RICOI and N. S. YANICK (J. Amer. Chem. Soc., 1936, 58, 313—315).—Solubility data at 10° , 25° , 50° , 75° , and 100° are recorded. Within this range neither double salts nor solid solutions are formed. E. S. H.

System mercuric iodide, caesium iodide, water. (JLLE.) M. PERNOT (Compt. rend., 1936, 202, 576—578).—The existence of $3\text{HgI}_2 \cdot 2\text{CsI}$, $\text{HgI}_2 \cdot 2\text{CsI}$, and $\text{HgI}_2 \cdot 3\text{CsI}$ has been confirmed. T. G. P.

System $\text{CaO-SO}_2\text{-H}_2\text{O}$. III. Precipitation temperatures. P. E. GISHLER and O. MAASS (Canad. J. Res., 1935, 13, B, 370—379).—A technique is described for measuring pptn. temp., and the results over a concn. range are tabulated. Colloidal matter causes supersaturation. $[\text{H}^+]$ and $[\text{HSO}_3^-]$ at the pptn. temp. have been calc. $[\text{H}^+]$ probably plays an important part in pptn., and the increased pptn. with rising temp. above the pptn. temp. is explained. HSO_3^- concns. for a range of CaO and SO_2 concns. from 50° to 90° are given. The system acts as a buffer in so far as HSO_3^- ions are concerned. E. E. A.

Fusion surface of the ternary system of organic compounds. I. T. ASAHINA and K. YOKOYAMA (J. Chem. Soc. Japan, 1935, 56, 415—428).—The system picric acid (I)- $\beta\text{-C}_{10}\text{H}_7\text{-OH}$ (II)-chalkone (III) has eutectic points at 70° [(I) 5.5, (II) 43, (III) 51.5%], 84° [(I) 25.5, (II) 16, (III) 58.5], and 103° [(I) 85, (II) 7.5, (III) 7.5%]. CH. ABS. (e)

Transformation of an incongruently fusing binary compound into a ternary eutectic. X. Carbamide-veronal-resorcinol. F. ADAMANIS (Rocz. Chem., 1935, 15, 546—553).—Thermal analysis indicates the existence of three 1 : 1 compounds, three ternary eutectics, and a peritectic. The system is

peculiar in that one of the compounds passes at the transition point into a ternary eutectic. R. T.

Specific heats of aqueous solutions of potassium chloride. C. J. B. CLEWS (Proc. Physical Soc., 1936, 48, 95—99).—Data for $15\text{--}45^\circ$ and 0.1—2.5*N* are tabulated. The temp. coeff. decreases with concn. N. M. B.

Heat content of sodium chloride in extremely dilute aqueous solutions. T. F. YOUNG and W. L. GROENIER (J. Amer. Chem. Soc., 1936, 58, 187—191).—Theoretical. The chord-area method has been applied to published data for heats of dilution. E. S. H.

Sodium hydroxide solutions. Heat of dilution at 20° . J. W. BERTETTI and W. L. MCCABE (Ind. Eng. Chem., 1936, 28, 247—248).—The heat of dilution has been determined at 20° for the concn. ranges 13.59—26.14 and 17.16—48.14% NaOH. Results are slightly lower than those of Fricke (A., 1929, 1386) but agree with those of Tucker (A., 1915, ii, 674) after correcting for sp. heat. R. S. B.

Heat of hydrogenation of diisobutylene. B. L. CRAWFORD, jun., and G. S. PARKS (J. Amer. Chem. Soc., 1936, 58, 373).—Direct calorimetric measurements give $\Delta H_{298}^\circ = -28,580 \pm 800$ g.-cal. for the reaction $\text{C}_8\text{H}_{16}(l) + \text{H}_2(g) = \text{C}_8\text{H}_{18}(l)$. E. S. H.

Electrolytic conductivity of calcium hydrogen sulphite solutions at 20° . (System $\text{CaO-SO}_2\text{-H}_2\text{O}$.) G. K. BERGMAN (Finnish Paper Timber J., 1935, Spec. Issue, 290—293).—Vals. for the conductivity of CaO-SO_2 solutions are given. The $[\text{CaO}]$ can be deduced from the conductivity and $[\text{SO}_2]$. CH. ABS. (e)

Properties of electrolytic solutions. XVII. Conductance of salts in benzene and dioxan. W. F. LUDER and P. B. KRAUS [with C. A. KRAUS and R. M. FUOSS] (J. Amer. Chem. Soc., 1936, 58, 255—258; cf. A., 1935, 705).—Data are given for tetraisoamylammonium iodide in C_6H_6 at 60° , for AgClO_4 in C_6H_6 at 25° , and for $\text{NBu}_4\text{-ClO}_4$ and $\text{NBu}_4\text{-OAc}$ in C_6H_6 and dioxan at 25° . The equiv. conductances show min. at low concns., below which they rise in accordance with the mass action law. A marked sp. effect of structure on conductance in solvents of very low dielectric const. is noted. E. S. H.

High- and low-frequency conductivities of solutions of electrolytes in glycerol and glycerol-water mixtures. J. HIEGEMANN (Ann. Physik, 1936, [v], 25, 337—358).—Published conductivity data for glycerol solutions agree with the square root law, but the slope is steeper than that required by the Debye-Onsager theory. Solutions of KCl and MgSO_4 in glycerol and glycerol- H_2O have been measured by the abs. method of Malsch, using a miniature thermostat (described). The results obtained are in close agreement with the requirements of the Debye theory for the solvents used. The ionic effects for both solutes are much $>$ any previously reported. W. R. A.

New method of determining hydration of SO_4^{2-} from the electrolytic transport of water. J. BABOROVSKÝ (Chem. Listy, 1936, 30, 5—6).—The hydration of SO_4^{2-} cannot be determined directly, owing to the solubility of the depolarisers which

have to be used; an indirect method is proposed, based on measurement of the electrolytic transport of H_2O in a cell consisting of Ag-AgCl electrodes in $N-KCl$, separated by parchment-paper diaphragms from a central chamber containing an equiv. concn. of K_2SO_4 . R. T.

Electrochemical study of lithium, rubidium, and silver bromides in a solution of aluminium bromide in ethyl bromide. V. A. PLOTNIKOV and E. J. GORENBEIN (J. Gen. Chem. Russ., 1935, 5, 1434—1440).—The val. of the max. sp. conductivity of the system $MBr-AlBr_3-EtBr$ falls in the series $Ag > Li > Cu > K > Rb$. Except with $AgBr$, Al is deposited at the cathode in all the systems, the decomp. potentials being: $LiBr$ 2, $RbBr$ 1.66, $AgBr$ 1.3 volts. R. T.

Electrochemical study of solutions of acetamide in bromine. V. A. PLOTNIKOV and S. I. JAKUBSON (J. Gen. Chem. Russ., 1935, 5, 1337—1341).—The conductivity max. corresponds with NH_2Ac_6Br ; Br is liberated at the anode, and NH_2Ac at the cathode. R. T.

Metal-metal potential in the e.m.f. of electrochemical cells. E. LANGE and K. NAGEL (Z. Elektrochem., 1936, 42, 50—65).—Theoretical. The source of the e.m.f. is discussed. E. S. H.

Electrode potential of iron in relation to hydrogen-ion concentration. J. W. SHIPLEY and J. H. SHIPLEY (Canad. J. Res., 1936, 14, B, 31—40).—The final electrode potentials observed when Fe has been immersed for several days in phosphate, borate, and citrate buffers show sharp falls of 0.74, 0.75, and 0.77 volts which occur at p_H 3.1—4.0, 4.3—4.6, and 10.1—10.9, respectively, for the three series of buffer solutions. Bubbling H_2 or O_2 through the solutions has little effect, but the presence of Cl^- causes the breaks to be less marked and displaces them to higher vals. of p_H . Corrosion takes place when the p_H vals. are below those at which the breaks occur. It is suggested that the electrode potential is determined by the presence or absence of a non-conducting film on the Fe . L. A. O'N.

Diffusion potentials and mobilities of ionised gelatin. II. Neutral and alkaline solutions. E. B. R. PRIDEAUX (Trans. Faraday Soc., 1936, 32, 576—582; cf. A., 1935, 300).—Diffusion potentials of K gelatinate have been determined in dil. solutions at p_H 6—10. The calc. mobility of the gelatin anion, nearly 40, agrees fairly with that found (A., 1932, 470) in much more conc. solutions. F. L. U.

Decomposition and equilibrium reaction potentials of fused potassium chloride. R. C. KIRK and W. E. BRADT (Trans. Electrochem. Soc., 1936, 69, Preprint, 75—88).—The decomp. voltage of fused KCl at 800° is 2.8 volts. By substituting a Cl_2 anode and using a supplementary cathode the equilibrium potential of the cell $K|KCl|Cl_2$ has been determined. The p.d. between anode and cathode increases almost linearly with increasing anodic c.d., and reaches a max. val. of 3.37 volts when the anodic c.d. is 1.0 amp. per sq. cm., which is in close agreement with the calc. val. of 3.32 volts for a cell with Cl_2 at atm. pressure. With graphite electrodes depolarisation may reach 0.47 volt, and

is attributed either to anodic formation of CCl_4 or to liberation of K carbide at the cathode.

J. W. C.

Oxidation potential of the system potassium molybdocyane-potassium molybdicyanide, and the effect of neutral salts on the potential. I. M. KOLTHOFF and W. J. TOMSICEK (J. Physical Chem., 1936, 40, 247—255; cf. A., 1935, 1462).—The normal potential of the system, extrapolated to zero ionic strength, is 0.7260 volt at 25° . Neutral salts increase the oxidation-reduction potential to a large extent. For univalent cations the effect decreases in the order $K^+ = NH_4^+ > Na^+ > Li^+ > H^+$. Bivalent cations at the same ionic strength have a much greater effect decreasing in the order $Ba^{++} > Sr^{++} > Ca^{++}$. The vals. of $\log f_3/f_4$, calc. from experimental data, are respectively $<$ and $>$ those calc. from the Debye-Hückel expression. M. S. B.

Polarographic studies with the dropping mercury electrode. III. Cause of maxima on current-voltage curves. D. ILKOVIČ (Coll. Czech. Chem. Comm., 1936, 8, 13—34).—Certain assumptions lead to the view that the intensity of the electric field is large close up to the dropping Hg electrode and falls rapidly towards the interior of the solution. This field attracts charged particles and dipoles much more strongly than the electrokinetic potential, and during the action of the "charging (non-faradic) current," the electrically adsorbable particles of the depolariser are drawn into and stored in this non-homogeneous field. If the applied e.m.f. is so large that the rate of exhaustion of the depolariser is $>$ its rate of adsorption, polarisation starts at the electrode surface, destroying the non-homogeneous field in solution and leaving a very steep fall of potential very close to the interface. From this theory, conditions are derived mathematically, and confirmed by experiments with 0.002—0.01N- KCl containing air, under which a large "adsorption current" and a small "diffusion current" with transition of the former into the latter appear on current-time curves during the charging in the formation of a single Hg drop at const. applied e.m.f. The current-voltage curve derived from these curves is confirmed experimentally. The theory explains the origin of the max. arising in current-voltage curves under various conditions with the dropping Hg cathode and predicts conditions under which similar max. may be realised with large stable Hg electrodes. J. G. A. G.

Simultaneous discharge of cadmium and hydrogen ions from solutions of simple salts of cadmium. O. ESSIN, T. BEKLEMISHEVA, and A. MATANTZEV (J. Gen. Chem. Russ., 1935, 5, 1383—1386).—An equation connecting the amount of Cd deposited per unit of current with the concn. of acid present (A., 1935, 310) has been verified for solutions of 0.25—1.0N- $CdSO_4$ in 0.1—10N- H_2SO_4 , for currents of 0.005—0.1 amp. per sq. cm., at 25° . R. T.

Overvoltage and electrolytic separation of hydrogen isotopes. J. HORIUTI and G. OKAMOTO (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1936, 28, 231—242; cf. A., 1934, 153, 258).—Overvoltage

and current, and the velocity of exchange between H and D at an anodically polarised Ni-H electrode in 0.001*N*-H₂SO₄, and in contact with H₂ containing 3% of D₂, have been determined. Parallel measurements of the electrolytic separation factor have been made. A theory of the electrode processes is put forward, and an explanation of Tafel's empirical equation is given. F. L. U.

Polarisation discharges in multiple electrode systems. H. HUNT, J. F. CHITTUM, and H. M. GRUBB (J. Physical Chem., 1936, 40, 239—245).—The conditions governing the production of currents between polarised exploring electrodes immersed in an electrolytic cell have been investigated. The phenomena observed originate in the polarisation at the ends of the electrodes and in the differential polarisation of each of the current electrodes at different points on the surface. The significance of these phenomena in electrolytic investigations is indicated. M. S. B.

Anode process in electrolysis of aqueous alkali chloride solutions with impregnated and non-impregnated graphite electrodes. I. II. Liberation of chlorine and oxygen at the anode. III. Influence of impregnation of the graphite electrode on the anode process. V. S. JOFFE. IV. Electro-capillary phenomena. V. S. JOFFE and M. M. STROGANOV (Z. Elektrochem., 1936, 42, 71—76, 76—79, 79—82, 82—85).—I. The distribution of current between the outer surface of the porous electrode and the inner pore surface depends on the resistivity of the electrode and on the nature of the p.d.-c.d. relation. Discharge of ions occurs throughout the whole cross-section of the electrode, but is conc. mainly in the outer layer. When the pores are filled by impregnation with linseed oil, electrolysis occurs only at the outer surface.

II. The ratio O₂:Cl₂ is greater in the anode gas liberated in the pores than in that liberated at the outer surface of the electrode, and passes through a min. at medium c.d.

III. The polarisation of the graphite anode in aq. NaCl has been studied. Under certain conditions of impregnation with oil, oxidation of C occurs and the anode suffers disruption.

IV. During anodic polarisation the electrolyte displaces air from the non-impregnated and oil from the impregnated graphite electrode. E. S. H.

Electrometallurgy of aluminium. P. DROSSBACH (Z. Elektrochem., 1936, 42, 65—70).—The equilibrium Na₃AlF₆-Li₃AlF₆-Al₂O₃ has been investigated at 750—1000°. Current efficiency and polarisation potential in the electrolysis of such mixtures have been determined. E. S. H.

Passivity of iron and steel in nitric acid solution. VIII. Y. YAMAMOTO (Bull. Inst. Phys. Chem. Res. Japan, 1936, 15, 15—21; cf. A., 1934, 1463).—The ability of HNO₃ to render Fe passive is increased and the concn. at which the effect appears is lowered by the addition of nitrates, with the exception of Cu(NO₃)₂. HNO₂ and higher nitrates of the metals are formed. AgNO₃ is especially effective and causes passivity in relatively dil. solutions of HNO₃. R. S. B.

Valency-linking shifting in cyclanes. J. BÖESEKEN (Proc. K. Akad. Wetensch. Amsterdam, 1936, 39, 28—30; cf. A., 1932, 269).—The influence of 1-hydroxycyclo-heptane-, -hexane-, -pentane-, -butane-, and -propane-1-carboxylic acids on the conductivity of 0.5*M*-H₃BO₃ has been determined and compared with corresponding data for disubstituted glycollic acids. Saturated ring compounds with > 5 members increase the conductivity to the same extent as the open-chain compounds, but in the case of 3- and 4-C rings the effect is much less. It is inferred that the valency linkings in rings containing < 5 C are shifted by the ring-closure. R. S.

Explosive reactions and analytical geometry. W. P. JORISSEN (Chem. Weekblad, 1936, 33, 83—90).—The factors governing the form of the curves representing the explosion limits of ternary gaseous mixtures are discussed. D. R. D.

Pressure dependence of unimolecular reactions. E. A. STEWARDSON (Phil. Mag., 1936, [vii], 21, 233—248).—Theoretical. The chance that an activated mol. in a quasi-unimol. reaction will dissociate, and the ratio (*r*) of the velocity coeffs. (*k*) of the unimol. and bimol. reactions are calc. In agreement with experiment it is inferred that increases in temp. and pressure produce changes in *r* in opposite directions, and that the addition of a light gas will maintain the unimol. rate. Good agreement is obtained with the dissociation of N₂O, except at low pressures, giving an average life of an activated complex (*τ*) of 10⁻¹¹ sec. With other reactions agreement is poor, but *τ* may be approx. estimated to be 10⁻⁶—10⁻⁸ sec. *d*(log *k*)/*dT* is greater for the bimol. than for the unimol. reaction by $\frac{1}{2}T$. R. S. B.

Limits of inflammability of hydrogen and deuterium in oxygen and in air. W. PAYMAN and H. TITMAN (Nature, 1936, 137, 190).—The upper and lower limits of inflammability of D₂ in O₂ and in air at 1 atm. differ slightly from those of corresponding mixtures with H₂. L. S. T.

Prevention of gas explosions by controlling oxygen concentration.—See B., 1936, 177.

Explosion limits. I. Influence of argon, nitrogen, helium, and carbon dioxide on explosion limits of hydrogen, carbon monoxide, methane, and butane in air. II. Occurrence of explosion limits, their dependence on the pressure, and the influence of dilution with an inert gas. J. VAN HEININGEN (Rec. trav. chim., 1936, 55, 65—75, 85—100).—I. The extinguishing action of the four gases is in all cases in the order CO₂ > He > N₂ > A (cf. Coward and Hartwell, A., 1926, 805). Addition of inert gas mainly affects the upper explosion limits, the lower limit depending little on the nature and amount of inert gas. The curves delimiting the explosion region of one particular combustible gas, obtained on the addition of the four inert gases, form a family having a common axis and intersecting only at the two explosion limits for 0% of inert gas.

II. A simple mathematical treatment of explosion limits is given without recourse to the theories of chain mechanisms. Assuming that the velocity of

reaction of two gases A and B is bimol. obeying the relation $s = kC_A \cdot C_B$, where s is the velocity, the usual curve of the equation $s = f(x)$, where x is the no. of g.-mol. of A and $1-x$ is the no. of g.-mol. of B present in v litres, is deduced. For certain vals. of s when reactions become explosive, two explosive limits occur at different concns. The effect of the change of thermal conductivity with concns. shows that the explosive limits are not given by the intersections of the parabola $s = f(x)$ with a straight line parallel to the X axis. The conclusion is reached, with certain assumptions, that two explosive limits occur at high pressures and approach one another as the pressure is decreased. Dilution with an inert gas is considered and an equation deduced which covers certain of the experimental results. The sp. action of an inert gas can be explained if it is assumed to influence the reaction const. and an equation is derived for this effect, but if the changes in thermal conductivity are taken into account, A , N_2 , He , or CO_2 appear to have no appreciable influence on the reaction const.

D. C. J.

Limits and speeds of detonation of some gaseous mixtures. J. BRITON and P. LAFFITTE (Compt. rend., 1936, 202, 316—318; cf. A., 1934, 969).—Vals. are given for the upper and lower limits and velocity of detonation for the following mixtures: $C_3H_8-O_2$, $C_4H_{10}-O_2$, $C_2H_2-O_2$, C_2H_2 -air, NH_3-O_2 , Et_2O-O_2 , Et_2O -air, for the effect of pressure (1—8.7 atm.) on the limits for H_2-O_2 and H_2 -air explosions, and for the effect of small additions of H_2 on the lower limit for $CO-O_2$ mixtures. $PbEt_4$ has no appreciable influence on the detonation limits.

H. J. E.

Thermal study of the oxidation of hydrocarbons. (MLLE.) S. ESTRADÈRE (Compt. rend., 1936, 202, 217—219).—A relationship is determined between inflammation temp. of hydrocarbons and the no. of C atoms; it is considered to run parallel with their octane nos.

T. G. P.

Temperature and latent energy in flame gases. W. T. DAVID (Phil. Mag., 1936, [vii], 21, 280—281; cf. A., 1935, 138, 598).—The temp. measured by a thin Pt-Rh wire in the flame gases on combustion at const. pressure of various gas mixtures for which the ideal calc. temp. is 1900° has been recorded. The measured temp. ranges from 1390° to 1745° and corresponds with latent energies of 28—8% of the heat of combustion. Similar data are given for mixtures which have the same measured temp., viz., 1550° . The long-lived latent energy depends on the nature of the combustible gas and of the diluents, and on the pressure.

R. S. B.

Thermal decomposition of ethane. I. Probability of decomposition into two methyl radicals and into ethylene and hydrogen. II. Collision efficiency in activation and mean life in activated state. H. SACHSSE (Z. physikal. Chem., 1935, B, 31, 79—86, 87—104).—I. In the decomp. at $560-590^\circ$ $[H]$ is \sim twice as great as corresponds with the equilibrium $H_2 \rightleftharpoons 2H$ in pure H_2 , showing that part of the C_2H_6 decomposes primarily into Me radicals, which form H atoms by chain reactions. $[H]$ is, however, only about 0.001 of the val. calc. assuming,

according to the Rice-Herzfeld theory (A., 1934, 369), that all the C_2H_6 decomposes by chain reactions initiated by the formation of Me. Hence only a small part of the C_2H_6 decomposes primarily into radicals.

II. The effect of pressure on the reaction velocity at $856-910^\circ$ abs. leads to the equation $\log k = 14.1 - 69,800/2.3RT$ for the velocity at infinite pressure. It appears that deactivation occurs in only 1 in $\sim 10^{25}$ collisions between an active and a normal mol. The life of an active mol. is 10^{-6} sec. The theory of "kinetically-effective degrees of freedom" (cf. A., 1927, 26) is criticised.

R. C.

Mechanism of, and constitutional factors controlling, the hydrolysis of carboxylic esters.

VIII. **Energies associated with induced polar effects in the hydrolysis of substituted benzoic esters.** C. K. INGOLD and W. S. NATHAN (J.C.S., 1936, 222—225).—The rate of alkaline hydrolysis of $p-C_6H_4X \cdot CO_2Et$, in which it is assumed that induced polar effects are isolated from local disturbances, has been determined in aq. 85 wt.-% EtOH at 25° and 50° . The velocity coeff., k , varies with the substituent, X , thus, $NH_2 < OMe < Me < H < Cl < I < Br < NO_2$ over a 5000-fold range. The activation energy, E , decreases from 20,000 to 15,000 g.-cal. thus, $NH_2 > OMe > Me > H > \text{halogens} > NO_2$. The linear relation between E and $\log k$ corresponds with a const. val. of B in $k = Be^{-E/RT}$, and the similar relation, considered on the same scale, between existing data for the acid-catalysed bromination of substituted CPhMe (A., 1935, 1209) is not inconsistent with a const. val. of B .

J. G. A. G.

Kinetic salt effect in saponification of ester ions. R. F. NIELSEN (J. Amer. Chem. Soc., 1936, 58, 206—215).—A conductivity method has been used to study the hydrolysis of Et_1 esters of malonic, succinic, and adipic acids, and a photometric comparison method for $EtHC_2O_4$ and the betaine ester $(NEt_3 \cdot CH_2 \cdot CO_2Et)ClO_4$ (I). No effect of the distance of the reacting group from the charge was observed for the four homologous ions. The kinetic salt effect for hydrolysis of (I) at ionic strengths down to 0.0001 is that given by the Brönsted-Debye equation for vals. of $\sqrt{\mu} < 0.1$.

E. S. H.

Influence of heavy water on the rate of esterification of benzoic acid in ethyl-alcoholic hydrogen chloride. A. KAILAN and H. HORNÝ (Ber., 1936, 69, [B], 437—440).—Under like mol. conditions the rate of esterification of BzOH by EtOH containing HCl is diminished less by D_2O than by H_2O .

H. W.

$\alpha\alpha$ -Dimethylacetoacetic acid. Hydrolysis of the ethyl ester. Ketonic decomposition. Reaction with iodine and bromine. Dissociation constant. K. J. PEDERSEN (J. Amer. Chem. Soc., 1936, 58, 240—246).—The rates of (a) hydrolysis of the Et ester at 0° and 25° , (b) ketonic decomp. of the acid in mixtures of HCl and NaCl at 25° and 35° , (c) ketonic decomp. of the ion at 25° and 35° , (d) reaction of the acid with I and Br at 25° have been studied. It is unlikely that the acid reacts directly with halogen; an intermediate enol form is probable. It appears that the CO_2 cleavage of β -ketocarboxylic acids leads directly to the enol form of the reaction

product. This reacts instantaneously with free halogen; in absence of halogen it is transformed into the corresponding ketone. The dissociation const. of the acid in solutions containing NaCl has been determined at 25° and 35°.

E. S. H.

Course of reaction in the alkaline hydrolysis of solutions of sodium chloroacetate. H. M. DAWSON and E. R. PYCOCK (Proc. Leeds Phil. Soc., 1935—1936, 3, 135—140; cf. A., 1934, 847).—The alkaline hydrolysis of $\text{CH}_2\text{Cl}\cdot\text{CO}_2\text{Na}$ (I) in presence of excess of alkali is a bimol. reaction. When excess of (I) is present the reaction of $\text{CH}_2\text{Cl}\cdot\text{CO}_2'$ with H_2O , $\text{CH}_2\text{Cl}\cdot\text{CO}_2'$, and $\text{OH}\cdot\text{CH}_2\cdot\text{CO}_2'$ must also be considered.

H. J. E.

Kinetics of thermal polymerisation of styrene. H. MARK and R. RAFF (Z. physikal. Chem., 1936, B, 31, 275—291).—The rates of polymerisation of the solution in PhMe at 98.2° and of the pure liquid at 60—98° have been determined. Assuming that the polymerisation consists in (1) a bimol. thermal formation of doubly unsaturated nuclei followed by (2) a bimol. growth of the mol. chains, and applying the theory previously described (A., 1935, 1206), it is deduced that the ratio of the rate of (1) to that of (2) is $\sim 8 \times 10^{-6}$, the ratio of the steric factors is $\sim 7.5 \times 10^{11}$, and the energies of activation are ~ 30 and ~ 8 kg.-cal., respectively.

R. C.

Appearance of radicals in thermal decomposition of organic molecules. F. PATAT and H. SACUSSE (Z. physikal. Chem., 1935, B, 31, 105—124).—In the formation of Me by decomp. of such substances as COMe_2 , a steady $[\text{Me}]$ has a corresponding steady $[\text{H}\cdot]$, so that the former may be deduced from the latter. In the thermal decomp. of MeCHO , EtCHO , and COMe_2 free Me radicals are formed, but in amount far too small to account for the whole of the decomp. by a chain reaction (cf. A., 1934, 369). The smaller is the difference between the experimentally determined heat of activation and the heat of activation of the first step of the decomp. into radicals, i.e., the energy required to break the weakest linking, the more radicals are formed in a thermal decomp. The decomp. into radicals which involves the simplest spatial rearrangements occurs by preference.

R. C.

Velocity of formation of compounds of higher order, with special reference to the streaming process for investigating very rapid reactions. A. THIEL and A. LOGEMANN (Sitzungsber. Ges. Beförd. ges. Naturwiss. Marburg, 1934, 69, 50—188; Chem. Zentr., 1935, i, 2939).—Colorimetric study of the kinetics of the formation of $[\text{Fe}(\text{phenanthroline})_3]\text{SO}_4$ indicate the initial formation of a 1:1 compound. A streaming method, using photoelectric registration, is described for the investigation of reactions proceeding to completion within 5×10^{-4} sec.

J. S. A.

Mechanism of aromatic side-chain reactions with special reference to the polar effects of substituents. VII. **Attack at a saturated carbon atom by a charged ion.** J. W. BAKER and W. S. NATHAN (J.C.S., 1936, 236—241).—The kinetics of the equilibrium $\text{C}_6\text{H}_4\text{X}\cdot\text{CH}_2\text{Br} + \text{CH}_2\text{Ph}\cdot\text{NC}_5\text{H}_5\text{NO}_3 \rightleftharpoons \text{C}_6\text{H}_4\text{X}\cdot\text{CH}_2\cdot\text{O}\cdot\text{NO}_2 + \text{CH}_2\text{Ph}\cdot\text{NC}_5\text{H}_5\text{Br}$, where X is H,

p-Me, *p*-Et, *p*-Bu', *p*-NO₂, or $\text{C}_6\text{H}_4\text{X}$ is 2:4- $\text{C}_6\text{H}_3(\text{NO}_2)_2$, have been investigated in COMe_2 at 20° and 40°. The energy of activation (18.4—18.9 kg.-cal.) is independent of X and is identical for the forward and reverse reactions. In all cases the equilibrium is largely displaced towards the left, probably owing to an orientation effect when NO_3' attacks the C atom. The velocity coeff. varies with X thus: $\text{H} < \text{Bu}' < \text{Et} < \text{Me} < \text{NO}_2 < 2:4\text{-(NO}_2)_2$. The variations fall within a 20-fold range and are accounted for by changes in the probability factor which is of the order of unity (cf. A., 1935, 1208).

J. G. A. G.

[Addition of bromine to] unsaturated acids.—See this vol., 454.

Mechanism of substitution at a saturated carbon atom. VI. Hydrolysis of isopropyl bromide. E. D. HUGHES, C. K. INGOLD, and U. G. SHAPIRO (J.C.S., 1936, 225—236).—The rate of hydrolysis of Pr^iBr by OH' has been determined in aq. 60 and 80 vol.-% EtOH at 45—75°. At very low $[\text{OH}']$, the kinetically unimol. substitution, $\text{S}_{\text{N}}1$, occurs without elimination of C_3H_6 , and at higher $[\text{OH}']$ a bimol. substitution reaction, $\text{S}_{\text{N}}2$, supervenes concomitantly with the elimination of C_3H_6 in a second-order reaction, $\text{E}2$. The temp. coeff. leads to the activation energies: $\text{S}_{\text{N}}1$ 22,690 g.-cal., $\text{S}_{\text{N}}2$ 20,760, $\text{E}2$ 22,100, and $\text{S}_{\text{N}}2 + \text{E}2$ 21,490 in 60% EtOH , and slightly higher vals. in 80% EtOH . By adding H_2O to the solvent, $\text{S}_{\text{N}}1$ is accelerated, $\text{S}_{\text{N}}2$ is slightly retarded, and $\text{E}2$ is more strongly retarded. These results accord with theory and the data are not invalidated by the formation of EtOPr^i , especially in 80% EtOH . The priority of Taylor's mechanism (A., 1935, 1465) is disputed.

J. G. A. G.

Velocity of decomposition of diazo-compounds in water. XIX. E. YAMAMOTO (J. Soc. Chem. Ind. Japan, 1936, 39, 15—17B).—*k* of decomp. of azobenzene-*p*-diazonium chloride (I) at 40—50°, and of azo-*o*-toluene-*p*-diazonium chloride (II) at 25—40° have been measured. Relative vals. of stability ($1/k$) of 36 diazo-compounds are tabulated. If $1/k$ for $\text{PhN}_2\text{Cl}=1$, that of (I) is 3.3, and that of (II) 6.2.

E. W. W.

Influence of degree of acidity on velocity of diazotisation.—See this vol., 465.

Hydrolysis of nucleotides by acids. H. ISHIKAWA (J. Biochem. Japan, 1935, 22, 385—395).—Rates of hydrolysis by dil. H_2SO_4 of guanylic, xanthylic, inosinic, and adenylic acids, guanosine and xanthosine, and ribosephosphoric acid were determined.

F. O. H.

Interaction of light and heavy water with aluminium carbide and calcium phosphide. R. M. BARRER (Trans. Faraday Soc., 1936, 32, 486—490).—The decomp. of Al_4C_3 by liquid H_2O has an apparent energy of activation of 14,200 kg.-cal. The reaction rates for H_2O and D_2O are in the ratio 3.9:1 at 273° abs., corresponding with a zero-point energy difference of 750 g.-cal. There is no evidence of a tunnelling mechanism at this temp. The decomp. of Ca_3P_2 by H_2O vapour is governed by a diffusion

process. The rates of decomp. by H_2O and D_2O vapours are in the ratio of the v.p. of H_2O and D_2O .

O. J. W.

Rates of interaction of proto- and deuterio-hydrogen and methane with charcoal. R. M. BARRER (Trans. Faraday Soc., 1936, 32, 481—486).—The rates of chemisorption of H_2 and D_2 and of CH_4 and CD_4 on charcoal have been measured. The differences in rate of sorption are due to zero-point energy differences, which are 770 and 750 g.-cal., respectively. The expression $k_{\text{H}_2}/k_{\text{D}_2} = Ae^{-\Delta E/RT}$ gave a val. of $A=1$. No penetration of energy barriers could be detected. The ratio of the velocities decreased in both sorptions with rise in temp.

O. J. W.

Oxidation of carbon. J. D. LAMBERT (Trans. Faraday Soc., 1936, 32, 452—462).—The kinetics of the oxidation of several kinds of C have been investigated at 250—500° by a dynamic method, in order to distinguish between the two types of process which are possible, viz., (1) direct formation of CO_2 by impact of O_2 mols. on a clean C surface, and (2) primary formation of both CO_2 and CO by the breakdown of surface oxide complexes. Pure graphite and diamond showed only process (1), activated coconut charcoal showed (1) with a trace of (2), and activated anthracite, containing much Fe, showed only (2). Treatment of coconut charcoal with FeCl_3 under suitable conditions gave a product closely resembling anthracite in its behaviour on oxidation.

O. J. W.

Kinetics of the oxidation of spherules and metallic powders. G. VALENSI (Compt. rend., 1936, 202, 309—312; cf. A., 1935, 1466).—An expression is developed for the rate of oxidation of a solid, the grains of which are protected by oxide films. Measurements on the oxidation of powdered Ni support the theory. The oxidation of non-spherical particles may be considered in terms of an "equiv. sphere."

H. J. E.

Velocity of corrosion of duralumin.—See B., 1936, 200.

Reactions in monolayers of drying oils. I. Oxidation of the maleic anhydride compound of β -elæostearin. G. GEE and E. K. RIDEAL. II. **Polymerisation of the oxidised forms of the maleic anhydride compound of β -elæostearin.** G. GEE (Proc. Roy. Soc., 1935, A, 153, 116—128, 129—141).—I. The mechanism of "drying" of a monolayer of the maleic anhydride compound of β -elæostearin on dil. acid substrates has been examined by means of a determination of the surface pressure and phase boundary potentials. A primary unstable peroxide, XO_2' , is first formed, which can then form either a stable isomeride, XO_2 , or be converted into a polymeride; the stable isomeride is also capable of forming the polymeride. At low temp. and high pressures the polymerisation of XO_2' occurs so rapidly that the whole reaction is pseudo-unimol. At higher temp. and pressures of the order of 5—6 dynes per cm. the two processes can be observed to proceed successively. The reactions $\text{X} \rightarrow \text{XO}_2' \rightarrow \text{XO}_2$ are unimol. with energies of activation of 6500 and 19,000 g.-cal. per mol., respectively.

II. The kinetics of polymerisation are discussed; a steric factor alone is sufficient to account for the form of the curves obtained. Chain-breaking materials may be (a) inserted in the substrate like quinol, or (b) inserted in the film itself like Etmyristate. The polymerisations of the unstable peroxide and of its stable isomeride have energies of activation of the order of 5000 and 20,000 g.-cal. per mol., respectively.

L. L. B.

Influence of constitution of the oxidised substances on the activity of catalysts for oxidation by concentrated sulphuric acid, and influence of temperature on the catalysts. J. MILBAUER (Bull. Soc. chim., 1936, [v], 3, 218—221).—Tests with numerous catalysts for the Kjeldahl reaction show that the efficiency of the catalyst depends on the constitution of the substance to be oxidised, and on the temp.

E. S. H.

Autoxidation. V. Induction period in autoxidation. H. N. STEPHENS (J. Amer. Chem. Soc., 1936, 58, 219—224; cf. A., 1934, 607).—A study of the effect of purification and the influence of addenda shows that the induction period in the autoxidation of cyclohexene is due to the presence of inhibitors.

E. S. H.

Oxidation of aqueous sulphite solutions in presence of pyridine. II. Autoxidation of aqueous sulphite solutions. Mechanism of sulphite autoxidation. P. BAUMGARTEN (Ber., 1936, 69, [B], 229—242; cf. A., 1932, 1216).—Autoxidation of SO_3'' in presence of $\text{C}_5\text{H}_5\text{N}$ gives 1-pyridinium-sulphonic acid and small amounts of 2- and 3-pyridyl-pyridinium salts isolated as the perchlorates. In presence of sufficient $\text{C}_5\text{H}_5\text{N}$ the yields diminish with increasing $[\text{SO}_3'']$, and reaction is best effected by passing a stream of air slightly laden with SO_2 through a well-stirred solution of $\text{C}_5\text{H}_5\text{N}$ in H_2O . The change does not occur in absence of air. Unlike EtOH , $\text{C}_5\text{H}_5\text{N}$ accelerates the autoxidation of HSO_3' owing to the increase of $[\text{SO}_3'']$ which it causes. In the initial stages of the change autoxidation of SO_3'' by $\text{C}_5\text{H}_5\text{N}$ is not restricted, but subsequently such effect is obvious, due to increase of $[\text{OH}']$. Inhibition occurs only within narrow p_{H} range. The theories of SO_3'' autoxidation are discussed.

H. W.

Enzymic fission of glucosides in heavy water.—See this vol., 520.

Alcoholic fermentation in heavy water.—See this vol., 522.

Mechanism of reactions between solid phases and a gaseous phase. M. BLUMENTHAL (Bull. Acad. Polonaise, 1935, A, 287—307).—The general properties of surface reactions are investigated theoretically.

T. G. P.

Adsorption and heterogeneous catalysis. I. KEMP (Chem. and Ind., 1936, 138).—Concerning terminology (cf. this vol., 298).

J. G. A. G.

Conjugated catalytic phenomena. [Catalysis by binary and ternary mixtures.] J. MILBAUER (Coll. Czech. Chem. Comm., 1936, 8, 1—12).—The catalysis of the oxidation of CO by 95.6% H_2SO_4 at 237° has been investigated by a flow method. The final rate of oxidation catalysed by mixtures of

As and Se oxides is independent of As oxides and $\propto [\text{SeO}_2]$. Pd is a very strong catalyst, of which the action is enhanced by HgSO_4 and raised to a max. by 10–30% of Ag_2SO_4 , but is markedly depressed by Se. Sp. proportions of HgSO_4 and Ag_2SO_4 , separately, raise the catalytic activity of SeO_2 to max. vals. Mixtures of HgSO_4 and Ag_2SO_4 are better catalysts than the single salts, whilst an approx. 1:4 CuSO_4 – HgSO_4 mixture has a max. catalytic activity. The effect on the reaction velocity of varying the composition of ternary catalysts is represented quantitatively by triangular diagrams. Catalysis by the systems Pd+Se+Ag, Hg+Se+Ag, Pd+Hg+Ag, Cu+Hg+Se was < the max. vals. obtained with the binary systems. J. G. A. G.

Catalytic interaction of ammonia with deuterium. A. FARKAS (Trans. Faraday Soc., 1936, 32, 416–427).—The exchange of H atoms between D_2 and NH_3 has been investigated on an Fe catalyst at 160–230°/30–400 mm. The rate of the exchange reaction is independent of NH_3 pressure and increases with pressure of D_2 . The apparent heat of activation is 15 kg.-cal. The *o-p* conversion of H_2 and of D_2 and the reaction $\text{H}_2 + \text{D}_2 = 2\text{HD}$ are much faster than the exchange reaction. For the *o-p* conversions the activation energy is 8–9 kg.-cal. The conversion is inhibited by NH_3 . The exchange reaction proceeds by the following reactions in the adsorption layer: $\text{NH}_3 \rightarrow \text{NH}_2 + \text{H}$, $\text{D}_2 \rightarrow 2\text{D}$, $\text{D} + \text{H} \rightarrow \text{HD}$, $\text{D} + \text{NH}_2 \rightarrow \text{NH}_2\text{D}$. The last of these is the slowest and rate-determining step. O. J. W.

Thermal decomposition of light and heavy ammonia and phosphine on tungsten. R. M. BARRER (Trans. Faraday Soc., 1936, 32, 490–501).—Velocity measurements have been made for the thermal catalytic decomp. on W filaments (α) of NH_3 between 6×10^{-2} and 6×10^{-4} cm. and 950–1150° abs., and (β) of PH_3 between 10^{-1} and 2×10^{-4} cm. and 800–970° abs. On various W catalysts and in the early stages of the reaction (α) was of zero order, but towards the end of decomp. or at the lowest *p* the velocity diminished as the NH_3 pressure decreased. Reaction (β) was of first order at $p = 10^{-4}$ to 5.0×10^{-3} cm. and became of approx. zero order at about 10^{-1} cm. The rate-determining step in both reactions involves a rearrangement of a H linking, since differences were found in zero-point energy of 800–900 g.-cal. for NH_3 and ND_3 , and 550 g.-cal. for PH_3 and PD_3 . H_2 and N_2 have no influence on the rate of catalytic decomp. of NH_3 , but O_2 produces a temporary poisoning of the catalyst. The energies of activation, measured by a compensating filament method, are 42,400 g.-cal. for the zero order NH_3 decomp., 25,000 g.-cal. for the first order and 32,200 g.-cal. for the zero order PH_3 decomp. O. J. W.

Siderite as basic material for the catalytic synthesis of ammonia.—See B., 1936, 190.

Centrifugal transformation of a thin layer of copper sulphide under the influence of metallic copper; interruption of this transformation by a separation of 1 Å. H. DEVAUX (Compt. rend., 1935, 201, 1305–1307).—A piece of Cu, Fe, Zn, Ni, Al, or Sn placed in contact with the thin layer of CuS

deposited on the surface of aq. CuSO_4 by H_2S induced a change which ultimately extended some distance around the metal. The reaction ceased when the film was so thin that the mols. were judged to be 0.6–1.0 Å. apart. The rate of the reaction $\propto \sqrt{\text{temp.}}$ (approx.). T. G. P.

Catalytic reduction of carbon dioxide to methane and higher hydrocarbons.—See B., 1936, 180.

[Catalytic] synthesis of *n*-heptane.—See B., 1936, 181.

Properties of the methyl alcohol catalyst copper-zinc oxide-chromic oxide.—See B., 1936, 191.

[Catalytic] synthesis of esters by dehydrogenation of alcohols.—See B., 1936, 181.

ψ -Halogenes. XXXI. Detection of iodine-mixed halogens by measurements of the rate of reaction between cyclohexene and iodine in the presence of salts of the heavy metals. L. BIRKENBACH, J. GOUBEAU, and H. G. KRALL (Ber., 1936, 69, [B], 476–484).—The reaction between I and cyclohexene in PhMe , CCl_4 , or Et_2O occurs very much more rapidly in the presence of AgNO_3 , AgNCO , AgClO_4 , or PbCl_2 than in their absence. The dependence of the rate on the nature of the metallic salt is explicable on the basis of catalysis, which, however, does not account for the effect of the quantity of salt. The change is therefore attributed to the intermediate formation of mixed halogens: $\text{I}_2 + \text{RHal}(\psi\text{-hal}) \rightarrow \text{IHal} \rightarrow (+>\text{C}:\text{C}<)>\text{Cl-CHal}<$. H. W.

Existence of a sharp temperature threshold for catalytic decomposition of molecules on a hot platinum surface, and the nature of this decomposition. O. BEECK (Physical Rev., 1934, [ii], 46, 331–332).—Decomp. of mol. beams of hydrocarbons projected on to a Pt strip filament have been investigated. Decomp. of C_2H_6 commences at approx. 800° and increases up to 1200° when all impinging mols. are dehydrogenated to C_2H_4 and H_2 . C_2H_4 shows no decomp. below 830°, but at 850° every impinging mol. yields C_2H_2 and H_2 . L. S. T.

Dehydrogenation and dehydration catalysed by nickel-aluminium oxide catalysts. A. A. BALANDIN and A. M. RUBINSTEIN (Z. physikal. Chem., 1936, B, 31, 195–213; cf. A., 1935, 1348).—The parallel dehydrogenation and dehydration of isoamyl alcohol and the secondary decomp. of the aldehyde formed have been studied. Catalysts prepared by pptg. mixtures of Ni and Al salts with NaOH are more active than those pptd. with Na_2CO_3 . Catalysts prepared from chlorides and sulphates may be as active as the most active catalysts prepared from nitrates. The ratio of the energy of activation of dehydrogenation to that of dehydration averages 0.51, the corresponding vals. for dehydrogenation: aldehyde decomp. and dehydration: aldehyde decomp. being 0.69 and 1.26, respectively. All three ratios vary little from one catalyst to another, but the heats of activation themselves vary considerably. The relation between the energy of activation and the coeff. *a* of Arrhenius' equation previously noted (A., 1933, 234) is valid for both dehydration and dehydro-

generation. It appears that the activity of a mixed catalyst is located at the lines of contact between its components. R. C.

Asymmetric main valency catalysts.—See this vol., 476.

Hydrogenation of ketones.—See this vol., 457.

Catalytic reduction of aromatic carboxylic acid esters under high pressure and temperature. K. MITSUI (Mem. Coll. Sci. Kyoto, 1935, A, 18, 329—336).—The reductions were effected by H_2 at 100 atm. in the presence of reduced Ni. EtOBz reacts rapidly at 150—190° and the product contains 90 mol.-% of Et hexahydrobenzoate; $CH_2Ph\cdot OH$ and BzOH were not produced. The product from $CH_2Ph\cdot CO_2Et$ at >140° contains 90 mol.-% of Et cyclohexylacetate. The product from Et salicylate at >200° contains 75 mol.-% of cyclohexanol, cyclohexane, and EtOH. $m\text{-OH}\cdot C_6H_4\cdot CO_2Et$ at 170—190° absorbs 3 mols. of H_2 forming products containing 75 mol.-% of Et *m*-hydroxyhexahydrobenzoate, and $p\text{-OH}\cdot C_6H_4\cdot CO_2Et$ at 180—200° absorbs 2 mols. of H_2 forming products containing 40 mol.-% of Et *p*-hydroxyhexahydrobenzoate. J. G. A. G.

Electrolytic separation of deuterium. A. J. EDWARDS, H. F. WALTON, R. P. BELL, and J. H. WOLFENDEN (J.C.S., 1936, 286—287).—Vals. of the separation coeff., α , obtained by protracted electrolysis of aq. NaOH containing 0.5—1% D_2O under apparently identical conditions fluctuate widely. Vals. of α for different cathode materials are recorded. J. G. A. G.

Electrolytic formation of persulphate. I. R. MATSUDA (Bull. Chem. Soc. Japan, 1936, 11, 1—7).—Aq. $[NH_4]_2SO_4$ and H_2SO_4 , in which the ratio of the normalities varied from 0:10 to 8:2, have been electrolysed at different c.d. and the variation of current efficiency for the formation of $S_2O_8^{--}$ examined. Current efficiency increases with c.d., the effect being greatest in the more acid solutions; it also increases as $[H_2SO_4]$ diminishes and the effect at low c.d. is > at high. Increase in total concn. for a const. 5:1 ratio raises the efficiency, especially at higher c.d. The results indicate that increase in $[OH^-]$ favours anodic oxidation. The effect of replacement of NH_4^+ by other cations has been investigated. Current efficiency for K^+ , Na^+ , and NH_4^+ , which form acid sulphates, is > for the other cations, viz., Mg^{++} , Li^+ , Al^{+++} , Cd^{++} , Fe^{+++} , Cu^{++} , and Zn^{++} ; it is greatest for K^+ , but the catalytic decomp. of $S_2O_8^{--}$ by cations is in the order $Na^+ > K^+ > NH_4^+$. M. S. B.

Electrical synthesis of nitric oxide. J. WILLEY (Nature, 1936, 137, 274—275).—With a 1:1 mixture of N_2 and O_2 the yield of NO at 5—10 mm. pressure with rapid gas circulation is practically independent of the electrical power supplied. A liquid air trap placed near the discharge condenses 7 to 10 times more NO_2 than one placed at a distance from it, although the equiv. time interval is only 0.05 sec. This effect disappears when a plug of oxidised Cu is placed between the discharge and the trap, or when a large excess of O_2 is used. It is apparently due to the simultaneous formation of active N which decomposes much of the NO formed. L. S. T.

Simultaneous discharge of Cd^{++} and H^+ ions in solutions of simple salts of cadmium. O. ESSIN, F. BEKLEMISHEVA, and A. MATANZEV (J. Chim. phys., 1936, 33, 72—77).—The yield of Cd obtained by electrolysis of aq. $CdSO_4$ has been studied at 25° for $[H_2SO_4]$ 0.1*N*—10*N* and $[CdSO_4]$ 0.125*N*—1*N* and with c.d. 0.25—1 amp. per sq. dm. The results are in accord with the equation of simultaneous discharge calc. from Volmer's theory of overpotential. J. W. S.

Electrolytic separation of bivalent europium. A. BRUKL (Angew. Chem., 1936, 49, 159—161).—Eu can be readily separated by electrolytic reduction at a Hg cathode. For mixtures of rare earths containing < 2% Eu_2O_3 it is necessary to co-ppt. the Eu (as $EuSO_4$) with $SrSO_4$ (cf. Selwood, A., 1935, 950), the $SrSO_4$ being then removed by dissolution in hot 50% HCl, and further purification effected through pptn. with $H_2C_2O_4$. Sa mother-liquors containing 1—1.2% Eu_2O_3 were electrolysed using c.d. of 0.1 amp. per sq. cm. (0.12 amp. per sq. cm. gave Sr-Hg), and after 8 electrolyses and subsequent separation of $SrSO_4$, the Eu content increased to 30%. Three further electrolyses without $SrSO_4$ gave a product containing 99.40% Eu_2O_3 , the impurities being Sa 0.5, Gd 0.03, and Yb 0.02%. The yield was 12 g. from 1.5 kg. of mother-liquor containing 1—1.2% Eu_2O_3 . D. C. J.

Mechanism of electrolytic processes. I. Anodic oxidation of some metals of the platinum group. J. A. V. BUTLER and G. DREVER. II. **Electrolytic oxidation of sodium sulphite.** J. A. V. BUTLER and W. M. LESLIE (Trans. Faraday Soc., 1936, 32, 427—435, 435—444).—I. When electrodes of Pd, Rh, and Ir are anodically polarised in acid and alkaline solutions, an adsorbed layer of O is formed prior to the establishment of the O overvoltage, as in the case of Pt (cf. A., 1932, 1092; 1934, 154). With Pd and Rh the slow formation of peroxidic oxides has been observed as the second stage in the oxidation. These oxides are reduced cathodically at a more positive potential than the adsorbed O, and the conditions of their formation have been studied. A mechanism of the anodic oxidation of insol. metals is suggested.

II. The electrolytic oxidation of Na_2SO_3 at Pt electrodes in buffer solutions of various p_H has been investigated. With p_H 7 the oxidation takes place at a more negative potential than that at which adsorbed O is formed. Since no other primary process is observed in this region with the buffer solution alone, oxidation probably takes place in solutions of this p_H by direct transfer of electrons from the SO_3^{--} ions to the electrode. With p_H 9 oxidation occurs in the same region as that in which adsorbed O is formed, so that oxidation by adsorbed O is possible. The effect of adding various salts has been studied. With Mn^{++} salts, which are the most effective, suppression of the initial stage of electrolysis is due to the formation of a film of MnO_2 . The results do not agree with Glasstone and Hickling's theory (cf. A., 1933, 913) and an alternative mechanism is suggested. O. J. W.

Effect of anode composition on zinc electrolysis.—See B., 1936, 201.

Electrolytic lead-plating.—See B., 1936, 201.

Electroplating bismuth on metals.—See B., 1936, 201.

Photochemical union of hydrogen and chlorine.
IV. Reaction at low hydrogen pressures. Effects of wave-length, of temperature, and of traces of oxygen. H. C. CRAGGS and A. J. ALLMAN (J.C.S., 1936, 241—252).—By irradiating O₂-free mixtures of 0.1—0.6 mm. of H₂ and 1.7—166 mm. of Cl₂ with monochromatic light of λ 546 m μ , HCl is formed, and the temp. coeff. leads to the activation energy 9.78 kg.-cal. (cf. 4.74—5.5 at λ 436 m μ). No HCl was obtained at λ 579 m μ . The quantum efficiency, γ , relative to unity at 436 m μ is approx. 0.3 at 546 m μ . These results may be correlated with the continuous background of the banded spectrum region of Cl₂. Thus, Cl₂ mols. in high vibration levels absorbing at λ 546 m μ acquire sufficient additional energy to dissociate into atoms which initiate reaction chains. At approx. 2 mm. total pressure, ultra-violet light affords vals. of γ < with visible light, but at higher pressures this difference was not observed. Cl₃ formed by light of short λ would account for these results. 0.1 mm. of O₂ retards the reaction between Cl₂ and < 0.01 mm. H₂, but has no effect when there is 0.5—0.01 mm. H₂, although O₂ is consumed. These effects are discussed. J. G. A. G.

Properties of illuminated iodine solutions.
I. Photochemical dissociation of iodine molecules in solution. E. RABINOWITCH and W. C. WOOD (Trans. Faraday Soc., 1936, 32, 547—556).—Improvement of the apparatus previously described (A., 1935, 586) has permitted the detection and measurement of a reversible change in the extinction coeff. (ϵ) of I solutions under the influence of strong illumination. In CCl₄ and C₆H₁₄ ϵ decreases under illumination owing to dissociation of I₂ mols. into atoms. The velocity of recombination of the latter in solution is about 1000 times > that of Br atoms in He at atm. pressure, agreeing with the assumption that triple collisions are necessary in gas and that in solution every collision is effective. The quantum yield for dissociation of I₂ in solution is the same in the continuous spectral region as in the band region. Explanations of the results are offered. F. L. U.

Detection of a latent image in thalious bromide. W. J. G. FARRER (Nature, 1936, 137, 276).—Emulsions of TlBr in gelatin can receive a latent image, but direct reduction of the exposed bromide to Tl is not possible. By treatment with aq. AgNO₃ the Tl in the emulsion is replaced by Ag without destruction of the latent image, and after removal of the excess of sol. Ag the plate can be developed and fixed in the usual way. Replacement of the Tl by Ag occurs apparently without alteration in crystal shape or structure. TlBr emulsions can be colour-sensitised with dyes in the same way as Ag emulsions, but the same high degree of sensitivity has not yet been reached. L. S. T.

Free *n*-propyl radical.—See this vol., 451.

Photodecomposition of iodoform and of alkyl and alkylene iodides. K. E. GIBSON and T. IREDALE (Trans. Faraday Soc., 1936, 32, 571—576;

cf. A., 1933, 553).—The quantum yield in the photochemical production of I by C₆H₆ solutions of MeI, CH₂I₂, BuⁿI, CH₃BuⁿI, and C₁₆H₃₃I has been determined at room temp. and in absence of O₂. For MeI and BuⁿI the yield is approx. 1, and for the others 0.55—0.75. MeI in EtOH gives a val. > 1. The results are discussed. F. L. U.

Photochemical decomposition of gaseous methyl iodide alone and in presence of hydrogen and nitrous oxide. R. SPENCE and W. WILD (Proc. Leeds Phil. Soc., 1935—1936, 3, 141—144; cf. A., 1931, 1138).—Irradiation of MeI yielded CH₄, C₂H₆, and I. Increased yields of CH₄ were not obtained in presence of H₂. The approx. quantum yield of CH₄ formation in terms of MeI disappearing was 0.06. There was no detectable reaction between Me and N₂O. H. J. E.

Photochemical formation of organic diradicals.

III. Anthracene, the fulgides, thiophosgene, and their derivatives. A. SCHÖNBERG (Trans. Faraday Soc., 1936, 32, 514—521; cf. A., 1935, 986).—In order to explain the different chemical properties of irradiated solutions of certain anthracenes, fulgides, and CSeCl₂ in comparison with those of non-irradiated solutions, a photoequilibrium between the normal and diradical forms of the mol. is assumed, as was done in the case of rubrene (cf. A., 1934, 643). The phenomena of photo-oxidation, photoisomerisation, and photopolymerisation can be accounted for by this means. Objections to the theory are discussed. O. J. W.

Behaviour of *dl*-serine, *dl*-phenylalanine, *dl*-alanine, *dl*-lactic acid, and propionic acid towards X-rays and ultra-violet light. J. P. BECKER (Strahlenther., 1935, 52, 537—544; Chem. Zentr., 1935, ii, 203).—The decomp. of *dl*-serine (I) and *dl*-lactic acid (II) follows a different course from that of *dl*-alanine (III) and EtCO₂H; this is ascribed to the presence of an α -OH in (I) and (II). *dl*-Phenylalanine also differs from (III) in its mode of decomp. The physiological action of X-rays and ultra-violet light is, in part, attributed to such action. H. N. R.

Comparison of the photochemical decomposition of *l*-aspartic acid, *l*-asparagine, and glycylglycine by X-rays and ultra-violet light. J. P. BECKER (Strahlenther., 1935, 52, 531—536; Chem. Zentr., 1935, ii, 203).—Both *l*-aspartic acid and *l*-asparagine yield MeCHO on irradiation with X-rays or ultra-violet light; the decomp. products of glycylglycine are different. H. N. R.

Photolysis of aliphatic aldehydes. III. Hydrogen from acetaldehyde. F. E. BLACET and J. G. ROOF (J. Amer. Chem. Soc., 1936, 58, 278—280; cf. A., 1933, 930; 1934, 1188).—The fraction of mols. yielding H₂ increases linearly from 10% at λ 3130 to 31% at λ 2537. The mechanism of the primary process appears to be: $\text{RHCO} + h\nu \rightarrow \text{R} + \text{HCO}$. E. S. H.

Photochemical reactions of cellulose. IV. Relation between wave-length and strength of light from a quartz mercury vapour lamp. S. OGURI (J. Soc. Chem. Ind. Japan, 1936, 39, 35—

36B).—A table shows the deflexions of a thermopile galvanometer at λ of 2000—7000 Å. A. G.

Concentrations of sodium vapour in the electric arc. T. PECZALSKI and N. SZULC (Compt. rend., 1935, 201, 1335—1337; cf. A., 1935, 1046).—The concns. of Na within and around a C arc burning in the presence of NaCl have been determined spectroscopically. T. G. P.

Significance of potassium carbonate for the corrosive action of potassium cyanide. H. ELBEL (Z. ges. gerichtl. Med., 1934, 24, 25—29; Chem. Zentr., 1935, i, 3951—3952).—The corrosive action of KCN depends on its alkaline properties, and is weakened rather than strengthened by K_2CO_3 . R. N. C.

Rubidium and caesium fulminates. L. HACKSPILL and W. SCHUMACHER (Compt. rend., 1936, 202, 69—71).—The fulminates were prepared by treating the alkali-metal amalgam, prepared in vac., with a suspension of Hg fulminate in anhyd. MeOH, and pptg. the salt with anhyd. Et_2O . Dissolution in MeOH and repptn. with Et_2O is necessary to remove traces of the double fulminate of Hg and Rb or Cs. The latter renders the product liable to detonate at $< 50^\circ$. H. J. E.

Caesium mercury iodide. F. GALLAIS (Compt. rend., 1936, 202, 54—56; cf. A., 1935, 592).—Measurements of electrical conductivity and of magnetic rotatory power are recorded for mixed solutions of CsI and $HgCl_2$ in H_2O or EtOH. The formation of Cs_2HgI_4 is indicated in 0.01—0.5M solutions. H. J. E.

Basic copper sulphates. O. BINDER (Ann. Chim., 1936, [xi], 5, 337—409).—A more detailed account of work previously described (this vol., 38, 172). $4CuO \cdot SO_3 \cdot 4H_2O$ at 150° gives $4CuO \cdot SO_3 \cdot 3H_2O$, the X-ray photograph of which resembles that of $4CuO \cdot SO_3 \cdot 4H_2O$. The four basic sulphates are formulated $[Cu\{(OH)_2Cu\}_3SO_4 \cdot H_2O]$; $[Cu\{(OH)_2Cu\}_3SO_4]$; $[Cu\{(OH)_2Cu\}_2SO_4]$, and $[Cu \cdot O \cdot Cu]SO_4$. The first three are identified with langite, brochantite, and antlerite (stolznerite), respectively. F. R. G.

Yellow cuprous oxide. G. R. LEVI (Z. anorg. Chem., 1936, 226, 173—174).—A claim for priority over Straumanis *et al.* (A., 1935, 1332) with reference to the proof of the direct formation of Cu_2O by reduction in aq. solution. M. S. B.

Organic cupri-tetrachlorides and -tetrabromides formed by secondary and tertiary amines and alkaloids. J. AMIEL (Compt. rend., 1935, 201, 1383—1385; cf. this vol., 212).—The following compounds have been prepared and in some cases their *d* and solubilities determined: $CuCl_4(NH_2Et)_2$, $CuCl_4(NHEt)_2$, $CuBr_4(NH_2Et)_2$, $CuCl_4(NH_2PhMe)_2$, $CuCl_4(NH_2PhEt)_2$, $CuCl_4(NHPhMe)_2$, $CuCl_4(NHPhEt)_2$, $CuBr_4(NH_2PhMe)_2$, $CuBr_4(NH_2PhEt)_2$, $CuBr_4(NHPhMe)_2$, $CuBr_4(NHPhEt)_2$; with nicotine, quinine, and strychnine $CuCl_4(C_{10}H_{14}N_2H_2) \cdot H_2O$, $CuCl_4(C_{10}H_{14}N_2H_2)$, $CuCl_4(C_{20}H_{24}N_2O_2H_2)$, $CuCl_4(C_{21}H_{24}N_2O_2H_2)$, $CuBr_4(C_{10}H_{14}N_2H_2)$, $CuBr_4(C_{20}H_{24}N_2O_2H_2)$, and $CuBr_4(C_{21}H_{24}N_2O_2H_2)_2$; and with brucine $CuCl_4(C_{23}H_{26}N_2O_4H_2)$. T. G. P.

Silver solutions containing iodine. (MLLE.) M. L. JOSIEN (Ann. Chim., 1936, [xi], 5, 147—265).—The action of aq. I on aq. $AgNO_3$ comprises a rapid reaction between the HI produced by hydrolysis of the I and Ag^+ , yielding insol. AgI , followed by decomp. of the HOI to give HI and HIO_3 . The latter reaction is slow, being accelerated by increasing salt concn., by rise of temp., and by addition of acid. The reaction is most rapid when the Ag salt of a strong acid is used in the reaction. The reduction of IO_3^- by HCl and As_2O_3 is attributed to a cyclic reaction, probably with intermediate production of I and oxidation of the As_2O_3 , rather than to catalytic action. Sparingly sol. Ag salts react with I similarly to $AgNO_3$, but the first step is not instantaneous. The reaction between $AgCl$ and I is not a direct substitution, but $3I_2 + 5AgCl + 3H_2O = 5AgI + HIO_3 + 5HCl$. It is concluded that there is no evidence of production of an intermediate product between OI^- and IO_3^- in the reaction between I and Ag salts or between I and alkali. J. W. S.

Solid reactions at 1000—1200° between magnesium oxide or beryllium oxide and nickel, iron, chromium, manganese, and their oxides. L. NAVIAS (J. Amer. Ceram. Soc., 1936, 19, 1—7).—The reactions were carried out with the mixtures as loose and pressed powders and with loose powder on a high-fired pressed slab of MgO or BeO . The degree of reaction was noted by the extent of discoloration at the interface. In an oxidising atm. at 1200° the reaction with MgO and BeO increased in the order NiO (with BeO , none), Fe_2O_3 , Cr_2O_3 , MnO_2 , in all cases reaction with MgO being the greater. The same sequence was found for the metallic elements in an oxidising atm., but the degree of reaction was $>$ with the corresponding oxides. In a H_2 atm. at 1200° only MnO_2 showed any reaction, and of the metals, Cr and Mn oxidised with very slight reaction. Mixtures of oxides and of metals showed less reaction than the individuals. Wet air gave most reaction between MgO and Mn, MnO_2 , or Cr powders. J. A. S.

Double salt, $K_2Mg(CO_3)_2 \cdot 4H_2O$. F. HALLA (Z. anorg. Chem., 1936, 226, 139—140).—On gradual addition of aq. K_2CO_3 to aq. $MgCl_2$, of suitable concn., reaction takes place in two stages, a flocculent ppt. of $MgCO_3 \cdot 3H_2O$ being first formed. This redissolves and, as the addition of aq. K_2CO_3 continues, a cryst. ppt. of $K_2Mg(CO_3)_2 \cdot 4H_2O$ is obtained. Solubility determinations have been made at 17° in aq. KCl of varying concn. to reduce hydrolysis. The temp. coeff. of solubility has also been determined. M. S. B.

Production of calcium sulphate hemihydrate in the wet way, and the polymorphism of the anhydrous sulphate. P. GAUBERT (Bull. Soc. franç. Min., 1934, 57, 252—267; Chem. Zentr., 1935, i, 3523).— $CaSO_4 \cdot 0.5H_2O$ was obtained as hexagonal prisms by evaporation of a hot HNO_3 solution of $CaSO_4$. When dehydrated in air at 130° , or in a neutral liquid at 170° , they maintain their form and optical orientation, but *n* decreases, whilst the double refraction increases (γ -form). This is transformed at 180° into the β -form ($n <$ that of natural anhydrite). At 520° the β -form gives the α -form. H. J. E.

Zinc, even impure but perfectly smooth and without external contamination, does not effervesce with dilute acids. P. RONCERAY (Bull. Soc. chim., 1936, [v], 3, 206—213).—The technique described for Fe (A., 1935, 834; this vol., 174) has been applied to Zn with similar results. E. S. H.

Barium arsenates. Characterisation of $2\text{As}_2\text{O}_5 \cdot 3\text{BaO}$. H. GUÉRIN (Compt. rend., 1936, 202, 225—227; cf. this vol., 173).—The thermal decomp. of Ba meta-, ortho-, and pyroarsenates has been investigated. $\text{BaO} \cdot \text{As}_2\text{O}_5$ when heated in a vac. at 700° yields the sesquiarsenate $3\text{BaO} \cdot 2\text{As}_2\text{O}_5$.

T. G. P.

Purification of mercury. B. PESCE (Annali Chim. Appl., 1935, 25, 654—657).—A pycnometer for determining the d of Hg is described. The presence of very small amounts of impurities in Hg can be detected most readily by d determinations. Hg cannot be purified completely by distillation only, but two preliminary distillations followed by the treatment suggested by Beutell (A., 1910, ii, 105) give a pure product.

A. M. P.

Reactions of mercuric oxide. E. MONTIGNIE (Bull. Soc. chim., 1936, [v], 3, 459—460).—The reactions of HgO with KCN, KCNS, $\text{K}_4\text{Fe}(\text{CN})_6$, $\text{K}_2\text{Fe}(\text{CN})_6$, NaBO_2 , Te, P, As, and Sb are described.

E. S. H.

Action of mercuric oxide on solutions of sulphates and nitrates. E. MONTIGNIE (Bull. Soc. chim., 1936, [v], 3, 193—196).—The products of reaction with Al, Ti^{IV} , Ce^{III} , Fe^{II} , Mn^{II} , Zn, and Cu^{II} sulphates, and Bi, Zr, Cu^{II} , and Ni^{II} nitrates have been identified. HgO does not react with aq. AgNO_3 or $\text{UO}_2(\text{NO}_3)_2$.

E. S. H.

Mercuric chromates. E. MONTIGNIE (Bull. Soc. chim., 1936, [v], 3, 460—462).—The conditions of formation of HgCrO_4 and HgSO_4 in the systems (1) $\text{Hg}-\text{H}_2\text{SO}_4-\text{K}_2\text{CrO}_4$, (2) $\text{HgO}-\text{H}_2\text{SO}_4-\text{K}_2\text{CrO}_4$, (3) $\text{Hg}-\text{H}_2\text{SO}_4-\text{CrO}_3$, (4) $\text{HgO}-\text{H}_2\text{SO}_4-\text{CrO}_3$ at $10-15^\circ$ have been determined.

E. S. H.

Action of mercuric oxide on potassium dichromate. E. MONTIGNIE (Bull. Soc. chim., 1936, [v], 3, 419—420).—With small amounts of HgO, the product is HgCrO_4 ; further addition of HgO produces basic chromates.

E. S. H.

Aluminium, even impure but perfectly smooth and without external contamination, does not effervesce with dilute acids. P. RONCERAY (Bull. Soc. chim., 1936, [v], 3, 213—218).—The results obtained with Zn (see above) have also been observed with Al.

E. S. H.

Decomposition of sodium aluminates. V. D. DJATSCHKOV and O. S. KOSHUCHOVA (Kolloid-Z., 1936, 74, 196—200).—The stability of solutions of Na aluminate increases rapidly with increase of the ratio $\text{Na}_2\text{O}/\text{Al}_2\text{O}_3$ above 1.4—1.5. The solutions exhibit min. stability at a concn. of 120—180 g. Al_2O_3 per litre. Addition of Na_2SiO_3 first stabilises the solutions, but at higher concns. causes coagulation, the pptd. Al_2O_3 being contaminated with SiO_2 . Addition of agar-agar increases the stability, whilst gelatin, methylene-blue, and Me-violet have no effect, and tannic acid very little.

F. L. U.

Acid fluorides of univalent cations. C. FINBAK and O. HASSEL (Z. anorg. Chem., 1936, 226, 175—176).—Determination of the lattice consts. of the TI compound, obtained by the concn. of the solution of Ti_2O or Ti_2CO_3 in excess of HF, indicates that it is a silicofluoride and not an acid fluoride as supposed by other investigators. Similar conclusions have been reached previously with regard to other so-called "acid fluorides," and doubt is thrown on the possibility of the existence of acid fluorides in general.

M. S. B.

Reactivity of red and yellow lead oxide with silica. J. A. HEDVALL and A. ELDH (Z. anorg. Chem., 1936, 226, 192—196).—The amount of reaction occurring between red PbO and SiO_2 , when an intimate mixture of the two is heated for 1 hr. at $450-650^\circ$, has been determined and compared with the rate of transition from red to yellow PbO at the same temp. Although the transition temp. is 488.5° both the rate of reaction with SiO_2 and the rate of transition begin to be appreciable at approx. 600° only. Above this temp. both increase rapidly. The temp.-reactivity curve for red PbO with SiO_2 is practically identical with that for yellow PbO, since the slight pressure used in mixing results in partial transformation into the stable red form.

M. S. B.

Induced oxidation of nitrogen. M. POLJAKOV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 35—36).—A discussion of the formation of N oxides in gaseous explosions.

H. J. E.

Structure of nitrogen peroxide deduced from its action on potassium iodide. M. DODÉ (Compt. rend., 1935, 201, 1378—1380).—The reactions between N_2O_4 and KI or aq. KI have been investigated; they indicate that N_2O_4 exists in at least two forms in equilibrium.

T. G. P.

Non-existence of the nitrosyl of Angeli.—See this vol., 460.

Nitrogen iodide. E. ROEDERER (Z. anorg. Chem., 1936, 226, 145—167).—Attempts to employ $\text{N}_2\text{H}_3\text{I}_3$ for the development of a new photographic process, depending on photochemical reactions with the highest possible quantum output, were unsuccessful. $\text{N}_2\text{H}_3\text{I}_3$ shows a max. stability in aq. solution at p_H approx. 10. The requisite p_H is a little higher in the presence of aq. NH_3 than in its absence. The equilibrium const. for the formation of $\text{N}_2\text{H}_3\text{I}_3$ from aq. NH_3 and I in aq. solution is $K = [\text{NH}_4]^2[\text{OH}]^5[\text{I}]^3/[\text{I}']^3$ and is approx. $10^{-29.23}$. No $\text{N}_2\text{H}_3\text{I}_3$ is formed by the interaction of NH_3 and I in CCl_4 . An additive product is mainly obtained, as in the reaction between gaseous NH_3 and solid I, but there is also a small amount of oxidation of NH_3 , probably to N_2 and H_2 , and simultaneous reduction of I to I' with formation of NH_4I . Similar behaviour is observed in C_6H_6 solution. A reaction scheme is suggested. The distribution coeff. of NH_3 between CCl_4 and the gas phase is 7.24 ± 0.04 .

M. S. B.

Decomposition of nitrogen iodide. W. E. GARNER and W. E. LACHEM (Trans. Faraday Soc., 1936, 32, 567—569).—See A., 1935, 828.

F. L. U.

Constitution and mechanism of formation of the solid, yellow hydride of phosphorus. P. ROYEN and K. HILL (*Naturwiss.*, 1936, 24, 108).—The hydride of P, generally regarded as $P_{12}H_6$, is not a definite compound, but arises from adsorption of PH_3 on an amorphous, yellow P. X-Ray diagrams of $P_{12}H_6$ and P_9H_2 show no interference. More difficultly volatile mols., e.g., NH_3 , piperidine, and PEt_3 , can cause partial or complete removal of the hydride as PH_3 . The formation of red alkali-metal salts in aq.-EtOH solutions is probably due to peptisation, rather than to the existence of an acidic H in $P_{12}H_6$. The formula of the hydride is dependent on surface conditions, and varies from $P_{12}H_{5.8}$ to $P_{12}H_{7.2}$. It is suggested that the reaction is $3P_2H_4 = 4PH_3 + 2P$, analogous to the reaction between PH_3 and PEt_2Cl , in which an unstable intermediate compound, PH_2PEt_2 is formed, and decomposes to give amorphous yellow P and PH_2Et , $PHEt_2$, and PEt_3 , some of these being adsorbed on the P. A. J. M.

Phosphorus pernitride P_4N_6 . H. MOUREU and G. WETROFF (*Compt. rend.*, 1935, 201, 1381—1383).—The products of the reaction of PCl_3 on liquid NH_3 , heated in a vac. at 550° , yield P_4N_6 , a white, insol., non-volatile substance spontaneously inflammable in air, and hydrolysed at 215° thus: $P_4N_6 + 15H_2O = 2(NH_4)_2HPO_4 + NH_4H_2PO_4 + NH_4H_2PO_3$. Under similar conditions $P_3N_5 + 12H_2O = 2(NH_4)_2HPO_4 + NH_4H_2PO_4$. P_4N_6 heated above 750° in a vac. gives PN, which condenses out in a pure state. PN is completely hydrolysed only after 3 days at 215° . The primary reaction is $PN + 3H_2O = NH_4H_2PO_3$. T. G. P.

Action of arsenic trichloride on the elements. E. MONTIGNIE (*Bull. Soc. chim.*, 1936, [v], 3, 190—191).—At room temp. S, Bi, and Al are unattacked; with Se, Te, Pb, and Au, respectively, As is liberated and Se_2Cl_2 , $TeCl_4$, $PbCl_2$, and $AuCl_3$ formed; Ag forms $AsCl_3Ag_3$. E. S. H.

Formulae of basic salts of bismuth. M. PICON (*Bull. Soc. chim.*, 1936, [v], 3, 186—190).—The system advocated shows the ratio of acid radicals to metal atoms: e.g., $Bi_{20}O_{21}(NO_3)_{18} \cdot 6H_2O$ instead of $10Bi_2O_3 \cdot 9N_2O_5 \cdot 6H_2O$. E. S. H.

Bivalent bismuth iodide. E. MONTIGNIE (*Bull. Soc. chim.*, 1936, [v], 3, 191—193).—Unsuccessful attempts to prepare BiI_2 are recorded. E. S. H.

Preparation of bismuth iodosulphide by the wet method. F. FRANÇOIS and M. L. DELWAULLE (*Bull. Soc. chim.*, 1936, [v], 3, 504—508).— $BiSI$ is formed by the action of H_2S or Bi_2S_3 on solutions of BiI_3 in HI, or by the action of HI on Bi_2S_3 . Determinations of Bi as Bi_2S_3 in solutions containing I are rendered invalid by pptn. of $BiSI$. E. S. H.

Basic organic salts of bismuth.—See this vol., 460.

Occlusion of protoactinium by sulphides insoluble in hydrochloric acid. CHENG DA-CHANG and L. HOANG (*Bull. Soc. chim.*, 1936, [v], 3, 326—328).—The co-pptn. of Pa with CuS , Sb_2S_3 , HgS , and Bi_2S_3 has been studied under different conditions of concn. and acidity. Pa sulphide is sol. in the aq. HCl, but is adsorbed incompletely by the ppt. E. S. H.

Oxidation of inorganic reagents by ozone. I. Potassium iodide. G. GUÉRON, M. PRETTRE, and J. GUÉRON (*Bull. Soc. chim.*, 1936, [v], 3, 295—312).—Experiments in buffered, neutral solutions show that the normal reaction $2I' + O_3 + H_2O = I_2 + O_2 + 2OH'$ is accompanied by an independent, heterogeneous reaction, $I' + 3O_3 = IO_3' + 3O_2$. The latter reaction preponderates in presence of a large glass surface. The influence of concn. has been studied. Preliminary observations have been made on the simultaneous oxidation of AsO_3''' . E. S. H.

Constitution of sulphato-compounds. A. VON KISS (*Z. anorg. Chem.*, 1936, 226, 141—144).—The dialysis method is not a conclusive test for the existence of true complex compounds, since a simple association of ions without change of the constitution of the co-ordination zone will produce the effect of increased ionic wt. The method must be combined with spectroscopic determinations. These do not confirm the formation of true complex sulphates reported by Brintzinger *et al.* (A., 1935, 181). M. S. B.

Transformation from vitreous to metallic selenium. K. TANAKA and H. Y. TIEN (*Mem. Coll. Sci. Kyoto*, 1935, A, 18, 309—310; cf. A., 1935, 920).—Between 65° and 80° , the wt.-% of metallic Se, p , in the specimen annealed for t hr. is $p = P(1 - e^{-ct - t'})$, where P is approx. 78.5%, t' decreases from 4 to 0.65 and c increases from 0.062 to 1.11 as the temp. is raised. J. G. A. G.

Purification and preparation of very intense polonium sources. M. HAISSINSKY (*J. Chim. phys.*, 1936, 33, 97—98).—Po can be separated from Te, Au, Hg, and Pt by reducing the latter with N_2H_4 . Pptn. is preferably carried out in solution sufficiently acid to prevent adsorption of Po by the pptd. metal (20% HCl or AcOH). The Po can then be deposited by introduction of a polished Ag disc. J. W. S.

Preparation of polonium sources from radon bulbs. L. R. HAFSTAD (*J. Franklin Inst.*, 1936, 221, 191—213).—Details of the prep. of strong Po sources by an elaboration of the Curie method (A., 1926, 5) are given. R. S.

Preparation of chemically pure hydrochloric acid.—See B., 1936, 190.

Existence of chlorous anhydride $[Cl_2O_3]$. M. KANTZER (*Compt. rend.*, 1936, 202, 209—210).—The action of conc. H_2SO_4 on $KClO_3$ at -15° in presence of undecenoic acid yields ClO_2 and Cl_2O_3 . The absorption spectrum of ClO_2 consists of three groups of bands between 3895 and 4180 Å. Cl_2O_3 absorbs continuously between 3500 and 4260 Å., and has 10 broad bands between 4260 and 4649 Å. T. G. P.

Mechanism of permanganate reduction and the induced oxidation of chlorion. H. BASSETT and I. SANDERSON (*J.C.S.*, 1936, 207—211).— Mn''' is the first identifiable product when MnO_4' is reduced by Fe'' . Induced oxidation of Cl' in permanganate reactions is attributed to Mn''' and especially Mn'' , because the process $Mn''' \rightarrow Mn''$ is probably simpler than $MnO_4' \rightarrow Mn'''$. The end-point of the titration $FeCl_2-KMnO_4$ is most nearly stoichiometric when

Mn^{III} or substances forming stable complexes with Mn^{III}, e.g., SO₄^{II}, PO₄^{III}, F^I, and Cl^I, are added. Solutions 2–3*N* with respect to H₂SO₄ are best (cf. this vol., 44) but the end-point is always unstable, possibly owing to the change 2Mn^{III} = Mn^{IV} + Mn^{II}. PO₄^{III} is almost completely pptd. as the Mn^{II} salts of complex Mn^{IV} phosphoric acids by digesting with conc. HNO₃ and Mn or Mn^{II}. J. G. A. G.

Induced oxidation of potassium iodide by ozone. (MME.) G. GUÉRON, J. GUÉRON, and M. PRETTE (Compt. rend., 1935, 201, 1376–1378; cf. A., 1935, 945).—The heterogeneous oxidation of KI by O₃ in aq. solution is not an induced oxidation. With greatly diluted O₃ an induced oxidation accompanies, to a slight extent, the normal reaction O₃ + 2I⁻ + H₂O = O₂ + I₂ + 2OH⁻. T. G. P.

Iron of high purity. F. ADCOCK and C. A. BRISTOW (Proc. Roy. Soc., 1935, A, 153, 172–200).—Fe has been prepared (1) by the electrolysis of a solution of FeCl₂ and NaCl, using an "Arceo" Fe anode, and (2) by the decomp. of FeCl₂ by steam, in each case followed by treatment of the molten metal with a stream of pure H₂ and subsequent melting in vac. The work was controlled by chemical and X-ray analysis. Measurable differences existed in the physical properties of different batches. The α-γ transformation in some of the samples, indicated by dilatometric observations, does not take place at a const. temp. but over a definite temp. range. L. L. B.

Polished iron, even impure, does not oxidise in saturated moist air. P. RONCERAY (Bull. Soc. chim., 1936, [v], 3, 320–321).—A reply to criticism (cf. this vol., 174). E. S. H.

Active oxides. XCIII. Intermediate active states in the decomposition of needle iron ore into α-iron oxide and water vapour. G. F. HÜTTIG and E. STROTZER [with O. HNEVKOVSKY and H. KITTEL]. XCVII. A crystallised basic aluminium sulphite, Al₂O₃·2SO₂·H₂O. E. ROSENKRANZ and G. F. HÜTTIG (Z. anorg. Chem., 1936, 226, 97–125, 126–131).—XCIII. The changes in colour, bulk *d*, magnetic susceptibility, "apparent" mol. vol., and crystal structure, taking place during the dehydration of artificially prepared needle Fe ore, α-Fe₂O₃·H₂O, have been followed, and the results are discussed. There are no sharply defined intermediate active states, but the property-composition curves show points of inflexion.

XCVII. A basic compound, Al₂O₃·2SO₂·H₂O, has been separated from an aq. solution of Al₂(SO₄)₃ by shaking at 78–80° until some of the SO₂ was driven off. The composition of the salt was confirmed by the isobaric decomp. curve and X-ray examination. M. S. B.

Ferric ammonium carbonate. V. AUGER and (MME.) M. GALLISSOT (Compt. rend., 1936, 202, 224–225).—Aq. FeCl₃ reacts with a large excess of saturated aq. NH₄HCO₃ in presence of undissolved NH₄HCO₃ and CO₂ to yield unstable yellow prisms, [Fe(OH)₂NH₃(H₂O)]HCO₃. T. G. P.

Two double salts of ferric fluoride. A. H. NIELSEN (Z. anorg. Chem., 1936, 226, 222–224).—

The salts Sr₃Fe₂F₁₂·2H₂O, *d* 3.71, and BaFeF₅·H₂O, *d* 3.94, have been prepared and their chemical and crystallographic properties determined. M. S. B.

Complex chemical behaviour of *o*-amino-phenol.—See this vol., 465.

Complex salts of α-phenylethylamine. Equivalence of the four co-valencies of bivalent platinum and palladium.—See this vol., 462.

Duration of analyses. RAUCH (Document. sci., 1935, 4, 4–10; Chem. Zentr., 1935, i, 3818).—The time taken for completion of various routine analyses has been determined. J. S. A.

Quantitative spectrum analysis. I, II. W. VAN TONGEREN (Chem. Weekblad, 1936, 33, 130–141, 151–159).—A historical review, with full experimental details of published methods. D. R. D.

Chromatographic analysis and its applications. H. WILLSTAEDT (Svensk Kem. Tidskr., 1936, 48, 32–48).—A lecture.

Adsorption analysis of aqueous solutions. W. KOSCHARA (Z. physiol. Chem., 1936, 239, 89–96).—The differences involved in the application of adsorption analyses in aq. and org. media are discussed. The use of natural or acid-treated fuller's earth, Brockmann's Al₂O₃, and Al₂O₃·H₂O and the dependence of efficiency on the *p*_H of the solution are considered. H. W.

Influence of temperature on *p*_H measurements in alkaline media. P. SZIGETI (Nature, 1936, 137, 276).—Alkaline *p*_H vals. are valueless unless temp. is also recorded. L. S. T.

Analysis with fluorescent indicators. M. DÉRI-BÉRÉ (Ann. Chim. Analyt., 1936, [iii], 18, 37–39).—Acid-alkali titrations are performed in ultra-violet light, using the change of fluorescence colour at some characteristic *p*_H to mark the end-point. Umbelliferone, β-methylumbelliferone, and uranyl salts (in the absence of halogens) are suitable for strong acid-strong base titrations; β-C₁₀H₇·OH or eosin BN for weak acids; and aesculin or fluorescein for weak bases. J. S. A.

Use of the micro-thermal conductivity method for the determination of heavy hydrogen. A. FARKAS, L. FARKAS, and E. K. RIDEAL (Nature, 1936, 137, 315).—The reliability and accuracy of the method is maintained (cf. this vol., 181). L. S. T.

Determination of bound water by means of the ultracentrifuge. J. W. McBAIN (J. Amer. Chem. Soc., 1936, 58, 315–317).—Theoretical. Formulae are derived to show the error caused by neglecting solvation in ultracentrifuge determinations. E. S. H.

Analysis of heavy water. A. FARKAS (Trans. Faraday Soc., 1936, 32, 413–415).—The micro-thermo-conductivity method for the analysis of H₂-D₂ mixtures is applied to the analysis of H₂O-D₂O mixtures. The D content of the latter is calc. from the observed D₂ content of H₂-D₂ gas brought into equilibrium with the water. The method is specially suitable for investigating the interchange of H and D atoms between water and other substances.

without the need of separating the water for each determination. O. J. W.

Colour reactions of the chlorate ion. A. SÁ (An. Farm. Bioquim., 1934, 5, 111—114; Chem. Zentr., 1935, i, 3573).—The same colours are given by ClO_3' , NO_3' , and NO_3' with $\text{NHPh}\cdot\text{C}_{10}\text{H}_7\text{-}\alpha$ and with $\text{NH}(\text{C}_{10}\text{H}_7\text{-}\alpha)_2$. Different colours (described) are given with $\text{NHPh}\cdot\text{C}_{10}\text{H}_7\text{-}\beta$, $\text{NH}(\text{C}_{10}\text{H}_7\text{-}\beta)_2$, and phenyl-dihydrodibenzacridine. H. N. R.

Determination of iodine in iodised salt.—See B., 1936, 232.

Determination of oxygen dissolved in 1 c.c. of water.—See B., 1936, 254.

Polarographic studies with the dropping mercury cathode. LVII. Determination of oxygen in gases and solutions. V. VÍTEK (Coll. Czech. Chem. Comm., 1935, 7, 537—547).—The electroreduction of O_2 causes two "waves" in the current-voltage curve corresponding with reduction first to H_2O_2 and then to H_2O , and the magnitude of the saturation current of the total reduction of $\text{O}_2 \propto [\text{O}_2]$ and permits $[\text{O}_2]$ as low as 0.04 mg. per litre to be determined in a fraction of 1 c.c. 0.05—100% of O_2 in gaseous mixtures is determined within $\pm 2\%$ of the total $[\text{O}_2]$ by bubbling through MeOH and determining the solubility of the O_2 polarographically. J. G. A. G.

Determination of sulphur in silicates. A. F. FIOLETOVA (J. Appl. Chem. Russ., 1935, 8, 1461—1464).—Total S is best determined as SO_4'' after fusion with $\text{Na}_2\text{CO}_3\text{--KNO}_3$. SO_4'' is determined by extraction for 1 hr. with boiling 10% HCl in an inert atm.; atm. O_2 leads to high vals., owing to oxidation of sulphide S to SO_4'' . No satisfactory direct method of determination of sulphide S was found. R. T.

Indirect colorimetric semi-micro-determination of the sulphate anion. F. A. GOIN (An. Farm. Bioquim., 1934, 5, 61—68; Chem. Zentr., 1935, i, 3573).—The colour reaction between benzidine and $\text{AcOH}\text{--NaNO}_2$ in EtOH is applied to the determination of SO_4'' in urine. H. N. R.

Determination of sulphate. Conditions necessary for the precipitation of benzidine sulphate, with special reference to the determination of sulphates in urine. E. C. OWEN (Biochem. J., 1936, 30, 352—360).—The pptn. of SO_4'' by benzidine (I) is optimal at p_H 2—3; HPO_4'' is pptd. by (I) at $p_H > 2$ and may be removed before the SO_4'' determination by the method of Fiske (A., 1921, ii, 556). The $[\text{Cl}']$ in the urine is not sufficient to produce appreciable errors. H. D.

Application of the systems water-ethyl alcohol-potassium carbonate and -ammonium sulphate to the rapid detection of certain anions. A. G. KOBLJANSKI (J. Appl. Chem. Russ., 1935, 8, 1494—1497).—In the two-phase liquid system EtOH-saturated aq. K_2CO_3 , the anions SO_4'' , Cl' , $\text{Fe}(\text{CN})_6'''$, and $\text{Fe}(\text{CN})_6'''$ are present chiefly in the aq. and I' , CNS' , and S'' in the EtOH, layer, whilst in EtOH-saturated aq. $(\text{NH}_4)_2\text{SO}_4$ I' , Br' , Cl' , CNS' , $\text{Fe}(\text{CN})_6'''$ and $\text{Fe}(\text{CN})_5\text{NO}''$ are found chiefly in the EtOH, and

$\text{Fe}(\text{CN})_6'''$ in the aq. layer. These findings are applied to the detection of the individual anions when present together. R. T.

Gravimetric determination of selenates. P. SPACU (Bull. Soc. chim., 1936, [v], 3, 159).—The slightly acid SeO_4'' solution is treated with aq. $\text{Pb}(\text{OAc})_2$ and the mixture boiled. The ppt. is collected, dried in vac., and weighed as PbSeO_4 . E. S. H.

Colorimetric determination of nitrates in water: influence of chlorides.—See B., 1936, 254.

Differentiation of constituents of nitrous vapours by formation of nitrogen compounds. A. SANFOURCHE and J. BUREAU (Compt. rend., 1936, 202, 66—69).—Tests are described in which various mixtures of NO and NO_2 were analysed (a) by absorption in H_2SO_4 (d 1.833), and (b) by absorption in a solution of $\text{NH}_2\text{Ph}\cdot\text{HCl}$. The latter method gave more trustworthy analytical results. H. J. E.

Determination of nitrate- and nitrite-nitrogen with copper-zinc powder. T. ARND and H. SEEBERG (Angew. Chem., 1936, 49, 166—167).—The vals. formerly obtained (B., 1932, 201; 1933, 118) were due mainly to the method of prep. of the Cu-Zn powder. Directions are given for this prep. and the method is recommended for fertilisers etc. D. C. J.

Potentiometric titration of phosphates. E. MICHALSKI (Rocz. Chem., 1935, 15, 468—480).—Excess of standard AgNO_3 is added to the alkaline solution, 0.1N-NaOH is added to neutrality (orange coloration with phenol-red), a drop of $N\text{-AcOH}$ is added, and Ag is determined in the filtrate; the results are 0.2% > the theoretical, owing to adsorption of Ag by the ppt. of Ag_3PO_4 . Ca, Sr, Ba, and Mg do not interfere, but Cl, Br, I, NH_4 , Al, and Fe should be absent. R. T.

Sensitive reaction for phosphate. A. STEIGMANN (Chem.-Ztg., 1936, 60, 129).—The sensitivity of the phosphomolybdate reaction is enhanced by adding a glycerol-gelatin solution, which is boiled until the protein no longer gives turbidity with $(\text{NH}_4)_2\text{MoO}_4$. J. S. A.

Fluorine and ammonia as sources of error in determination of phosphate by the [hydroxy]-apatite method. A. T. JENSEN (K. Veterin. Landsb. Aarskr., 1935, 41—50; Chem. Zentr., 1935, ii, 255).—Modifications of Damsgaard and Sørensen's method are described, eliminating errors due to the presence of F' or NH_3 (cf. A., 1935, 718). J. S. A.

Separate determination of arsine and phosphine in air. V. G. GUREVITSCH and B. A. RASCHKOVAN (J. Gen. Chem. Russ., 1935, 5, 1317—1323).—1 c.c. of 12% KBr is added to the solution, containing 0.2 mg. of H_3PO_4 and H_3AsO_4 , the mixture is evaporated to dryness, 5 c.c. of 1—7N-HCl are added, and the solution is again evaporated to dryness (twice), the residue is dissolved in H_2O , and H_3PO_4 is determined colorimetrically. H_3AsO_4 is determined in presence of H_3PO_4 by reducing with nascent H to AsH_3 (0.001—0.05 mg.), absorbing the gaseous products in conc. HNO_3 , evaporating the HNO_3 to dryness, and determining H_3AsO_4 in the residue by the

ordinary colorimetric procedure. AsH_3 and PH_3 in air are determined by absorption in conc. HNO_3 , evaporation, and analysis of the residue by the above methods.

R. T.

Risk of error in determining traces of arsenic in organic and inorganic materials. W. A. DAVIS and J. G. MALBY (Analyst, 1936, 61, 96—100).—Before applying the Marsh or Gutzeit test AsO_4^{3-} must be reduced to AsO_3^{3-} , preferably by warming with aq. H_2SO_3 or NaHSO_3 , excess of which must be removed. During the actual test the Gutzeit flask should be heated at 40—60°.

E. C. S.

Colorimetric determination of small quantities of silica in solutions, minerals, and technical products. I. P. ALIMARIN and V. S. ZVEREV (Trans. Inst. Econ. Min. U.S.S.R., 1934, No. 63, 15 pp.).—A crit. survey. Dienert and Wandenbulcke's method, based on the formation of $\text{H}_8[\text{Si}(\text{Mo}_2\text{O}_7)_6]$, is best for 0.005—5% SiO_2 . In presence of large amounts of mineral acids and their hydrolysable salts, NaOAc should be added. The effects of P and Fe are counteracted by adding excess of H_3PO_4 . The phosphomolybdate colour can also be removed with tartaric or citric acid. The effect of F is avoided by adding AlCl_3 , which forms H_3AlF_6 from H_2SiF_6 .

CH. ABS. (e)

Rapid gravimetric determination of silicic acid.—See B., 1936, 190.

Quantitative spectrography of alkali metals. P. URBAIN and M. WADA (Bull. Soc. chim., 1936, [7], 3, 163—169).—An electric arc between Cu electrodes is used. To reduce the rate of vaporisation of the alkali-metal compound, it is mixed with a refractory substance. Determination is by comparison of line intensities.

E. S. H.

Determination of sodium chloride in salt.—See B., 1936, 232.

Reaction for calcium. S. A. CELSI (An. Farm. Bioquim., 1934, 5, 85—89; Chem. Zentr., 1935, i, 3573).—A mixture of $\text{K}_4\text{Fe}(\text{CN})_6$ and $\text{Cu}(\text{NH}_4)_2\text{SO}_4 \cdot \text{H}_2\text{O}$ gives with Ca^{++} a sky-blue ppt.

H. N. R.

Application of copper ferrocyanide ammoniate in testing for calcium. J. V. DUBSKÝ and A. LANGER (Coll. Czech. Chem. Comm., 1936, 8, 47—56).—By the action of $\text{K}_4\text{Fe}(\text{CN})_6$ on solutions of $\text{CaCl}_2 + \text{CuCl}_2$ in presence of NH_3 , $(\text{CH}_2\text{NH}_2)_2$ (en), or $\text{C}_2\text{H}_5\text{N}$, the following compounds have been obtained: $\text{Cu}_2\text{Ca}(\text{NH}_4)_2[\text{Fe}(\text{CN})_6]_2 \cdot 8\text{NH}_3 \cdot 6\text{H}_2\text{O}$; $\text{Cu}_2\text{Ca}(\text{NH}_4)_2[\text{Fe}(\text{CN})_6]_2 \cdot 6\text{H}_2\text{O}$; $\text{CuCa}[\text{Fe}(\text{CN})_6]_2 \cdot 5$, and $6\text{NH}_3 \cdot 2\text{H}_2\text{O}$; $\text{CuCa}[\text{Fe}(\text{CN})_6] \cdot 6\text{NH}_3 \cdot 3\text{H}_2\text{O}$; $\text{Cu}_2[\text{Fe}(\text{CN})_6] \cdot \text{en}_3 \cdot 6\text{H}_2\text{O}$; $\text{CuCa}[\text{Fe}(\text{CN})_6] \cdot \text{en}_2 \cdot 2\text{H}_2\text{O}$; $\text{Cu}_2[\text{Fe}(\text{CN})_6] \cdot 4\text{C}_2\text{H}_5\text{N} \cdot 6\text{H}_2\text{O}$; $\text{Cu}_2\text{Ca}[\text{Fe}(\text{CN})_6]_2 \cdot 8\text{C}_2\text{H}_5\text{N} \cdot 30\text{H}_2\text{O}$. Speculative coordination formulæ are advanced.

J. S. A.

Potentiometric determination of calcium concentrations in solutions. H. J. C. TENDELOO (J. Biol. Chem., 1936, 113, 333—339).—A method, using a CaF_2 electrode, is described. Absorption of Ca by proteins decreases with increasing acidity.

H. G. R.

Determination of radium in carnotite and pitchblende.—See B., 1936, 232.

Dithizone method for determination of lead. P. A. CLIFFORD and H. J. WICHMANN (J. Assoc. Off. Agric. Chem., 1936, 19, 130—156).—The transmission spectra of solutions of dithizone (I) in CHCl_3 and CCl_4 show strong absorption at 600 $\text{m}\mu$, and a weak band at 450 $\text{m}\mu$. The quant. relation between Pb and (I) at p_{H} vals. between 5 and 12, and the principles and inherent errors of the different methods of extraction and colorimetric determination, are discussed. Procedures, based on the "mixed-colour" method (cf. B., 1934, 379) with the use of a photometer, are outlined for the determination of Pb in urine and bone etc.

E. C. S.

Volumetric determination of lead and of molybdates with adsorption indicators. C. CANDEA and I. G. MURGULESCU (Ann. Chim. Analyt., 1936, [iii], 18, 33—36).—Pb, present as $\text{Pb}(\text{OAc})_2$ or $\text{Pb}(\text{NO}_3)_2$, is titrated against MoO_4^{2-} using eosin A as adsorption indicator.

J. S. A.

Gravimetric determination of lead as lead chromate. L. GUZELJ (Z. anal. Chem., 1936, 104, 107—119).—The accuracy of the method is not affected by the presence of AcOH , NH_4OAc , KCl , KBr , $(\text{NH}_4)_2\text{SO}_4$, or NH_4NO_3 , but $[\text{HNO}_3]$ should be $> 0.1N$. Addition of NH_3 after pptn. may lead to the formation of basic Pb chromate, which is hindered by NH_4OAc or $(\text{NH}_4)_2\text{CrO}_4$. $[\text{Pb}]$ should be as low as is practicable.

J. S. A.

Determination of lead and antimony in pure metals and their alloys. H. VDOVISZEWSKI (Z. anal. Chem., 1936, 104, 94—107).—The determination of Pb as PbSO_4 by Treadwell's method, and of Sb as Sb_2S_3 by Vortmann and Metz's method, is critically reviewed, and modifications of procedure are advocated. The determination of Pb as PbCrO_4 is rapid, but leads to slightly high results.

J. S. A.

Gravimetric determination of certain metals [with thiolbenzthiazole]. III. Determination of lead, thallium, bismuth, and gold. G. SPACU and M. KURAŠ (Z. anal. Chem., 1936, 104, 88—93).—Pb is pptd. quantitatively by thiolbenzthiazole (I) from hot ammoniacal solutions as the basic salt, $\text{C}_7\text{H}_4\text{NS}_2\text{PbOH}$ (II), which is dried at 110° and weighed as such. Any normal salt, $(\text{C}_7\text{H}_4\text{NS}_2)_2\text{Pb}$, is converted into (II) on boiling in presence of NH_3 . Tl, Bi, and Au are similarly pptd. by (I). $\text{C}_7\text{H}_4\text{NS}_2\text{Ti}$ is dried at 110°; $(\text{C}_7\text{H}_4\text{NS}_2)_3\text{Bi}$ and $(\text{C}_7\text{H}_4\text{NS}_2)_3\text{Au}$ are ignited to Bi_2O_3 and Au, respectively.

J. S. A.

Drop method for detection of cerium. L. KULBERG (J. Appl. Chem. Russ., 1935, 8, 1452—1456).—Ag and Ti^{IV} are removed from 0.2 ml. of solution by pptn. as chlorides, 2—3 drops of saturated aq. $\text{K}_4\text{Fe}(\text{CN})_6$, 0.5 ml. of 10% KCN, and 3—4 drops of N-NaOH are added (to ppt. or neutralise the interfering effects of Mn^{II} , Co^{II} , or Th^{III}), and an AcOH solution of leuco-malachite-green is added, when a green coloration is obtained in presence of $< 3 \times 10^{-8}$ g. of Ce^{III} .

R. T.

Potentiometric determination of cerous salts with ferrocyanide. P. SPACU (Z. anal. Chem., 1936, 104, 119—122).— Ce^{III} is titrated potentiometrically against $\text{K}_4\text{Fe}(\text{CN})_6$ in 30% aq. EtOH solution.

The Ce must be added to the $K_4Fe(CN)_6$ to avoid adsorption errors. J. S. A.

Colorimetric determination of aluminium in waters.—See B., 1936, 222.

Colorimetric determination of iron. L. UR-BÁNYI (Mezőg. kutat., 1935, 8, 279—287).—The thiocyanic and sulphosalicylic acid reactions give inaccurate results. Comparison of the colours in the case of the Prussian-blue reaction is much easier. Best results were obtained when the acidity of the medium corresponded to 0.1N-HCl and the solution contained about 0.1—1.0 mg. of Fe per 10 ml.

NUTR. ABS. (m)

Determination of ferric oxide. A. F. FIOLETOVA and S. CHAIKINA (J. Appl. Chem. Russ., 1935, 8, 1467—1469).—Someya's Zn amalgam method is simpler and not less accurate than are the $TiCl_3$ reduction, the iodometric, and the colorimetric methods. R. T.

Determination of iron and manganese in water.—See B., 1936, 254.

Determination of cobalt by electrolysis at controlled potentials and using hydrazine hydrate and chloride as depolarisers. A. JÍLEK and J. VŘEŠTAL (Coll. Czech. Chem. Comm., 1935, 7, 512—520).—The conditions for the quant. electrodeposition of Co have been investigated. < 100 mg. of Co are determined to within ± 0.2 mg. as a coherent, completely acid-sol. deposit by electrolysis at 4 volts and about 0.5 amp. with a rotating anode a solution of $CoSO_4$ containing 0.5 g. of $N_2H_4 \cdot HCl$, 2 c.c. of conc. $N_2H_4 \cdot H_2O$ (I), and 45 c.c. of conc. aq. NH_3 , diluted to 100 c.c. After 1 hr., 1 c.c. of (I) is added and the electrolysis continued for 2 hr. Small quantities of Cl^- have no effect, but the results are somewhat low with 1 g. of K_2SO_4 , and with 1 g. of NH_4NO_3 . Ni and Co-Ni mixtures can be determined under identical conditions. J. G. A. G.

Volumetric determination of cobalticyanide ion. R. UZEL and B. JEŽEK (Coll. Czech. Chem. Comm., 1935, 7, 497—511).—Electrometric titration of $K_3Co(CN)_6$ with $AgNO_3$ always gives results < stoichiometric owing to adsorption of $Co(CN)_6^{3-}$ on colloidal $Ag_3Co(CN)_6$. Analogous results are obtained when Ag^+ is replaced by Hg^+ , Hg^{2+} , and Cu^{2+} . With Cu^{2+} , the end-point becomes more vague as the at. wt. of the added univalent ion increases, but bi- and ter-valent ions do not interfere. K_2CrO_4 indicates the stoichiometric end-point of the titration of $Co(CN)_6^{3-}$ with $AgNO_3$ even in the presence of Zn^{2+} and Mn^{2+} after boiling off excess of HCN in acid solution and neutralising. Ni, Fe, and other metals are eliminated earlier. $Co(CN)_6^{3-}$ is formed from Co^{2+} by way of the intermediate brownish-red anion $[Co^{III}(CN)_5OH]^{2-}$. J. G. A. G.

Volumetric determination of nickel in presence of cobalt. G. CHARLOT (Bull. Soc. chim., 1936, [v], 3, 324—326).—The Ni and Co compounds are converted into $K_4Ni(CN)_6$ and $K_3Co(CN)_6$, respectively, by the usual methods. By adding alkali, which ppt. Ni_2O_3 , and then aq. HCl and $H_2C_2O_4$, the Ni complex is destroyed and $NiCl_2$ obtained in solution, the Co complex being unchanged. Ni is then determined

volumetrically with KCN in aq. NH_3 solution. The precision is 0.05—0.2 mg. of Ni. E. S. H.

Oxidimetric determination of the oximes of nickel and copper. J. MIRONOFF (Bull. Soc. chim. Belg., 1936, 45, 1—8).—The volumetric method described by Tougarnoff (A., 1935, 187) gives quant. results when small amounts of Cu and Ni are pptd. with phenylglyoxime (I), diacetylmonoxime (II), diphenylglyoxime (III), or benzoinoxime (IV). The same procedure as with dimethylglyoxime can be used for (I) and (II), but with (III) hydrolysis must be performed carefully on account of frothing. With (IV) the benzoin formed must be removed, or high results are obtained. J. W. S.

Oxidation-reduction indicators. I. New indicators for the bromate titration of tin and antimony. Z. RAICHINSCHTEIN (J. Appl. Chem. Russ., 1935, 8, 1470—1475).— $SnCl_2$ is titrated in 1.15N-HCl at 30—50° with 0.1N- $NaBrO_3$, in presence of 0.1% benzopurpurin B. $SbCl_3$ is titrated in 3.1—3.5N-HCl using benzopurpurin 4B as indicator. R. T.

Precipitation of thorium by sebacic acid. L. E. KAUFMAN (J. Appl. Chem. Russ., 1935, 8, 1520—1524).—3—10 ml. of 3% sebacic acid (I) in EtOH are added to 100 ml. of the boiling neutral solution, containing Th and Ce, the ppt. is collected, washed, dried at 100°, and warmed at 100° with fuming HNO_3 to disappearance of NO_2 , when the solution is evaporated to dryness, and dissolved in 100 ml. of H_2O . Th is then repptd. with (I), and the washed ppt. is calcined and weighed as ThO_2 . R. T.

Determination of oxides of vanadium in ores.—See B., 1936, 191.

Chemical differentiation of polished metallic minerals by the contact method. III, IV. R. GALOPIN (Arch. Sci. phys. nat., 1935, [v], 17, Suppl., 252—257, 257—261; cf. A., 1935, 463).—Details are given for the detection of the minerals Sb_2S_3 , Bi_2S_3 , FeS , Sb_2S_3 , $3PbS$, Sb_2S_3 , $2PbS$, Cu_2S , Sb_2S_3 , NiS , $NiSb$, $NiAs$, $CuFeS_3$, Fe_3S_{n+1} , and $(NiFe)S$. R. S.

Drop method of detection of bismuth. N. A. TANANAIEV and A. V. TANANAIEVA (J. Appl. Chem. Russ., 1935, 8, 1457—1460).— $SnCl_2$ is added to the solution, when a brown coloration is given by $\leq 2 \times 10^{-6}$ g. of Bi (Hg interferes). Alternatively, Ag and Pb are pptd. by saturated aq. $NaCl-Na_2SO_4$ and $SnCl_2$ and KI are added to the solution, when a yellow to orange ppt. is obtained in presence of $\leq 10^{-5}$ g. of Bi. A third method consists in conversion into the chloride, followed by dilution, when $BiOCl$ is pptd. ($\leq 5 \times 10^{-5}$ g. of Bi). The limitations of the methods and their applications to special cases are discussed. R. T.

Spectroscopic determination of adsorbed ions. (Miss) M. ANNETTS and L. NEWMAN (J. Physical Chem., 1936, 40, 187—193).—The spectroscopic method for the determination of very small concns. of metal ions has been applied to the study of the action of NaOH and $NaMnO_4$ as stabilising agents, and of $AlCl_3$ as a coagulating agent, for Au sols, and also of $MgCrO_4$ as a coagulating agent for Au and Cu sols. The limits of sensitivity are $M/100,000$ for

Au and Mn, $M/50,000$ for Mg, Cr, and Na, and $M/1000$ for Al. M. S. B.

Volumetric determination of palladium by means of oximes. M. GAIHDE (Bull. Soc. chim. Belg., 1936, 45, 9—14; cf. this vol., 444).—Oximes of Pd cannot be hydrolysed and titrated directly like those of Cu and Ni. By pptn. with excess of standard salicylaldoxime in acid solution, filtering, and titrating the excess of oxime, 5—40 mg. Pd can be determined in presence of other metals. J. W. S.

Use of overhead heating in analysis. F. HEINRICH and F. PETZOLD (Chem.-Ztg., 1936, 60, 145—147).—Heating from above by electrical heating elements is recommended for rapid, quiet evaporation of liquids, drying of ppts., etc. R. S. C.

Apparatus for measurement of thermal conductivity of metal foil. A. EUCKEN and H. WARRENTUP (Z. tech. Physik, 1935, 16, 99—105; Chem. Zentr., 1935, ii, 191).—A centrally heated disc is used. Measurements on Cu and Al agree with previous data. J. S. A.

Thermoregulator. R. D. STEHLER (Science, 1936, 83, 40).—Increased precision is obtained by placing metal foil in the bulb of an ordinary PhMe regulator. L. S. T.

Quantitative spectral analysis under variable discharge conditions. V. NAEDLER (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 23—26).—A discussion of errors in the use of a spark for excitation. H. J. E.

Mercury-vapour lamp with very intense resonance radiation. G. KORNFELD and F. MÜLLER-SKJOLD (Z. physikal. Chem., 1936, B, 31, 223—226).—A lamp is described which has an incandescent cathode of Konel metal and gives for 2537 Å. twelve times the intensity of the ordinary Hg-vapour lamp. R. C.

Counter measurements and Röntgen unit. H. WILHELM (Z. tech. Physik, 1935, 16, 2—8; Chem. Zentr., 1935, i, 3012—3013).—No general relationship between counter results and X-ray dose can be derived, but between limits of λ , and for homogeneous radiation, a fairly const. factor may be found. The use of counters for measurement of very weak X-ray doses is described. J. S. A.

Photo-electric analysis with fluctuating light. F. MÜLLER and W. DÜRICHEN (Chem. Fabr., 1935, 8, 267—269).—The insertion of a rotating perforated disc between the light source and the photo-electric cell gives rise to a fluctuating photo-electric current which may be amplified by means of thermionic valve circuits. The light intensity may be then reduced to give the max. sensitivity. Two barrier-layer cells may be used to provide a highly sensitive differential arrangement. J. S. A.

Significance of ions in gas-filled photo-cells. H. RICHTER (Z. tech. Physik, 1934, 15, 598—601; Chem. Zentr., 1935, i, 2951).—The relative importance of ionisation by collision, and of the formation of free electrons by bombardment of the cathode, has been investigated. By delaying the inception of the stable glow discharge, the performance of the cell may be improved. J. S. A.

H H

Abnormalities in characteristic of vacuum photo-cells. H. GEFFCKEN (Z. tech. Physik, 1934, 15, 595—598; Chem. Zentr., 1935, i, 2950—2951).—Vac. photo-cells in which the work of exit from the photosensitive layer is artificially lowered by suitable chemical treatment of that layer show irregular behaviour, the saturation current jumping reversibly from a lower to a higher val. The effect is not due to wall charges, but is attributed to changes in the cathodic space charge. Better compensation of space charges, and high sensitivity, may be attained by admission of traces of gas. J. S. A.

Electrophotometer of barrier-layer [photo-] cells intended for practical opacimetry. P. MEUNIER (Compt. rend., 1935, 201, 1371—1373). T. G. P.

Photometric determination of m.p. P. WOOG, J. GIVAUDON, R. SIGWALT, and J. LIENHART (Bull. Soc. chim., 1936, [v], 3, 439—442).—The fusion of the substance produces a "grease spot" on a paper screen, which is observed under unequal illumination from opposite sides, as in the Bunsen photometer. E. S. H.

Shielded-filament X-ray tube for pure X-ray spectra. E. DERSHEM (Rev. Sci. Instr., 1936, [ii], 7, 86—89).—The target is shielded from visible light and from spattered W from the filament. Fogging of plates by visible light is practically eliminated, the intensity of characteristic radiation remains const., the tube current is nearly const., and the life of the filament is increased. C. W. G.

Apparatus for X-ray patterns of the high-pressure modifications of ice. R. L. McFARLAN (Rev. Sci. Instr., 1936, [ii], 7, 82—85).—Very rapid insertion and centring of the crystal, its rotation, and the evacuation of the diffraction chamber are possible. C. W. G.

Influence of dispersion on the reading of the Haber-Löwe gas interferometer. E. KARWAT (Z. Instrument., 1933, 53, 12—21, 70—78; Chem. Zentr., 1935, i, 3957). H. J. E.

Simple comparator for absorption spectrograms. F. ROSEBURY (Science, 1936, 83, 86). L. S. T.

p_H measurements, dark-coloured substances, and indicator methods. F. ANSELM (Chem. Fabr., 1935, 8, 269—271).—The application of very thin colorimeter cells (up to 0.65 mm. thick) is described. J. S. A.

Production of high-velocity lithium ions. R. L. THORNTON and B. B. KINSEY (Physical Rev., 1934, [ii], 46, 324).—The arrangement described yields a current of 1.5 micro-amp. at 5×10^5 volts. L. S. T.

Superconducting galvanometer. H. G. SMITH and F. G. A. TARR (Trans. Roy. Soc. Canada, 1935, [iii], 29, III, 23—35).—A moving-coil galvanometer, the coil of which is immersed in a liquid He cryostat, is described. H. J. E.

Weston normal cell as standard for the international volt. A. K. KOLOSOV (Vses. Nauch.-Issled. Inst. Metrol., 1932, No. 100, 131—137; cf. A., 1934, 625).—To avoid mixing of the components

during transport, the cathode limb has a constriction to hold the Hg in place. The saturated CdSO_4 contains approx. $0.004N\text{-H}_2\text{SO}_4$. In washing the Hg_2SO_4 with saturated aq. CdSO_4 washing must cease when the concn. of acid in the washings is $0.004N$. High acid concns. lead to gas formation in the anode limb.

CH. ABS. (e)

Resolving power in recording of coincidence by two counters arranged behind one another. J. N. HUMMEL (Z. tech. Physik, 1934, 15, 573—575; Physikal. Z., 1934, 35, 997—999; Chem. Zentr., 1935, i, 2942).—Data concerning resolving power are given.

J. S. A.

Sensitive counter tube arrangement. E. B. ANDERSEN (Z. Physik, 1936, 98, 597—604).—A counter for weak radioactive measurements is surrounded by other tubes, and the amplifier registers those impulses present only in this tube.

A. B. D. C.

Determination of the end-point of conductometric titrations by calculation. J. H. BOULAD (Bull. Soc. chim., 1936, [v], 3, 408—412).—Mathematical procedure, replacing the graphical method, is described.

E. S. H.

Easily constructed electrical relay. G. F. KOEPF and J. F. MEZEN (Science, 1936, 83, 109—110).

L. S. T.

Iron-free coil for production of maintained intense magnetic fields. G. GERLOFF and E. LÖWE (Z. Physik, 1936, 98, 559—560).—The apparatus gives homogeneous fields up to 5000 oersted.

A. B. D. C.

Pipette for measurement of aqueous solutions. Y. P. LIU (J. Chinese Chem. Soc., 1936, 4, 20—21).—The pipette is provided with a two-way stopcock above the bulb.

R. S. B.

Micro-burette. W. SPATZ (Chem. Fabr., 1936, 9, 70).—A capillary connecting tube avoids the formation of air bubbles between the burette and the reservoir.

J. S. A.

Apparatus for determination of gases. M. L. JEAN (Bull. Soc. chim., 1936, [v], 3, 267—269).—The apparatus formerly described (A., 1935, 466) is modified.

E. S. H.

Accessories for gas analysis. W. ALLNER (Chem. Fabr., 1936, 9, 70—72).—A device for collecting gases at const. variable pressure, and a modified Jaeger CuO tube for the fractional combustion of H_2 and hydrocarbons, are described.

J. S. A.

Constant-volume gas analysis apparatus. B. N. SINGH and P. B. MATHUR (Biochem. J., 1936, 30, 321—322).—The apparatus is used for determination of O_2 and CO_2 with an accuracy of $\pm 0.1\%$.

W. McC.

Multiple-unit distilling apparatus for determination of fluorine by Willard and Winter's method. D. S. REYNOLDS, I. B. KERSHAW, and K. D. JACOB (J. Assoc. Off. Agric. Chem., 1936, 19, 156—162; cf. A., 1933, 242, 654).

E. C. S.

Preparation of glass helices for use in fractionating columns. W. C. YOUNG and Z. JASAITIS (J. Amer. Chem. Soc., 1936, 58, 377).—Technique is recommended.

E. S. H.

Determination of Poisson's elastic constants by means of ultrasonic waves. R. BAR and A. WALTI (Helv. phys. Acta, 1934, 7, 658—661; Chem. Zentr., 1935, i, 3759).—The method is applied to the determination of the elastic moduli of glass.

J. S. A.

Air-damped balances. W. N. BOND (Analyst, 1936, 61, 85—90).—The theoretical and practical advantages of critically air-damped over oscillating balances are discussed.

E. C. S.

Constant-level siphon. R. LAUTIE (Bull. Soc. chim., 1936, [v], 3, 503—504).

E. S. H.

Level control in funnels. W. R. THOMPSON (Science, 1936, 83, 168).

L. S. T.

Apparatus for catalytic hydrogenation at high pressure. L. PALFRAY (Bull. Soc. chim., 1936, [v], 3, 508—511).—The apparatus consists of an autoclave and H_2 compressor, with automatic recording of temp. and pressure. It is suitable for the range $0\text{--}300\text{ kg.}$ and $0\text{--}300^\circ$.

E. S. H.

Determination of density of grains. W. F. DE JONG (Zentr. Min., 1935, A, 140—142; Chem. Zentr., 1935, ii, 252).—A flotation method, applicable to particles weighing about 1 mg., is described.

J. S. A.

Improvised micro-manipulator. P. H. SIMONS (J. S. African Chem. Inst., 1936, 19, 24—25).—The adjustments of a microscope sub-stage condenser may be used to manipulate needles, capillaries, etc. in the field of the microscope.

J. S. A.

Determination of contact angles from measurements of the dimensions of small bubbles and drops. I. Spheroidal segment method for acute angles. G. L. MACK. II. Sessile drop method for obtuse angles. G. L. MACK and (Miss) D. A. LEE (J. Physical Chem., 1936, 40, 159—167, 169—176).—I. Acute angles of contact may be determined as a function of the radius and vol. of a small spherical drop of liquid by a method which is practically independent of the solid surface concerned. An expression for the effect of gravity on the form of the drop is given.

II. Average obtuse contact angles may be determined from measurements of the vertical height, the horizontal radius, and the radius of curvature at the apex of sessile drops or bubbles under a plate. The third dimension required may be calc. from the capillary const. of the liquid by a simplified equation.

M. S. B.

Apparatus for maintaining circulation of gases in laboratory apparatus. V. I. KUZNETZOV (J. Appl. Chem. Russ., 1935, 8, 1516—1517).—A simple laboratory pump is described.

R. T.

Safety tube for preventing bumping of liquids supersaturated with gas. V. I. KUZNETZOV (J. Appl. Chem. Russ., 1935, 8, 1514—1515).—A U-tube, containing 1—2 drops of Hg, with one broad and one narrow limb, is fused to the lower part of the condenser tube of a Kjeldahl set. The tube, by allowing gases to enter, but not to leave, the apparatus, permits instant equalisation of pressure, thereby eliminating bumping.

R. T.

Research applications of colloidal graphite. B. H. PORTER (Rev. Sci. Instr., 1936, [ii], 7, 101—106).—Applications to vac. technique, electronic devices, electrical contacts, and other purposes are described. C. W. G.

Determination of vapour pressure. V. A. KIREEV and A. A. POPOV (J. Gen. Chem. Russ., 1935, 5, 1399—1401).—Apparatus is described, whereby the v.p. of AcCl , $\text{CH}_2\text{Cl}\cdot\text{CO}_2\text{H}$, and propylene oxide have been measured at different temp., and empirical equations connecting temp. with v.p. have hence been derived. R. T.

Glass apparatus for handling low-b.p. liquids. S. F. BIRCH and P. DOCKSEY (Chem. and Ind., 1936, 169—170).—The construction of a simple apparatus which can be used also for the solvent extraction of liquids is described. S. M.

Mixing arrangement for large quantities in the laboratory. B. FLASCHENTRÄGER and P. FABER (Chem. Fabr., 1935, 8, 272).—A rotary shaking machine is described. J. S. A.

Determination of surface tension by the drop-weight method. K. C. BAILEY (Nature, 1936, 137, 323). L. S. T.

Ripple method of measuring surface tension. R. C. BROWN (Proc. Physical Soc., 1936, 48, 312—322).—An apparatus for the production, stroboscopic observation, and measurement of ripples for surface-tension determinations is described. Results for the fall of surface tension of a slowly adsorbed aq. solution of cetylpyridinium bromide are similar to those obtained by a static method, showing that the ripples do not retard attainment of surface equilibrium. N. M. B.

Measurement of surface tension by means of stationary waves on a vertical jet. J. SATTERLY and J. C. STRACHAN (Trans. Roy. Soc. Canada, 1935, [iii], 29, III, 105—112).—Measurements with H_2O and Hg are described, using a modification of Satterly and McPherson's method (*ibid.*, 1934, 28, 177). Sources of error are discussed. H. J. E.

Determination of viscosity by the oscillation of a vessel enclosing a fluid. I. E. N. DA C. ANDRADE and Y. S. CHONG. II. E. N. DA C. ANDRADE and L. ROTHERHAM (Proc. Physical Soc., 1936, 48, 247—260, 261—266).—I. An improved technique and method of calculation are described. Accurate results are obtained for H_2O over the temp. range 2.5—65.2°.

II. Instead of the energy of oscillation being dissipated by the viscous forces, energy is supplied at every oscillation, by the discharge of a condenser, to maintain a fixed amplitude; η is calc. from the amplitude and the energy supplied. The method is checked by measurements of η for hexane in terms of that of H_2O . N. M. B.

Arrangement for measuring the viscosity of gases. A. FORTIER (Compt. rend., 1935, 201, 1330—1332).—A method which depends on delivering a rigorously const. vol. of gas independent of the pressure and of the capillary is outlined. T. G. P.

Measurement of absolute viscosity by the falling-sphere method. L. R. BACON (J. Franklin Inst., 1936, 221, 251—273).—The vals. given by Stokes' formula are shown to depend on the ratio diameter of sphere/diameter of tube. Various correction formulæ have been tested, but only that due to Faxen yields vals. in agreement with capillary-tube determinations over the range 10—10,000 poises. R. S.

Apparatus for automatically maintaining reduced pressure. C. F. WINCHESTER (Science, 1936, 83, 64). L. S. T.

Instruments for registration of vapour pressure [of water] and specific humidity. F. WENK (Z. Instrument., 1935, 54, 15—19; Chem. Zentr., 1935, i, 3957).—Apparatus is described. J. S. A.

Vacuum in laboratory and technique. H. BAERMANN (Chem. Fabr., 1935, 8, 395—404).—A comprehensive review covering modern types of vac. pumps, measuring instruments, vac. sealing media, automatic regulators, and vac. evaporating and distilling technique. A. R. P.

Geochemistry.

Spectra of meteors. P. M. MILLMAN (Ann. Ast. Obs. Harvard Coll., 1932, 82, 113—146).—9 spectra are discussed. Fe, Ca, Mg, Mn, Al, Cr, and Si were identified. CH. ABS. (e)

Evolution of helium from the earth. E. K. GERLING (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 41—43).—Analyses are recorded for the $\text{He}+\text{Ne}$ content of air in contact with the earth in various districts. In none of the localities examined was the val. high. H. J. E.

Lake Akanuma, a siderotrophic lake at the foot of volcano Bandai, Hukusima Prefecture, Japan. S. YOSHIMURA (Proc. Imp. Acad. Tokyo, 1935, 11, 426—428).—The temp., p_{H} , $[\text{O}_2]$, $[\text{Mn}]$, $[\text{Fe}]$, $[\text{Cl}]$, and sp. conductivity are recorded for samples of H_2O from the surface and from various

depths. The absence of dissolved O_2 at 1 m. and below is due to reduction by Fe^{++} and Mn^{++} , which are present in high concn. The high conductivity is due to CaSO_4 . J. W. S.

Radioactive waters at Starobelsk. E. S. BURKSER (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 45—48).—Complete analytical data are given for samples from depths of 400—750 m. The Ra content was 0.80—6.1 $\times 10^{-11}\%$. Th and mesothorium were absent. H. J. E.

Mineral and medicinal springs of Switzerland. ANON. (Mitt. Lebensm. Hyg., 1935, 26, 250—328).—Analyses of 62 springs are given and a system of classification is evolved based on mineral constituents, physical properties, and clinical effects. J. G.

Characteristics of Pearl River water. W. W. HUANG (J. Chem. Eng. China, 1935, 2, 139—147).—Seasonal variations in chemical composition of this H₂O are recorded in detail. C. I.

Corpus Christi structural basin postulated from salinity data. W. A. PRICE (Bull. Amer. Assoc. Petrol. Geol., 1935, 19, 317—355).—Consideration of lines of isoalkalinity indicates that original oceanic H₂O diluted with surface H₂O entered at the outcrop and penetrated slowly down the dip.

CH. ABS. (p)

Difference in the isotopic composition of the oxygen in air and water. N. MORITA and T. TITANI (Bull. Chem. Soc. Japan, 1936, 11, 36—38).—By preparing H₂O from light H₂ and from O₂ obtained (1) from the air, (2) by the partial electrolysis (5%) of ordinary H₂O, and (3) by the complete hydrolysis of H₂O, and by comparing δ for the three samples, it has been shown that air is richer in O¹⁸ than ordinary H₂O. The distribution coeff. of O¹⁸ between air and H₂O is approx. 1.04. M. S. B.

Analyses of phosphorite from the culm formation of the Świetykrzyż mountains. S. BISKUPSKI (Bull. Acad. Polonaise, 1935, A, 85—91).—Analytical data are recorded and discussed. The Ca₃(PO₄)₂ content increases and that of CaCO₃ decreases with the age. The CaF₂ was almost const. in all the phosphorites. H. J. E.

Origin of guano minerals in the Dominican Grotto, Slovakia. J. V. KAŠPAR (Věstn. Stát. Geol. Úst. Českoslov. Repub., 1934, 10, 104—111; Chem. Zentr., 1935, i, 3527).—Analytical data are given.

H. J. E.

Symmetrical extinction angles of albite-twinned plagioclases. S. Tsuboi (Proc. Imp. Acad. Tokyo, 1935, 11, 423—425).—The curve given by Wright (Amer. J. Sci., 1913, 36, Plate X) for the max. symmetrical extinction angles of albite-twinned plagioclases is shown to be incorrect and a revised curve is given. J. W. S.

Relations of later gabbro to sulphides at the Horne Mine, Noranda, Quebec. G. G. SUFFEL (Econ. Geol., 1935, 30, 905—915).—Sulphide ores at this mine are definitely later than all other formations except, possibly, the later gabbro dykes. All the chalcopryite, and probably the pyrrhotite and pyrite, are now shown to be post-dyke. L. S. T.

Differentiation in traps and ore deposition. A. C. LANE (Econ. Geol., 1935, 30, 924—927; of. A., 1935, 955).—A discussion. L. S. T.

Mylonitic sphalerite from Friedensville, Pennsylvania. R. D. BUTLER (Econ. Geol., 1935, 30, 890—904). L. S. T.

Large quartz veins of Great Bear Lake, Canada. G. M. FURNIVAL (Econ. Geol., 1935, 30, 843—859).—These have been formed by the deposition of quartz (I) from hydrothermal solutions at moderate temp. Minerals other than (I) are sparse and represent last-stage depositions. They are specular hematite, bornite, chalcopryite, covellite, chalcocite, pyrite, famatinite, and siderite. Pitchblende has also been found in a large vein on Hottah Lake. The extensive

alteration and replacement of the severely-fractured wall rocks by SiO₂ which accompanied the formation of the veins is described in detail. Analyses showing the chemical changes during alteration and a diagram showing gains and losses of oxides are given. The genetic relations of the veins are also discussed.

L. S. T.

Geologic problems of the Canadian Pre-Cambrian gold fields. E. Y. DOUGHERTY (Econ. Geol., 1935, 30, 879—889).—Problems relevant to the science of ore deposits and to the practice of mining geology are discussed. L. S. T.

Natural glasses of the insoluble residues of the Pennsylvanian limestones of Texas. L. T. PATTON (Science, 1936, 83, 83—84). L. S. T.

Origin of cyanite. S. TABER (Econ. Geol., 1935, 30, 923—924; cf. A., 1935, 954). L. S. T.

Synthetic emerald. EPPLER (Deut. Goldschmiede-Ztg., 1935, 38, 144—146; Chem. Zentr., 1935, i, 3969).—Optical data are given for distinguishing natural from synthetic emeralds. J. S. A.

Relations of amphibolites and peridotites at Sarrazac (Dordogne). M. ROQUES (Compt. rend., 1936, 202, 332—334).—The rocks are described and their relationships are discussed. Analyses are given. H. J. E.

Assimilation processes, formation of migmatites, and their signification in the origin of magmas. F. K. DRESCHER-KADEN (Chem. Erde, 1936, 10, 271—310).—Cases of rock variation around granite and gabbro masses at various well-known localities, which have hitherto been ascribed to differentiation of the magma, are now asserted to be due to assimilation of the surrounding rocks into which the magma was intruded, with the production of migmatites or mixed rocks. The bearing of this on the origin of magmas and on petrological theory is discussed (cf. Reynolds, A., 1935, 1477). L. J. S.

Copper-bearing spathic iron veins in the Bober-Katzbach Mtns., Silesia. A. NEUHATS (Chem. Erde, 1936, 10, 247—270; Fortschr. Min. Krist. Petr., 1936, 20, 50—55).—These veins were discovered in 1922 and have been worked for Fe and Cu ores. The principal mineral is chalybite (containing 3% Mn), and the Cu ore is mainly chalcopryite with associated rarer Ni and Co minerals. A detailed description is given and the origin of the veins discussed. L. J. S.

Geochemistry of barium. W. VON ENGELHARDT (Chem. Erde, 1936, 10, 187—246).—Numerous igneous and sedimentary rocks, minerals, meteorites, and org. plant remains were examined spectroscopically for Ba. In igneous rocks Ba goes with K, ranging from 0.2% BaO in syenite to 0.0003% in peridotite, with an average of 0.048%. In sedimentary rocks it is adsorbed by clay, clay-slates containing BaO 0.05% and limestone 0.01%. The average for the whole lithosphere is 0.045%. The deposition of baryte under various conditions is discussed. L. J. S.

Rocks from Cape Verde Islands. H. ERMERT (Chem. Erde, 1936, 10, 155—186).—A collection of rocks from the islands of São Vicente and Sal is

described, with chemical analyses of foyaite, dioritic essexite, trachyandesite, gabbroid essexite-dolerite, and augite. These when tabulated and plotted with earlier analyses show a similarity to the rocks of the Canary Islands, and the two form a rock province characterised by the predominance of Na_2O . Mineral analyses are given of sands from the same islands.

L. J. S.

Synthesis of montmorillonite. W. NOLL (Chem. Erde, 1936, 10, 129—154; cf. A., 1935, 601).—In presence of little alkali both montmorillonite (I) and kaolin are formed; with still less or none (or in a slightly acid solution) only kaolin. With an excess of NaOH analcime is formed. Similar results are obtained in presence of $\text{Ca}(\text{OH})_2$ and $\text{Mg}(\text{OH})_2$. With excess of $\text{Mg}(\text{OH})_2$ this enters into the composition of the (I) up to 15.3% MgO , which then corresponds with a fuller's earth. In the natural formation of clay minerals by the hydrothermal alteration of rocks, if alkalis accumulate, owing to feeble circulation, then (I) is formed, whilst if they are removed by an excess of H_2O kaolin is formed.

L. J. S.

Rock-forming minerals from Belgian Congo. A. VANDENDRIESSCHE (Natuurwetensch. Tijds., 1936, 17, 243—247).—The crystallography, physical properties, and chemical analyses of olivine and augite from near the Mikenjo volcano, Kivu, are given. These minerals occur in soil derived from basaltic lavas.

D. R. D.

Colour of corundum. I. I. ISLAMOV and J. M. TOLMATSHEV (Compt. rend. Acad. Sci. U.R.S.S., 1936, 1, 11—13).—Corundums have been analysed spectroscopically, the red form containing Cr 0.18, Ti 0.01, V 0.04, and Ga 0.005%, the blue, Cr 0.002, Ti 0.2, V trace, and Ga 0.005%, and the light grey, Cr trace, Ti 0.03, V trace, and Ga 0.002%. Fe is present in approx. the same amount in each. A qualitative analysis has been made for other elements in corundum, and on disthene. The cause of colour is discussed.

R. S. B.

Optical diagram for magnesium-iron mica (phlogopite). D. P. GRIGORIEV (Zentr. Min., 1935, A, 142—150; Chem. Zentr., 1935, ii, 198).—The variation of the optic axial angle and refractivity of phlogopite with the FeO content deviates widely from the theoretical curve. The cause is discussed.

J. S. A.

Classification of the granites of the southern Katanga according to the planimetric study of thin sections. M. GYSIN (Arch. Sci. phys. nat., 1935, [v], 17, Suppl., 243—246).—The granites can be divided into 8 classes, belonging to the granitic or dioritic groups of the calco-alkaline series.

R. S.

Luminescence of calcite (with special reference to the Polish deposits). S. KREUTZ (Bull. Acad. Polonaise, 1935, A, 486—500).—Specimens of calcite were heated to 300°, 330°, 360°, 530°, 680°, and red heat, and, on cooling, their luminescence was examined. Luminescence is lost on heating, this fact being connected with loss of CO_2 . The blue luminescence of some samples changes to a bright yellow between 330° and 580°. Although the luminescence of specimens from different localities differs, there are

two main spectral ranges, one in the red, and the other in the blue and violet. The phosphorescence exhibited by some specimens of calcite was also investigated.

A. J. M.

Origin of tektites. I. Tektites as fulgurites [formed in the atmosphere]. T. VOGT (Kong. Norske Vidensk. Selsk. Forh., 1935, 8, 9—12; Chem. Zentr., 1935, i, 3527).

H. J. E.

Preservation of pyrite and marcasite. F. A. BANNISTER (Museums J. London, 1933, 33, 72—75).—The decomp. of specimens of natural FeS_2 can be arrested by cleaning with aq. NH_3 , washing, drying at 70°, and coating with a 7% solution of vinyl acetate in 1:1 PhMe-COMe_2 .

CH. ABS. (e)

Lovchorrite of the Chiba swamps. I. K. CHAZANOVITSCH (Razved. Nedr, 1935, 4, No. 1, 28).—Lovchorrite contains approx. 16% of Ce and Ce earths, 1% of Th, and some U. It resembles glue plates. Chibinite is similar.

CH. ABS. (e)

Lake Bosumtwi [volcanic glass]. N. R. JUNNER (Rep. Geol. Surv. Gold Coast, 1932—1933, 4—7).—The volcanic glass contained 64.01% of SiO_2 .

CH. ABS. (e)

Preliminary staining studies of the Lehigh Valley dolomitic limestone. J. FULLER (Proc. Penna. Acad. Sci., 1934, 8, 83—87; Rev. géol., 14, 522).—Staining tests distinguish dolomitic from MgO -free limestones. Malachite-green and $\text{K}_4\text{Fe}(\text{CN})_6$ with HCl are satisfactory. Lemberg's solution gives the best results.

CH. ABS. (e)

Iron deposits of southern Anhui. C. Y. HSIEH (Bull. Geol. Soc. China, 1931, 10, 317—347).—The Fe ores are genetically related to diorite intrusions, and are of the contact metamorphic and hydrothermal types. In the former, magnetite occurs with garnet and babingtonite.

CH. ABS. (e)

Genesis of the Mivirando tin ores. W. C. SIMMONS (Ann. Rep. Geol. Survey Uganda, 1932, 50—52; Rev. géol., 14, 290).—It is suggested that Sn came up as K stannate, which, on meeting Al_2O_3 and SiO_2 , deposited cassiterite and muscovite. The alkali manganates, tungstates, titanates, etc. may transport the respective metals.

CH. ABS. (e)

Occurrence and distribution of staurolite in Gangpur State, Bihar and Orissa. M. S. KRISHNAN (Quart. J. Geol. Soc. India, 1933, 5, 67—73).—Staurolite occurs in mica-schists with quartz, biotite, muscovite, penninite, and garnet.

CH. ABS. (e)

Correlation between specific gravity, chemical constitution, and condition of formation of minerals and rocks. D. C. NAG (Quart. J. Geol. Soc. India, 1932, 4, 29—67).—The d has been calc. from analyses, assuming the mol. vol. of a compound equal to the sum of the mol. vols. of its constituents.

CH. ABS. (e)

Geology of the Orkneys. G. V. WILSON, W. EDWARDS, J. KNOX, R. C. B. JONES, J. V. STEPHENS, and J. S. FLETT (Mem. Geol. Survey Scotland, 1935, 205 pp.).—Deposits of galena associated with strombolite, and the petrography of numerous basic dikes, are described. Analyses are given.

CH. ABS. (e)

Minerals in diamondiferous concentrates. N. R. JUNNER (Rep. Geol. Survey Gold Coast, 1932—1933, 14—15).—Diamonds are often enclosed in pisolites of limonite with 0.15—1.19% of Cr_2O_3 . This suggests their origin from ultra-basic igneous rocks. Analyses of garnets, ilmenite, and chrysoberyl are given. CH. ABS. (e)

Arrangement of micro-crystals of silica in the onyx. M. ICHINOSE (Mem. Coll. Sci. Kyoto., 1935, A, 18, 315—316).—X-Ray diffraction patterns show that micro-crystals of SiO_2 in onyx have a fibrous arrangement, of which the common axis is [1120] and perpendicular to the surfaces of the banded layers in the mineral. J. G. A. G.

Iron formations and associated rocks of the Eastern Bababudans, Kadur District, Mysore. C. S. PICHAMUTHU (J. Mysore Univ., 1935, 8, 1—48).—Analyses are given, and the origin of the banded ferruginous quartzites is discussed. C. W. G.

Viscosity of fused rocks. M. VOLAROVITSCH (Compt. rend., 1936, 202, 78—80; cf. A., 1934, 751).—Analytical and η data (1110—1400°) are recorded for a series of rocks. η increases, in general, with the acidity of the rock. H. J. E.

Violet fluorspars. H. ARSANDAUX (Bull. Soc. franç. Min., 1935, 58, 268—277).—When slowly heated, strongly-coloured fluorspars emit a relatively prolonged thermoluminescence, which approx. \propto the intensity of pigmentation. They differ from most coloured fluorspars in emitting little or no fluorescence under the action of ultra-violet light until they have been decolorised by heat. The violet fluorspar from the Isle quarry, near Limoges, is described in detail. Mn may be responsible for the fluorescence in this case. L. S. T.

Hydroxides of aluminium of the bauxitic clays of Ayrshire. J. DE LAPPARENT (Bull. Soc. franç. Min., 1935, 58, 246—267).—These clays contain a large amount of boehmite (I) and a small quantity of diaspore (II). The origin of (I) and (II), which is formed after (I), is discussed. L. S. T.

Elasticity and plasticity of rocks and artificial stone. R. H. EVANS (Proc. Leeds Phil. Soc., 1935—1936, 3, 145—158).—Tests on numerous specimens in tension and compression are described and discussed. H. J. E.

Andesites of the Trojaga District in the Mar-moros Carpathians. M. KAMIENSKI (Bull. Acad. Polonaise, 1935, A, 399—407).—Microscopical and chemical investigations of the volcanic rocks of the Trojaga indicate that they belong to the calc-alkali series of the amphibole-andesites and amphibole-biotite-andesites which show the character of dacitoids. They were probably erupted in the second Mediterranean or the Samet epoch. T. G. P.

Morphological studies of enargite. S. KÔZU and S. WATANABÉ (Proc. Imp. Acad. Tokyo, 1935, 11, 418—420; cf. A., 1934, 244, 1060).—Examination of many crystals of enargite (Cu_3AsS_4) leads to the conclusion that this crystal is hemimorphic. Its crystal habit and modes of twinning are discussed. J. W. S.

Space-group and cell dimensions of enargite. S. KÔZU and K. TAKANÉ (Proc. Imp. Acad. Tokyo, 1935, 11, 421—422; cf. preceding abstract).—Re-examination of the X-ray reflexions of enargite crystals indicates the cell dimensions a_0 6.39, b_0 7.35, c_0 6.15 Å. with two Cu_3AsS_4 mols. per unit cell. It is concluded that the space-group is C_{2v}^n . J. W. S.

Chemical formula of malachite. M. GUILLOT and G. GENESLAY (Compt. rend., 1936, 202, 136—137).—Artificial malachite ($8\text{CuO} \cdot 4\text{CO}_2 \cdot 5\text{H}_2\text{O}$) identical with the natural product may be prepared by (a) the action of saturated aq. Na_2CO_3 or NaHCO_3 on saturated aq. CuSO_4 or (b) the hydrolysis of alkali cupricarbonates or Cu^{II} "carboxydiammine." T. G. P.

Heavy mineral assemblage of white clay and ochres associated with the laterite of Sohawal State, central India. N. L. SHARMA and S. PURKAYASTHA (Quart. J. Geol. Soc. India, 1934, 6, 49—54). CH. ABS. (e)

Petrography of clay. C. W. CORRENS (Naturwiss., 1936, 24, 117—124).—The distribution of nuclear size of clay particles in different specimens of clay, and the examination of the constituents of clay by microscopical and X-ray methods, are discussed. The effect of HCl , NaOH , and H_2O_2 of various concns. is reviewed. H_2O_2 is without appreciable action. A. J. M.

Transformation of absorbed anions in Ad-sharien red earth. B. B. POLINOV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 49—50).—Analytical data are given showing the displacement of adsorbed Cl' and SO_4'' on treating samples of the soil with 0.1N- NaH_2PO_4 . H. J. E.

Podolian loess. I. Petrographical analysis of a loess profile from Grzybowice near Lwow. J. TOKARSKI (Bull. Acad. Polonaise, 1935, A, 374—398).—Microscopical and chemical investigations in 10 horizons indicate that the deposit belongs to the latest diluvial epoch. The loess exhibits only slight genetic relationship to the Tertiary sand of Lwow. T. G. P.

Marine oil shale, source of oil in Playa del Rey field, California. H. W. HOOTS, A. L. BLOUNT, and P. H. JONES (Bull. Amer. Assoc. Petrol. Geol., 1935, 19, 172—205).—The migration of oil in the field is discussed. CH. ABS. (e)

Native hydrocarbons associated with oil shales of the Lothians. H. R. J. CONACHER (Trans. Edinburgh Geol. Soc., 1934, 13, 89—97).—Chrimatite (m.p. 51°) occurs in cavities in igneous rocks. Zietrisikite (m.p. 84°) occurs in joints in sandstone. Wurtzilite (m.p. 130°) is found in oil shales and ironstone nodules, and resembles ixolite. CH. ABS. (e)

Oil deposits in the Lena river basin and its tributaries (Siberia). Organic substance of the minerals from the river Tolba. S. P. USPENSKI (Nef. Choz., 1935, 27, No. 2, 29—32).—Analyses are recorded and discussed. CH. ABS. (e)

Migration of Hungarian hydrocarbons. E. R. SCHMIDT (Föld. Közlöny, 1934, 64, 278; Chem. Zentr., 1935, i, 3527).—A discussion. H. J. E.

Organic Chemistry.

Appearance of radicals in thermal decomposition of organic molecules.—See this vol., 433.

Thermal decomposition of ethane. I, II. See this vol., 432.

Free radicals and atoms in primary photochemical processes. Free *n*-propyl radical. T. G. PEARSON and R. H. PURCELL (J.C.S., 1936, 253–256).—Formation of Pr^\bullet by irradiation of COPr^\bullet , with ultra-violet light (A., 1935, 1221) is proved by removal of As, Sb, and Te mirrors and reaction with Hg (forms a liquid, which with HgBr_2 gives $\text{HgPr}^\bullet\text{Br}$); excitation of the Hg is avoided by filtration of the irradiating light through Hg vapour. The half-life period of Pr^\bullet is 2.3×10^{-3} sec. in SiO_2 at room temp. R. S. C.

Preparation of isomeric hexanes. P. L. CRAMER and M. J. MULLIGAN (J. Amer. Chem. Soc., 1936, 58, 373–374).—*n*-Hexane, b.p. 68.74–68.78° ($\text{CH}_3\text{EtPr}^\bullet\text{OH}$; Al_2O_3 at 350°), β -methylpentane, b.p. 60.22–60.26° ($\text{CMe}_2\text{Pr}^\bullet\text{OH}$; I at 122°), γ -methylpentane, b.p. 63.16–63.21° (CMeEt_2OH ; I at 120°), β -dimethylbutane, b.p. 49.8–49.82° ($\text{CHMeBu}^\bullet\text{OAc}$ heated at 400°), and β - γ -dimethylbutane, b.p. 57.82–58.02° ($\text{OH}\cdot\text{CMe}_2\cdot\text{CMe}_2\cdot\text{OH}$; HBr at 130–150°), are prepared by reduction (H_2 , PtO_2) of the olefines formed by dehydration (methods quoted) of the alcohols quoted after the hydrocarbons. H. B.

Thermal study of oxidation of hydrocarbons.—See this vol., 432.

Polarisability of the ethylenic linking. G. WITTO (Ber., 1936, 69, [B], 471–475).—The additive capacity of the C:C linking in $\text{CR}_2\cdot\text{CR}_2$ depends on the nature of the addendum and on that of R. The displacability of the valency electrons on deformation of the state of union of the C:C group is much more pronounced than that of the C:C linking, and this reacts on R. Examples cited are the ability of $\text{CHMe}\cdot\text{CH}\cdot\text{CHO}$ to undergo the aldol condensation, the fission of $\text{CPh}_2\cdot\text{CH}\cdot\text{CH}_2[\text{CH}_2\cdot\text{CH}\cdot\text{CPh}_2]$ by alkali metal, the pinacolin transformation of $[\text{OH}\cdot\text{CPhR}\cdot\text{C}]_2$, the action of NaOH on 2:6:3-(NO_2) $_2\text{C}_6\text{H}_2\text{Me}\cdot\text{CHO}$, and the dissimilarity in the behaviour of 2- and 4-pyrones. The conditions for the realisation of valency tautomerism are discussed. H. W.

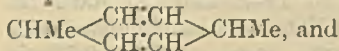
Raman spectrum of rubber and related hydrocarbons. See this vol., 407.

Preparation of unsaturated hydrocarbons by elimination of halogen acids from corresponding halides. A. BELL and R. H. CLARK (Trans. Roy. Soc. Canada, 1935, [iii], 29, III, 61–68).—Quant. comparison of the prep. of unsaturated hydrocarbons from 25 halides by the use of $\text{EtOH}\cdot\text{KOH}$ (I), quinoline (II), NH_2Ph , NPhMe_2 , NPhEt_2 , $\text{C}_5\text{H}_5\text{N}$, and piperidine indicates that (I) gives poor yields with *n*-halides owing to formation of ethers, but, together with the org. bases, is suitable for higher *sec.*, *tert.*, and *cyclo*-halides, whilst (II) is recommended for *n*- and lower *sec.*-halides. Bromides and iodides give better yields than chlorides. F. O. H.

Allylic rearrangements. II. Magnesium crotyl and methylvinylcarbinyl bromides. W. G. YOUNG, S. WINSTEIN, and A. N. PRATER (J. Amer. Chem. Soc., 1936, 58, 289–291; cf. A., 1932, 250).—The same mixture (method of analysis: Dillon *et al.*, A., 1930, 888) of $56.4 \pm 2\%$ of Δ^a - and $26.5 \pm 1.4\%$ *cis*- and $17.2 \pm 3\%$ *trans*- Δ^a -butene is obtained by hydrolysis (dil. HCl) of the Grignard reagents (A) from various mixtures of $\text{CHMe}\cdot\text{CH}\cdot\text{CH}_2\text{Br}$ and $\text{CH}_2\cdot\text{CH}\cdot\text{CHMeBr}$. Rearrangement occurs during the formation of (A). H. B.

Thermal rearrangements of pentenes. C. D. HURD, G. H. GOODYEAR, and A. R. GOLDSBY (J. Amer. Chem. Soc., 1936, 58, 235–237).— Δ^a -Pentene (I) undergoes 56–58% decomp. at 580–600° (contact time 13–18 sec.; method essentially that of A., 1934, 1089) to give liquid (probably mainly *cycloalkenes* and aromatic hydrocarbons) and gaseous products (CH_4 , C_2H_6 , C_2H_4 , C_3H_6 , and Δ^a -butene in the mol. ratio 6:2:1:2:2; small amounts of H_2 , C_3H_8 , Δ^a -butene, and butadiene). A little of (I) rearranges to Δ^b -pentene (II). The extent of decomp. of (II) at 580° and 600° is 23 and 54%, respectively. Essentially the same products are formed and a little of the (II) rearranges to (I). (I) prepared from MgEtBr and allyl bromide in Bu_2O contains a little $\text{CH}_3\cdot\text{CHPr}^\bullet$ (removable by distillation) [the statement (B., 1934, 228) that this is produced during pyrolysis of (I) is erroneous]. (II) (free from isomerides) is obtained by dehydration (H_2SO_4) of $\text{CHEt}_2\cdot\text{OH}$. H. B.

Dimerisation of divinyl. J. M. SLOBODIN (J. Gen. Chem. Russ., 1935, 5, 1415–1420).—The condensate obtained as a by-product of the catalytic prep. of divinyl from EtOH by Lebedev's method consists of *p*-xylene 66, and 4-vinyl- Δ^1 -cyclohexene + $\text{PhMe} + \text{PhEt}$ 33%; the probable intermediates are $\text{CH}_2\cdot\text{CH}\cdot\text{CHMe}\cdot\text{CH}\cdot\text{CH}\cdot\text{CH}_2$,



Rôle of intermediate compounds in the process of catalytic polymerisation of acetylene. I. Reaction of acetylene with solutions of cuprous and ammonium chlorides, and a study of the complexes formed. L. G. TZIURICH and A. A. GINZBURG (J. Gen. Chem. Russ., 1935, 5, 1468–1478).—The cryst. product obtained by saturating a solution containing CuCl 18 and NH_4Cl 20% with C_2H_2 has the composition $6\text{CuCl}\cdot 3\text{NH}_4\text{Cl}\cdot\text{C}_2\text{H}_2$; it readily dissociates into its components, with which it is in equilibrium in the solution. R. T.

Hydrogenation of vinylacetylene. S. V. LEBEDEV, A. I. GULJAEVA, and A. A. VASSILIEV (J. Gen. Chem. Russ., 1935, 5, 1421–1433).—The $\cdot\text{C}\cdot\text{C}\cdot$ and $\cdot\text{C}\cdot\text{C}\cdot$ groups of $\text{CH}_2\cdot\text{CH}\cdot\text{C}\cdot\text{CH}$ (I) are hydrogenated simultaneously and with equal velocity in presence of Pt catalyst, whilst with Pd (on Ni or Na prot-albinate) addition takes place chiefly at the triple linking; $\text{CHMe}\cdot\text{CHMe}$ is not found amongst the products of incomplete hydrogenation. (I) may be

quantitatively reduced to divinyl by nascent H (from Zn-Cu and H₂O, or at a Pt-black cathode). R. T.

Action of anhydrous alkaline earths on monohalogenated paraffins. J. B. SENDERENS and J. ABOULENC (Compt. rend., 1936, 202, 104—106).—When dropped on heated CaO or BaO (reaction temp. in parentheses) C_nH_{2n+1}Cl decomposes cleanly to C_nH_{2n}+HCl (retained by catalyst). Thus BuⁿCl (275—285°) or BuⁿBr (300—310°) gives C₄H₈; PrⁿCl (250°) or PrⁿBr (265°) gives CHMe:CH₂, and BuⁿCl (210°) gives CMe₂:CH₂. No C is deposited.

J. W. B.

From iodoform to fluoroform. O. RUFF [with O. BRETSCHNEIDER, W. LUCHSINGER, and G. MILTSCHUTZKY] (Ber., 1936, 69, [B], 299—308).—CHF₃ obtained by heating CHI₃-AgF-SiO₂ is contaminated with CO and considerable amounts of SiF₄. CaF₂ is a more suitable diluent, the best results being secured with AgF:CaF₂=1:4 and HgF:CaF₂=1:1.2. The prep. of CHF₃, CHIF₂, and CHI₂F from HgF, CHI₃, and CaF₂ (33.4:20:40) is described in detail. At >100° PbF₂, ZnF₂, CuF₂, CoF₂, and SbF₃ do not yield appreciable quantities of CHF₃. Slow passage of CHCl₃ vapour over AgF-CaF₂ gives about 57% of CHCl₂F at 100° and about 48% of CHClF₂ at 250°; at 340° about 10% of CHF₃ is obtained, but the mixture sinters and becomes ineffective at this temp. At about 500° PbF₂ gives a little CHCl₂F among other products. CHF₃ has b.p. -84.4°/760 mm., m.p. -160°. It does not lose HF when heated alone or in presence of KF at 1150°. It is unchanged by HNO₃ alone or with conc. H₂SO₄, N₂O₃, or AgNO₃ at 140°; at >175° it is completely decomposed by N₂O₃. NOF leaves it partly unchanged after 3 hr. at 100° and Mn₂O₇ is without action at 25°. Oxidising agents transform it into COF₂ and HF. It is unaffected by CaO at 365°. Iododifluoromethane, b.p. 21.6°/760 mm., is very sensitive to light and air, but in their absence it is stable indefinitely. It is only partly decomposed by Pt-asbestos at 700°. It reacts readily with AgNO₃. Di-iododifluoromethane, b.p. 100.3±0.5°/760 mm., m.p. -34.5°±0.5°, is sensitive to light and air. It slowly separates I when warmed; at >250° it is almost completely decomposed with production of HF. It reacts with Mg only when irradiated. With liquid NH₃ it gives NH₄F and NH₄I. With Na₂SO₃ in 50% EtOH at 80° complete separation of F from C is observed.

H. W.

Hydrolysis of isopropyl bromide.—See this vol., 433.

Alcohol determination. R. M. MAYER (Deut. Z. ges. gerichtl. Med., 18, 638—646; Chem. Zentr., 1935, i, 3961).—A modified Nicloux method is described.

H. N. R.

Alcoholic fermentation in heavy water.—See this vol., 522.

Determination of small concentrations. II. Butyl and amyl alcohols. M. V. ALEXEEVA (J. Gen. Chem. Russ., 1935, 5, 1324—1330).—7 ml. of 0.05N-KMnO₄ and 10 ml. of 5N-H₂SO₄ are added to 10 ml. of solution, containing 0.1—1.5 mg. of BuOH or C₅H₁₁·OH, the mixture is kept in the dark for

35 min., when 10 ml. of 0.05N-Na₂C₂O₄ are added, the solution is warmed to 80—90°, and excess of oxalate is titrated with 0.05N-KMnO₄. Esters to an amount of >25% of that of the alcohols present do not interfere, but EtOH should be absent.

R. T.

Mechanism of conversion of Δ^γ-butenol into Δ^β-butenyl bromide. L. W. J. NEWMAN and H. N. RYDON (J.C.S., 1936, 261—264).—Δ^β- (I) and Δ^γ-Butenol (II) are stable to boiling alone, hot 30% KOH, Ac₂O, and AcOH; Δ^β- (III) and Δ^γ-butenyl bromides are similarly stable and hydrolysis of the acetates does not cause isomerisation. Change of (II) into (III) by hot H₂SO₄-HBr occurs by dehydration to butadiene and addition of HBr thereto, both the last reactions having been separately realised under the experimental conditions used. CH₂:CMe·CH₂·OH reacts with HBr as does (I) and its bromide is hydrolysed at the same rate as is (III). Mixtures of the Δ^β- and Δ^γ-isomerides are analysed by the much more rapid esterification by HBr or hydrolysis of the Δ^β-isomeride at room temp.

R. S. C.

Action of micro-organisms on the diastereomeric forms of hexane-γδ-diol. H. VAN RISSEHEM (Bull. Soc. chim. Belg., 1936, 45, 21—35).—Griner's mixed [CH₂:CH·CH(OH)]₂ with H₂-Pd-black in Et₂O gives meso- (I), m.p. 90.1—90.2°, b.p. 115.1°/24 mm., and dl-hexane-γδ-diol (II), f.p. 20.9°, b.p. 108.65—108.75°/24 mm. (I) with *B. xylinum* or *M. aceti* gives d-hexan-γ-one-8-ol (III), b.p. 70.7—71°/22 mm., [α]_D²⁰ +88.16°, and a little (EtCO)₂ (II) with *B. xylinum* slowly or *M. aceti* rapidly gives the l-form of (III), whilst some l-(II) remains unattacked; d-(II) thus reacts preferentially. It is concluded that bacteria attack the d-C. Hydrogenation of d-(III) gives l-(II), b.p. 105.7—106.2°/20 mm., [α]_D²⁰ -12.24°.

R. S. C.

Lycoxanthine and lycophyll, two natural derivatives of lycopene. L. ZECHMEISTER and L. von CHOLNOKY (Ber., 1936, 69, [B], 422—429).—The fruits of *Solanum dulcamara* are ground with sand, washed with EtOH, and then extracted with Et₂O. After removal of the solvent the residue is dissolved in C₆H₆ and analysed chromatographically using Ca(OH)₂. Alternatively, the dry residue is dissolved in benzene and the solution shaken with 90% MeOH; the final treatment is with Ca(OH)₂ in C₆H₆-benzene. Thus are obtained lycoxanthine (I), m.p. 168° (corr.) (acetate, m.p. 137°), lycophyll (II), C₄₀H₅₆O₂, m.p. 179° (corr.) [dipalmitate, m.p. 76° (corr.)], and lycopene (III). The absorption spectra of (I), (II), and (III) are so remarkably similar that the presence of 11 conjugated and two isolated double linkings in each is regarded as established. On the assumption that the OH occupy the same positions as in other xanthophylls, the constitution

CMe₂·CH·CH(OH)·CH₂·[CMe·CH·CH:CH]₃·[CH:CMe·CH:CH]₂·CH:CH·CMe·CH₂·CHR·CH:CMe₂ is assigned with R=H in (I) and R=OH in (II). The quant. separation of (II) from (I) and (III) is described, also the determination of (I) and (II) in the crude materials. (I) and (II) do not appear to be present in preserved tomatoes, but are detected in the

fresh fruit. The berries of *Tamus communis* contain (III) a little (I), but not (II). The carotenoids are unesterified. (I) and (II) are absent from *Rosa canina*, but present in traces in *Actinophleus Macarthurii*. (III) and its derivatives are not contained in *Coloneaster horizontalis*.
H. W.

α -D-[γ -]Anhydromannitol. F. VALENTIN (Coll. Czech. Chem. Comm., 1936, 8, 35—42).— α -Methylmannopyranoside 6-bromide (freed from NH_2Ac by EtOAc) with $\text{Ba}(\text{OH})_2$ gives α -methyl- γ -anhydromannopyranoside, stable to H_2S , hydrolysed by 3% HCl to γ -anhydromannofuranose (I), which with 2.5% Na-Hg in slightly alkaline solution gives α -anhydromannitol (50% yield), m.p. 148° (lit. 138°), $[\alpha]_D^{20} -23.75^\circ$ in H_2O (dibenzylidene derivative, m.p. $125-126^\circ$, $[\alpha]_D^{20} -48.8^\circ$ in CHCl_3), which with Br reverts to (I). CHPh is determined by distillation with 60% H_2SO_4 in CO_2 and determination of the PhCHO in the distillate as phenylhydrazones.
R. S. C.

Chloroalkoxylation of olefines by the action of chlorine in presence of alcoholic alkali. M. V. LICHOSCHERSTOV and A. A. PETROV (J. Gen. Chem. Russ., 1935, 5, 1348—1354).—Compounds of the type $\text{OR}\cdot\text{CHMe}\cdot\text{CHMeCl}$ (I) ($\text{R}=\text{alkyl}$) are obtained in 60—70% yield by adding a 30% excess of NaOH to the ROH , passing Cl_2 continuously (25% excess), and introducing $\text{CHMe}\cdot\text{CHMe}$ intermittently. When the mixture is diluted with H_2O , a 3:1 mixture of (I) and $(\cdot\text{CHMeCl})_2$ separates.
R. T.

Preparation of dimethylacetal by condensing methyl alcohol with acetylene. S. TAMARU and Y. TANAKA (J. Chem. Soc. Japan, 1935, 56, 486—504).— HgCl_2 or H_2SO_4 may be used as catalysts, the optimum temp. being 40° ; the former is prevented from losing its activity by addition of $\text{Fe}_2(\text{SO}_4)_3$.
CH. ABS. (r)

Mixed glycerides of salicylic acid and fatty acids. A. LUKASIAK (Rocz. Farm., 1934, 12, 1—26; Chem. Zentr., 1935, i, 3005—3006).—Resorption of salicylic acid (I) compounds is followed by determination of (I) in the urine. Results with Et and ethylene salicylates, the triglyceride of (I), salicylodichlorohydrin, and α -distearo- β -salicylin are described. The following are described: β -palmito-, m.p. 32° , β -butyro-, b.p. $102-103^\circ/12\text{ mm.}$, and β -isovalero-, b.p. $104-106^\circ/8\text{ mm.}$, - $\alpha\gamma$ -dichlorohydrin; $\alpha\beta$ -dibutyro- γ -monochlorohydrin, b.p. $133-136^\circ/8\text{ mm.}$; diisovalero- α -iodohydrin, b.p. $153-155^\circ/4\text{ mm.}$; $\alpha\gamma$ -diisovalerin, b.p. $146-150^\circ/5\text{ mm.}$; $\alpha\alpha$ -diisovalero- β -salicylin, b.p. $210-212^\circ/4\text{ mm.}$; α -salicylo- $\gamma\gamma$ -dibutyryn, b.p. $198-201^\circ/3\text{ mm.}$; β -palmito-, m.p. 44° , β -butyro-, m.p. 51° , and β -isovalero- $\alpha\gamma$ -disalicylin, m.p. 65° .
H. N. R.

Spectrophotometric determination of ethylene glycol dinitrate. J. H. FOULGER (J. Ind. Hyg., 1936, 18, 127—129).—The absorption of the coloured solution, formed by the action of $\text{OH}\cdot\text{C}_6\text{H}_5(\text{SO}_3\text{H})_2$ on $\text{C}_2\text{H}_4(\text{O}\cdot\text{NO}_2)_2$ (I), at 4900 \AA. has been determined, and data obtained by which the concn. of (I) can be determined from (a) the sp. extinction val. (for concn. $1.6-3.3\text{ mg. per }100\text{ c.c.}$) and (b) a table of differences of photometer readings (for concn. $0.5-4.2\text{ mg. per }100\text{ c.c.}$).
J. N. A.

Interpretation of differences in properties of alkyl chlorosulphites and chloroformates from the electronic viewpoint. P. CARRÉ (Compt. rend., 1936, 202, 298—300; cf. A., 1935, 606).—A discussion.

Reaction of complex sulphuric acid esters. L. LISON (Bull. Soc. Chim. biol., 1936, 18, 225—230).—The colour change produced by org. esters of H_2SO_4 of high mol. wt. on metachromatic dyes such as toluidine-blue and cresyl-blue is sp. for such substances and might be used in their qual. investigation.
A. L.

Polysaccharide hydrogen sulphates with heparin-like action. S. BERGSTRÖM (Z. physiol. Chem., 1936, 238, 163—168; cf. A., 1935, 1519).—Details are given of the prep. and activities of the esters [including that from pectic acid (I)]. Synthetic chondroitintrisulphuric acid, chitindisulphuric acid, and (I) polysulphate have activities \leftarrow that of the product (II) from cellulose. The activities of the other preps. are only 8—50% of that of (II).
W. McC.

Mannitoldimolybdic acid. Variation of the p_H of molybdic acid caused by addition of sugar. (MME.) Z. SOUBAREV-CHATELAIN (Compt. rend., 1935, 201, 1390—1392).—The effect of sugars, e.g., mannitol, on the p_H of molybdic acid and its salts (A., 1933, 909) is explained by formation of mannitoldimolybdic acid (I), $[\text{C}_6\text{H}_{14}\text{O}_6\cdot\text{HMo}_2\text{O}_7]\text{H}$, thus: increase of p_H , $2\text{Na}_2\text{MoO}_4 + \text{C}_6\text{H}_{14}\text{O}_6 + 2\text{H}_2\text{O} \rightleftharpoons (\text{I}) + 3\text{NaOH}$; decrease of p_H , $2[\text{MoO}_3\text{Cl}_2]\text{H}_2 + \text{C}_6\text{H}_{14}\text{O}_6 + \text{H}_2\text{O} \rightleftharpoons (\text{I}) + 4\text{HCl}$.
R. S. C.

Aminoethyl phosphate from tumours.—See this vol., 364.

Specific reaction of dichlorodiethyl sulphide in presence of other chemical warfare gases. M. OBERMILLER (Angew. Chem., 1936, 49, 162—164).— $\text{S}(\text{CH}_2\cdot\text{CH}_2\text{Cl})_2$ (I) in small concn. gives with aq. solutions of AuCl_3 and PdCl_2 a strong yellow colloidal turbidity. On filter-paper reddish-brown and yellow stains are given with AuCl_3 and PdCl_2 , respectively. Negative results were obtained with the other common war gases. A positive result was observed with 1.5 mg. of (I) in 20 c.c. of liquid. By means of a special apparatus (I) could be removed from a large vol. of air and (I) in concn. of 10 mg. per cu. m. detected in 4 min.
D. C. J.

Mechanism of the sulphonation process. A. MICHAEL and N. WEINER (J. Amer. Chem. Soc., 1936, 58, 294—299).—Contrary to Wieland (cf. A., 1920, i, 280), the reaction between C_2H_4 and oleum (I) does not involve addition of H_2SO_4 (as $\text{OH}+\text{SO}_3\text{H}$). The results now obtained [and the data of Plant and Sidgwick (A., 1921, i, 153)] show that $\text{H}_2\text{S}_2\text{O}_7$ is the reactive entity and leads to ethionic acid (II) [Ba salt (+0.5 H_2O)]; each mol. of $\text{H}_2\text{S}_2\text{O}_7$ gives 1 mol. of (II): $\text{CH}_2\cdot\text{CH}_2 + \text{OH}\cdot\text{SO}_2\cdot\text{O}\cdot\text{SO}_2\cdot\text{OH} \rightarrow \text{SO}_3\text{H}\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{O}\cdot\text{SO}_3\text{H}$. When (I) contains more SO_3 than is necessary to form $\text{H}_2\text{S}_2\text{O}_7$, carbyl sulphate (III), $\text{SO}_2\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{O}\cdot\text{SO}_2$, is also formed by the direct addition of S_2O_6 to C_2H_4 . (III) is also produced from C_2H_4 (excess) and SO_3 in the gaseous phase (CO_2 used as diluent). Isethionic acid, $\text{OH}\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{SO}_3\text{H}$, is

converted into (II) by (a) 100% H_2SO_4 (1 mol.), (b) 100% H_2SO_4 (1 mol.) followed by SO_3 (1 mol.), and (c) SO_3 (1 mol.); 2 mols. of SO_3 give (III).

Wieland's mechanism (*loc. cit.*) of aromatic substitution is held to be untenable. Sulphonation is considered to be an aldolisation (pseudo-substitution) reaction (cf. A., 1935, 1103). The formation of Ph_2SO_2 from C_6H_6 and (I) is explained: $2\text{C}_6\text{H}_6 + \text{S}_2\text{O}_6 \rightarrow \text{SO}_2 \begin{smallmatrix} \text{O} \\ \diagup \quad \diagdown \\ \text{O} \end{smallmatrix} \text{SPh}_2(\text{OH})_2 \rightarrow \text{Ph}_2\text{SO}_2 + \text{H}_2\text{SO}_4$.

C_6H_6 could not be sulphonated by $\text{Me}_2\text{SO}_4 + \text{AlCl}_3$; methylation occurs owing to the production of MeCl .

H. B.

[Addition of bromine to] unsaturated acids. C. E. SUN (J. Chinese Chem. Soc., 1936, 4, 1—5).—The activation energy for the addition of Br to $\beta\gamma$ -unsaturated acids is probably the same as for olefines (22.4 kg.-cal.), whilst that for $\alpha\beta$ -unsaturated acids is calc. to be 31.5 kg.-cal., in agreement with the more facile reaction in the former case.

R. S. C.

Exchange between organic compounds and heavy water. F. K. MÜNZBERG [with W. OBERST] (Z. physikal. Chem., 1935, B, 31, 18—22).—There is a small exchange of H for D in a solution of HCO_2Na in heavy H_2O at 100° , but not below. With solutions of HCO_2H , $\text{CO}_2\text{H} \cdot [\text{CH}_2]_2 \cdot \text{CO}_2\text{H}$, and $\text{CH}_2\text{Cl} \cdot \text{CO}_2\text{H}$ at 50° only the H of CO_2H is exchangeable, whilst with $\text{CH}_2(\text{CO}_2\text{H})_2$ all the H may be exchanged.

R. C.

Thermal decomposition of esters in presence of aluminium chloride. H. GAULT and E. BELOFF (Compt. rend., 1936, 202, 71—73).— Bu^nOAc heated with AlCl_3 to 300 – 330° gives Bu^nCl (50—55%), olefine (liquid at -70°), and a mixture of CO , CO_2 , H_2 , and CH_4 with traces of C_2H_6 , C_3H_8 , and olefine. The amount of BuOAc decomposed \propto the wt. of AlCl_3 used. Rise of temp. gives more gaseous products, but does not otherwise alter the course of the decomp.

H. B.

Electrolytic reduction of organic compounds. I. Analogies between cathodic reduction and the action of dissolving metals. Reduction of sorbic acid. E. ISAACS and C. L. WILSON (J.C.S., 1936, 202—207).—Evidence is reviewed showing that the course of electrolytic reduction depends on the solvent used. H_2 overvoltage is important for reduction of ketones and aldehydes, but not for sorbic acid (I). Reduction of (I) gives the following % of Δ^7 -hexenoic acid in the product at Hg, Cd, and Cu cathodes: in N -NaOH, 40, 39, and 40; in 0.5*N*- NaHCO_3 , 41, —, —; in 70% $\text{AcOH} + 0.5M$ - NaOAc , 54, 50, and 50; in 2*N*- H_2SO_4 , 52, —, —, respectively; these are very similar to the results obtained with Na-Hg and Al-Hg (A., 1929, 1270). Hg as cathode or amalgam leads to much "pinacol," b.p. 180 – $183^\circ / <1$ mm. Anthracene gives the 9:10- H_2 -derivative with Na-Hg, Al-Hg, or Mg-Hg in EtOH or, better, dioxan, or at a Hg cathode in alcoholic NaOH, $(\text{NH}_4)_2\text{SO}_4 + \text{NH}_3$, or NMe_4OH .

R. S. C.

Tricosanoic and tetracosanoic acids and their derivatives. R. ASHTON, R. ROBINSON, and J. C. SMITH (J.C.S., 1936, 283—285).—Lauryl chloride, b.p. $134^\circ / 9$ –10 mm., is condensed with $\text{CH}_3\text{Ac} \cdot \text{CO}_2\text{Et}$ and Na, and the product treated with Et λ -bromo-

undecooate, b.p. $174^\circ / 10$ mm.; hydrolysis then leads to *v*-ketotetracosanoic acid, m.p. 95° , reduced (Clemmensen) to tetracosanoic acid (I), m.p. (a) 83.5 – 84.5° (capillary), (b) 83.8° (thermometer in melt), f.p. 83.5° . Br yields α -bromotetracosanoic acid, m.p. 71.5 – 72° (lit. 69.5 – 70°), and thence is obtained α -hydroxy-tetracosanoic acid, m.p. 99.5 – 100° (lit. 94 – 95°). Undecoyl chloride leads similarly to tricosanoic acid (II), m.p. (a) 79 – 80.5° , (b) 78.86° , f.p. 78.75° . (I) and (II) give continuous solid solutions with a max. depression of the m.p. of 0.45° . The product of oxidation of cerebronic acid may be impure (I).

R. S. C.

Preparation of unsaturated acids from stearic acid. E. M. PRIK (Plast. Massui, 1934, No. 6, 26—27).—Chlorination of stearic acid, followed by elimination of HCl (Zn dust, or heating in vac.), yields an unsaturated product, b.p. 190 – $214^\circ / 5$ mm.

CH. ABS. (r)

Reactions in monolayers of drying oils. I, II. —See this vol., 434.

Qualitative test for linolenic acid, its value and limitations. G. J. MARTIN (J. Amer. Chem. Soc., 1936, 58, 364—365).—Oils containing linolenic acid (I) give a deep blue colour when 1 c.c. is heated with 5 c.c. of arsenophosphotungstic acid (Benedict, A., 1931, 973) at $100^\circ / 1$ hr. Approx. determinations of the amount of (I) present can be made; Me linolenate is used as standard. Other fatty acids containing 3 double linkings give the reaction.

H. B.

Fatty acids of phrenosin and kersin. A. C. CHIBNALL, S. H. PIPER, and E. F. WILLIAMS (Biochem. J., 1936, 30, 100—114).—Brain contains at least 3 phrenosins and 3 kersins, the components of which differ only in the chain-length of the fatty acids. A sample of phrenosinic (cerebronic) acid (I), m.p. 102.3 – 102.6° , $[\alpha]_D^{25} + 3.33^\circ$ in $\text{C}_5\text{H}_5\text{N}$ (Ac derivative, m.p. 66 – 66.5°), obtained by hydrolysis of a highly purified specimen of phrenosin is shown to consist of a mixture of even-no. α -OH-acids of mean mol. wt. corresponding closely with C_{24} , which on oxidation with CrO_3 in AcOH give a mixture of odd-no. *n*-fatty acids, identified as 85% C_{23} and 15% C_{25} . (I) consists therefore of 85% of α -hydroxy-*n*-tetracosanoic and 15% of α -hydroxy-*n*-hexacosanoic acids. (I) of low m.p. contains also α -hydroxy-*n*-docosanoic acid. Thudichum's neurostearic acid probably consists of 25—30% of (I), the rest being "lignoceric acid" (II). The acidic constituents of the kersins are *n*-docosanoic, *n*-tetracosanoic, and *n*-hexacosanoic acids; (II) is thus also a mixture and the name should be abandoned. Several binary mixtures of *n*-fatty acids of chain-length from C_{21} to C_{25} have been prepared and their m.p. and crystal spacings recorded.

P. W. C.

Absolute configuration of lactic acid. Assumptions made in calculation of optical rotation. W. KUHN (Z. physikal. Chem., 1935, B, 31, 23—57).—The sign of the rotation of $\text{CHMcEt} \cdot \text{OH}$ has been calc. by means of a simplified model in which the Me, Et, and active C are each replaced by an isotropic resonator with the charge of the Et group > that at the centre of the Me or active C; the resonance interaction between the three, taken as having the

same natural frequency, is calc. by an exact method. If the optical vibration of the OH absorption band of longest λ is assumed to be non-isotropic the model will be optically active, whilst if the OH group is isotropic there will be no activity. From the light scattering and Kerr effects of OH-compounds it is probable that for the COH group the above absorption band vibrates in the plane defined by the C, O, and

H atom. This leads to $\text{H}-\overset{\text{CO}_2\text{H}}{\underset{\text{Me}}{\text{C}}}-\text{OH}$ where the Me and

CO_2H lie behind the plane of the paper, for the configuration of $d(-)$ -lactic acid. Calculation shows that for $\text{CHRR}'\text{OH}$ the direction of rotation is independent of the sp. nature of R and R'. On both theoretical and experimental grounds vibrations corresponding with optical absorption bands of a mol. must be regarded as non-isotropic. The direction of the optical vibrations of the absorption band of longest λ of a given mol. generally is that in which the polarisability, as measured by the Kerr effect and light scattering, is a max. In the most important cases optical activity appears to be an effect not of the third, but of the first, or at most second, order.

R. C.

Mechanism of reactions of metal enolates of acetoacetic ester and related compounds. III. Copper enolates. A. MICHAEL and G. H. CARLSON (J. Amer. Chem. Soc., 1936, 58, 353—364; cf. A., 1935, 474).—The Cu^{II} enolate (I) (1 mol.) of $\text{CH}_2\text{Ac}\cdot\text{CO}_2\text{Et}$ and Cl (1.5 mols.) in CCl_4 at 0° or the b.p. give Cu_2Cl_2 (1 mol.) and $\text{CHClAc}\cdot\text{CO}_2\text{Et}$ (II) (2 mols.); the formation of CuCl_2 (Schönbrodt, A., 1890, 27) is ascribed to the use of an excess of Cl. (I) and Cu_2Cl_2 are also formed from (I) and CuCl_2 in boiling C_6H_6 . (I) and AcCl (1.5 mols.) in C_6H_6 or Et_2O at room temp. afford Cu_2Cl_2 , (II), and $\text{OAc}\cdot\text{CMe}\cdot\text{CH}\cdot\text{CO}_2\text{Et}$; $\text{CHAc}_2\cdot\text{CO}_2\text{Et}$ (III) is not formed. The Cu^{II} enolate (IV) of (III) with AcCl similarly gives the *O*-Ac derivative of (III) and the (impure) enolate, $\text{ClCu}\cdot\text{O}\cdot\text{CMe}\cdot\text{CAc}\cdot\text{CO}_2\text{Et}$, which is converted by cold H_2O into (IV) and by AcCl in boiling C_6H_6 into (III), CuCl_2 , and Cu_2Cl_2 . The Cu^{II} enolate (V) of $\text{CH}_2\text{Bz}\cdot\text{CO}_2\text{Et}$ (VI) and AcCl (2 equivs.) in boiling C_6H_6 afford the *O*-Ac derivative of (VI), CuCl_2 , and some Cu_2Cl_2 ; reaction is slow at room temp. and an intermediate enolate cannot be isolated. (I) and ClCO_2Et (2 equivs.) in boiling C_6H_6 give (cf. Nef, A., 1892, 140) Cu_2Cl_2 , some $\text{CHAc}(\text{CO}_2\text{Et})_2$, the enolate, $\text{ClCu}\cdot\text{O}\cdot\text{CMe}\cdot\text{C}(\text{CO}_2\text{Et})_2$, and unidentified products; (V) and ClCO_2Et (1.5 mols.) similarly yield Cu_2Cl_2 , $\text{CHBz}(\text{CO}_2\text{Et})_2$, and a little of the enolate, $\text{ClCu}\cdot\text{O}\cdot\text{CPh}\cdot\text{C}(\text{CO}_2\text{Et})_2$. (I) and BzCl in boiling C_6H_6 afford (cf. Nef, A., 1893, i, 628) Cu_2Cl_2 , (VIII) (below), $\text{CHBzAc}\cdot\text{CO}_2\text{Et}$, $\text{CBz}_2\text{Ac}\cdot\text{CO}_2\text{Et}$, and $\text{OBz}\cdot\text{CMe}\cdot\text{CH}\cdot\text{CO}_2\text{Et}$ (VII), b.p. $139^\circ/1.5$ mm., m.p. 42° , in varying proportions (according to amount of BzCl used). (I) and dry HCl (1 equiv.) in Et_2O and N_2 furnish the unstable, impure enolate, $\text{ClCu}\cdot\text{O}\cdot\text{CMe}\cdot\text{CH}\cdot\text{CO}_2\text{Et}$ [which is probably an intermediate in the reaction between (I) and AcCl], converted by cold H_2O into (I) and CuCl_2 , and by BzCl at room temp. into Cu_2Cl_2 , (II), (VII), and the Cu^{II} enolate (VIII) of $\text{CHBzAc}\cdot\text{CO}_2\text{Et}$. (VIII) and HCl (1 equiv.) similarly give an impure ClCu enolate,

$\text{C}_{13}\text{H}_{13}\text{O}_4\text{ClCu}$; the Cu^{II} enolate of $\text{COMe}\cdot\text{CH}_2\cdot\text{COPh}$ affords an impure enolate, $\text{C}_{10}\text{H}_9\text{O}_2\text{ClCu}$, whilst the Cu^{II} enolate of $\text{COMe}\cdot\text{CH}_2\cdot\text{COMe}$ and (IV) yield the pure enolates, $\text{ClCu}\cdot\text{O}\cdot\text{CMe}\cdot\text{CH}\cdot\text{COMe}$ and $\text{ClCu}\cdot\text{O}\cdot\text{CMe}\cdot\text{CAc}\cdot\text{CO}_2\text{Et}$, respectively, which with cold H_2O and aq. HCl give the original enolates and ketones, respectively. The results are interpreted by the theory (cf. *loc. cit.*) of the formation of polymols. and their subsequent decomp. Related reactions, e.g., the production of $\text{CH}_2\cdot\text{CO}$ from $\text{CH}_2\text{Br}\cdot\text{COBr}$ and Zn , are discussed briefly.

(VII) and its (liquid) isomeride (IX), b.p. $139^\circ/1.5$ mm. (from $\text{CH}_2\text{Ac}\cdot\text{CO}_2\text{Et}$ and BzCl in $\text{C}_5\text{H}_5\text{N}$), absorb H_2 and Br at about the same rate; (VII) reacts somewhat faster with $\text{ONa}\cdot\text{CMe}\cdot\text{CH}\cdot\text{CO}_2\text{Et}$ to give the Na enolate of $\text{CHBzAc}\cdot\text{CO}_2\text{Et}$. (VII) and (IX) could not be interconverted by heat or irradiation [whereby (IX) is destroyed and (VII) is unchanged]. It appears doubtful if (VII) and (IX) can be classed as ordinary stereoisomerides. H. B.

$\alpha\alpha$ -Dimethylacetoacetic acid.—See this vol., 432.

Monohydroxypalmitic acid in butter fat.—See this vol., 361.

Chlorohydroxystearic acids from oleic and elaidic acids. K. HASHI (J. Soc. Chem. Ind. Japan, 1936, 39, 18B).—Addition of HOCl to oleic acid, or of HCl to its oxide, yields only a *chlorohydrin* α , m.p. 38.0 — 38.3° ; that of HCl to elaidic acid oxide gives *chlorohydrins* β and γ , m.p. 49.5 — 51.0° , and 68.0 — 69.5° , with scarcely any α , whereas that of HOCl to elaidic acid yields a mixture, half of which is a substance of m.p. 51.0 — 55.0° . E. W. W.

Action of alkali metals on dialkylmalonic esters. F. KROLLFEIFFER and A. ROSENBERG (Ber., 1936, 69, [B], 465—470).—Na powder reacts vigorously with $\text{CMe}_2(\text{CO}_2\text{Et})_2$ is anhyd. Et_2O giving CO (95.3% of amount calc. for elimination of 1 CO_2Et) and $\text{Pr}^n\text{CO}_2\text{Et}$ (yield 35.8%); the deficit of the latter is attributed partly to volatility, partly to formation of further products; acidic substances are also produced, which are less in evidence when a more difficultly hydrolysable malonate is used. K and $\text{CEt}_2(\text{CO}_2\text{Et})_2$ react violently giving CO (10.4%), $\text{CHEt}_2\cdot\text{CO}_2\text{Et}$ (29.8%), and $\text{CO}_2\text{H}\cdot\text{CEt}_2\cdot\text{CO}_2\text{Et}$ (31.5%); the more turbid action with Na affords CO (85.4%), $\text{CHEt}_2\cdot\text{CO}_2\text{Et}$ (46.5%), and dicarbonyl compounds which could not be identified. K and $\text{CPr}^n_2(\text{CO}_2\text{Et})_2$ yield CO (11.6%), $\text{CHPr}^n_2\cdot\text{CO}_2\text{Et}$ (37.2%), and *Et H di-n-propylmalonate*, m.p. 43 — 44° ; with Na the products are CO (83.2%), $\text{CHPr}^n_2\cdot\text{CO}_2\text{Et}$ (61%), and minor amounts of acidic products. α -*n*-Propylvaleranilide has m.p. 102 — 103° . $\text{C}(\text{CH}_2\text{Ph})_2(\text{CO}_2\text{Et})_2$ and K react slowly at 15 — 20° , more vigorously at the b.p. of Et_2O , giving CO (4.6%) and $\text{CH}(\text{CH}_2\text{Ph})_2\cdot\text{CO}_2\text{Et}$ (32.5%) with considerable amounts of acidic products; with Na the products are CO (58%), $\text{CH}(\text{CH}_2\text{Ph})_2\cdot\text{CO}_2\text{Et}$ (38.1%), and very little acidic material. The mechanism of the change is not elucidated. H. W.

Optically active anhydrides. I. Anhydride of d - α -methylglutaric acid. E. BERNER and R. LEONARSEN (Kong. Norske Vidensk. Selsk. Forhandl., 1935, 7, 125—128; Chem. Zentr., 1935, i,

3781—3782).—Fractional crystallisation of the strychnine salt of *dl*- α -methylglutaric acid (I) yields *d*- α -methylglutaric acid, m.p. 81°, $[\alpha]_D^{20} +20.05^\circ$ in H_2O ; with $AcCl$ this affords *d*- α -methylglutaric anhydride, m.p. 50°, $[\alpha]_D^{20} -38.8^\circ$ in H_2O . *l*- α -Methylglutaric acid may be obtained by crystallisation of the brucine salt of (I). H. N. R.

Biochemistry of micro-organisms. XLVIII. Penicillic acid, a metabolic product of *Penicillium puberulum*, Bainier, and *P. cyclopium*, Westling. J. H. BIRKINSHAW, A. E. OXFORD, and H. RAISTRICK (Biochem. J., 1936, 30, 394—411).—Penicillic acid (I), $C_8H_{10}O_4$, m.p. 87° (cryst. from H_2O , $C_8H_{12}O_5$, m.p. 64—65°), a product of the metabolism of *P. puberulum*, Bainier, and in much larger yield of *P. cyclopium*, Westling, is optically inactive, monobasic, readily loses CO_2 , contains 1 active H, 1 OMe, and gives a monoacetate, $C_{10}H_{12}O_5$, m.p. 72°, a condensation product with dimedon, $C_{16}H_{22}O_6$, m.p. 204° (decomp.), a Br_2 -derivative, $C_8H_{10}O_4Br_2$, m.p. 154—155°, and a H_2 -derivative (II), m.p. 86° (cryst. from H_2O , $C_8H_{14}O_5$, m.p. 62—64°). On hydrolysis with $2N-H_2SO_4$, (I) gives CO_2 (1 mol.) and a substance, $C_{10}H_{16}O_4$ (bisdinitrophenylhydrazones, m.p. 254°), which probably resulted from the condensation of 2 mols. of $AcCOEt$, whilst (II) gives CO_2 (1 mol.) and a substance $C_6H_{10}O_2$, probably acetylisobutyl (isolated as a mixture of a bisdinitrophenylhydrazones, m.p. 226—227°, with two monodinitrophenylhydrazones, m.p. 186—187° and 121°, respectively). On hydrolysis with $0.25N-Ba(OH)_2$, (I) gives the following: CO_2 ; a substance, $C_5H_{10}O_2$ (monodinitrophenylhydrazones, m.p. 193—194°); $AcCOEt$ (bisdinitrophenylhydrazones, m.p. 272—274°); a substance, $C_8H_{12}O$ (monodinitrophenylhydrazones, m.p. 152—154°); a substance, $C_{10}H_{10}O_2$, m.p. 98—102°, a lactonic condensation product; $MeOH$; HCO_2H . (II) with CH_3N_2 gives a neutral Me_1 ester, $C_9H_{14}O_4$, an oil (N_2H_4 derivative, m.p. 207—208°), whilst (I) yields a pyrazoline *Me* ester, $C_{10}H_{14}O_4N_2$, m.p. 74°, which with NH_2OH gives a pyridazone, $C_9H_{12}O_2N_4$, m.p. 181°, and with $NHPh-NH_2$ a phenylpyridazone, $C_{15}H_{16}O_4N_2$, m.p. 198—199°. The ozonide of (I) on decomp. gives CH_2O , indicating the presence of a $:CH_2$ group; (II) gives no CH_2O . Neither (I) nor (II) gives ketonic reactions in cold aq. solution, but (I) rapidly absorbs 1 mol., more slowly a second mol., of NH_2OH , whereas (II) does not absorb NH_2OH . On heating with NH_2OH , (I) gives a dioxime, $C_6H_{10}O_2N_2$, m.p. 210—212° (decomp.), decarboxylation and demethylation having occurred, whilst (II) gives an orthoxazine, $C_8H_{11}O_3N$, m.p. 54—56°. (I) with $NHPh-NH_2$ gives a phenylpyrazolinephenylhydrazones (III), $C_{18}H_{20}N_4$, m.p. 176°, decarboxylation and demethylation occurring. (III) on oxidation with PbO_2-AcOH gives a phenylpyrazole (IV), $C_{12}H_{12}ON_2$, m.p. 72—74° (oxime, $C_{12}H_{13}ON_3$, m.p. 149°). (IV) on oxidation with $NaOI$ gives a monocarboxylic acid (V), $C_{11}H_{10}O_2N_2$, m.p. 170°, which with alkaline $KMnO_4$ gives 1-phenylpyrazole-3 : 4-dicarboxylic acid, m.p. 232° (*Me* ester, m.p. 89°). (V) on thermal decomp. gives 1-phenyl-4-methylpyrazole, m.p. 43°, oxidised with $KMnO_4$ to 1-phenylpyrazole-4-carboxylic acid, $C_{10}H_8O_2N_2$, m.p. 219—221°. These reactions

show that the decarboxylated, demethylated product arising from (I) is $\beta\gamma$ -diketo- δ -methylenepentane (VI). (II) on heating with red $P-HI$ gives γ -hydroxy- δ -methylhexoic acid (lactone, b.p. 227—230°; phenylhydrazide, m.p. 126°), thus fixing the point of attachment of the CO_2H to (VI). (II) with $KMnO_4$ and with O_3 gives *Me* dimethylpyruvate (monodinitrophenylhydrazones, m.p. 176—178°), which with $N-NaOH$ gives the free acid (dinitrophenylhydrazones, m.p. 196—197°). The OMe is thus attached to the β -C in (VI). (I) is therefore γ -keto- β -methoxy- δ -methylene- Δ^4 -hexonoic acid and must exist in both keto and lactone forms:

$$CH_2:CMc \cdot CO \cdot C(OMe):CH \cdot CO_2H \rightleftharpoons CH_2:CMc \cdot C(OH) \cdot C(OMe):CH \cdot CO.$$

P. W. C.

Reversible oxidation of ascorbic acid by norite charcoal.—See this vol., 390.

Colorimetric determination of aliphatic aldehydes. K. FISCHBECK and L. NEUNDEUBEL (Z. anal. Chem., 1936, 104, 81—88).— CH_2O , $MeCHO$, and $EtCHO$ are determined photometrically by means of the colour developed with 0.01% aq. fuchsin- H_2SO_3 (I) in acid solution, using filtered light of 470 $m\mu$. (I) may be kept without change under H_2 . CH_2O is warmed with (I) for 5 min. at 80°; $MeCHO$ and $EtCHO$ are mixed with (I) at room temp., and examined after a standardised time interval. A large excess of $EtOH$ has no effect. J. S. A.

Action of chloral on magnesium β -phenylethyl, γ -phenylpropyl, and δ -phenylbutyl bromides. P. M. DEAN and W. I. WOLF (J. Amer. Chem. Soc., 1936, 58, 332—333).—Chloral (I) (1 mol.) and $CH_2Ph \cdot CH_2 \cdot MgBr$ (1 mol.) give $CCl_3 \cdot CH_2 \cdot OH$ (II) (α -naphthylcarbamate, m.p. 120°), styrene, and $(CH_2Ph \cdot CH_2)_2$. Similarly, $CH_2Ph \cdot CH_2 \cdot CH_2 \cdot MgBr$ and (I) give (II), $CH_2Ph \cdot CH_2 \cdot CH_2$, and α -diphenylhexane; $CH_2Ph \cdot [CH_2]_3 \cdot MgBr$ affords (II), $CH_2Ph \cdot CH_2 \cdot CH_2 \cdot CH_2$, and α -diphenyloctane. No $CCl_3 \cdot CHR \cdot OH$ could be isolated. The main product is the olefine (usually isolated as dibromide). H. B.

Micro-determination of acraldehyde. I. M. KORENMAN (J. Appl. Chem. Russ., 1935, 8, 1476—1477).—3 ml. of 0.1*N*-I in KI and 1 ml. of 5% KOH are added to 5—10 ml. of dil. aq. acraldehyde, the solution is made acid with H_2SO_4 after 30 min., and the liberated I is titrated with 0.1*N*- $Na_2S_2O_3$. Alternatively, the solution is made strongly acid with H_2SO_4 , excess of $KMnO_4$ is added, the mixture is heated at 100° for 15 min., and $Na_2C_2O_4$ is added, excess of which is titrated with $KMnO_4$. R. T.

Constitution of Schiff's bases. J. TURCAN (Bull. Soc. chim., 1936, [v], 3, 283—294).— $CHPr^a:NR$ ($R=Pr^a$, C_5H_{11} , CH_2Ph , and Ph) and heptylideneaniline with Br give NH_2R (or its Br -derivatives) and $CPr^aBr \cdot CHO$ (polymeride, m.p. 95—97°) or bromoheptaldehyde, respectively. Reaction occurs by addition to the $CMe_2:CH \cdot NHR$ form. N_2O_4 , however, reacts with Schiff's bases in the same way whether a *tert*-C is or is not present, i.e., with the enimine form. Equilibrium between the two forms is thus demonstrated. R. S. C.

Constitution of oximes. See this vol., 406.

Quadrivalent compounds of bivalent copper and nickel. See this vol., 410.

Hydrogenation of ketones in presence of nickel and platinised nickel. Influence of alkali. M. DELÉPINE and A. HOREAU (Compt. rend., 1935, 201, 1301—1305).—The rate of hydrogenation of COMe₂, COMeEt, COMe·C₉H₁₉, COMePh, α -phenyl- β -dimethylhexan- β -one, cyclohexanone, CH₃Ac·CO₂Et, CHEtAc·CO₂Et, lævulic acid, CHMe·CH·CHO, PhCHO, *o*- and *p*-OH·C₆H₄·CHO, galactose, fructose, and α -diethylaminopentan- δ -one to alcohols at room temp. and atm. pressure in presence of Raney Ni is greatly increased by addition of a little NaOH. Fixation of the second mol. of H₂ by mesityl oxide, methylheptenone, and CHPh·CH·COMe is similarly accelerated. The effect is not due to enolisation, as it occurs also with COPh₂ and Bz₂. A similar, but smaller, acceleration is caused by platinising the Ni with a little dil. alkaline PtCl₄. Pd, Rh, and Ru have slight similar effects. The effects of platinisation and alkali are additive.

R. S. C.

Action of magnesium *tert*-butyl chloride on methyl propyl ketone and ethyl laurate. A. D. PETROV, K. I. KARASEV, and M. A. TSCHELZOVA (Compt. rend. Acad. Sci. U.R.S.S., 1936, 4, 31—33, and Bull. Soc. chim., 1936, [v], 3, 169—176).—With COMePr^a, MgBu^aCl (I) affords some β -*tert*-butyl-pentan- β -ol, b.p. 68.8—69.8°/16 mm. (chloride, b.p. 64.2—65.5°/12.5—13 mm.), together with large amounts of products formed by self-condensation of the ketone, but no *tert*-alcohol is obtained with dodecyl ketone (II) (reduced to carbinol, converted into the olefine through the xanthate) (Kipping, J.C.S., 1890, 57, 983). Et laurate and (I) in Et₂O-xylene at 110—120° give only (II): 2R·CO₂Et \rightarrow R₂CO + CO(CO₂Et)₂ \rightarrow CO₂ + Et₂O (R = C₁₁H₂₃), but with MgBu^aCl it affords ϵ -*n*-butylhexadecan- ϵ -ol (III), b.p. 180—182°/15 mm. (unstable bromide), with partial dehydration to ϵ -*n*-butyl- Δ^8 -hexadecene, b.p. 165—167.5°/15 mm., best obtained by dehydration of (III) with H₂C₂O₄ at 140—180°. Similar results are obtained with Et palmitate. (I) is not decomposed by heating to 110°.

J. W. B.

Diacetyl. J. PIEN, J. BAISSÉ, and R. MARTIN (Lait, 1936, 16, 119—138).—The formation of a phenylhydrazone is recommended as a qual. test (photomicrographs of the crystals are given). A colorimetric determination (for dilutions down to 1 in 100,000) is described. The reagent used is *m*-tolylenediamine, which reacts to give a yellow colour.

E. B. H.

Nomenclature of methylated sugars. E. VETOČEK (Coll. Czech. Chem. Comm., 1936, 8, 43—45).—It is proposed to designate sugar Me ethers as methylglucose etc. and *C*-Me derivatives as methylglucose etc.

R. S. C.

Formation of osazones. J. KENNER and E. C. KNIGHT (Ber., 1936, 69, [B], 341—343).—The formation of osazones is ascribed to the oxidising action of salts of NHPH·NH₂. The latter is stable below 300°, but mixtures of it and its hydrochloride commence to evolve gas at 120° and the reaction becomes very vigorous at 165°. From *o*-, *m*-, and

p-tolyl- and *p*-bromophenyl-hydrazine gas is rapidly evolved at about 100°, 100°, 115°, and 120°, respectively.

H. W.

Change in optical rotation of glucose in dilute solutions of boric acid. P. S. TANG and P. N. SUNG (Nature, 1936, 137, 275).—Contrary to previous observations (A., 1932, 120), changes occur in α of glucose in H₃BO₃ and Na₂B₄O₇ at certain concns. For 10% solutions of glucose $[\alpha]_D$ falls to a sharp min. with 0.13*M*-H₃BO₃.

L. S. T.

Simultaneous formation of two isomeric isopropylidene derivatives of 2-methyl- γ -methylglucoside. D. J. BELL (J.C.S., 1936, 186—187).—The oily product from 2-methyl- γ -methylglucoside, anhyd. CuSO₄, and 1% H₂SO₄-COMe₂ is a mixture of 3:5- and 5:6-isopropylidene derivatives. By methylation (Purdie), hydrolysis (0.5% HCl at 100°), conversion into the β -glucoside, and then into the dinitrate, it yields 2:3-dimethyl- β -methylglucoside 4:6-dinitrate, m.p. 99—100° (lit. 98—99°). The material from the mother-liquor with Zn and Fe in AcOH gives impure 2:6-dimethyl- β -glucoside, characterised as 3:4-di-*p*-toluenesulphonate, m.p. 157—158°.

R. S. C.

Condensation products of acetoacetic ester.

IV. Two highly reactive compounds of glucose and acetoacetic ester. C. U. MOORE, R. J. ERLANGER, and E. S. WEST (J. Biol. Chem., 1936, 113, 43—47).—Et glucosycycloacetoacetate (I) (A., 1927, 1173) is oxidised by HgSO₄ at room temp. to a non-cryst. hygroscopic substance (II), C₁₂H₁₈O₈, m.p. 65—72°, $[\alpha]_D^{25}$ -70.9° in H₂O (no mutarotation). (II) rapidly reduces cold Fehling's solution, and immediately becomes reddish-brown when treated with alkali. It gives unstable products with NHPH·NH₂ and NH₂OH, and immediately affords CHI₃ with KOI. It contains 3 OH and 1 Ac. Treatment of it with BzCl in CHCl₃-C₅H₅N affords a Bz₂ derivative, C₂₆H₂₆O₁₀, m.p. 45—49°, $[\alpha]_D^{25}$ -52.5° in abs. EtOH (no mutarotation). Oxidation of (I) with BzO₂H in H₂O-EtOAc containing BaCO₃ at 7° gives an isomeric product, C₁₂H₁₈O₈, m.p. 57—60°, $[\alpha]_D^{25}$ -33.4° in H₂O, which closely resembles (II), but contains only 2 OH groups which are reactive towards Ac₂O.

H. W.

Oxidation of α -methyl-*d*-mannopyranoside.

E. L. JACKSON and C. S. HUDSON (J. Amer. Chem. Soc., 1936, 58, 378—379).—Oxidation [aq. Ba(OBr)₂] of α -methyl-*d*-mannopyranoside (I) removes C₃ and gives the acid (II), CO₂H·CH(OMe)·O·CH(CO₂H)·CH₂·OH (*Sr* salt, $[\alpha]_D^{25}$ -53° in H₂O), which does not reduce Fehling's solution. Hydrolysis (hot H₂O) of (II) and subsequent oxidation (Br-H₂O) affords H₂C₂O₄ and *d*-glyceric acid. (II) is also obtained by successive oxidation of (I) or α -methyl-*d*-glucoside with HIO₄ and Br-H₂O; (II) should be similarly produced from all the α -methyl-*d*-aldohexopyranosides.

H. B.

Glucoside derivatives. E. JOLLES [in part with M. BOTRINI] (Gazzetta, 1935, 65, 1217—1221).—*Æseulin tetra*-, m.p. 270° (decomp.), $[\alpha]_D^{18}$ +46.9° (all rotations in C₅H₅N), *amygdalin hexa*-, m.p. 267° (decomp.), $[\alpha]_D^{18}$ -25.4°, *arbutin tetra*-, m.p. 224—225° (decomp.), $[\alpha]_D^{18}$ +23.3°, and *salicin penta*-(*N*-phenyl-

carbamate), m.p. 204° (decomp.), $[\alpha]_D^{18} -42.8^{\circ}$, are obtained by action of PhNCO on the respective glucosides in C_5H_5N . E. W. W.

Saponins from seeds of *Barringtonia asiatica*, Kurz. Constituents of the sugar part of A_1 -barrinin.—See this vol., 396.

Saponin-like substance of radix clematidis. See this vol., 396.

Glycosides of the flowers of *Linaria vulgaris*, L. Constitution of linarin and pectolinarin. K. W. MERZ and Y. H. WU (Arch. Pharm., 1936, 274, 126—148; cf. Schmid and Rumpel, A., 1931, 738; 1932, 621).—Extraction of the dried flowers with Et_2O removes fatty material from which hentriacontane is isolated. Further extraction with EtOH gives mannitol, the phenolic linarin (I), $C_{28}H_{32}O_{14} \cdot H_2O$ (cf. Klobb, A., 1908, i, 903), m.p. 256° (decomp.) (rapid heating), $[\alpha]_D^{18} -100.1^{\circ}$ in AcOH, and amorphous pectolinarin (II), $C_{29}H_{34}O_{15}$, m.p. $240-250^{\circ}$ (decomp.). (I) gives a Ac_7 derivative (III) ($+2H_2O$), m.p. $123-125^{\circ}$, and is hydrolysed (conc. HCl) to glucose, rhamnose, and linareginin (IV), $C_{16}H_{12}O_5$, m.p. 262° (decomp.) [Ac_2 , m.p. 200° , Bz_2 , m.p. 200° , and Br_2 , m.p. 257° (decomp.), derivatives; *Me ether* (CH_2N_2), m.p. 170° ; *Me ether acetate* (V), m.p. 196°]. The Ac_1 derivative obtained from (III) and AcOH-HBr in $CHCl_3$ is methylated (CH_2N_2) to (V). (IV) is degraded by conc. KOH in H_2 to HCO_2H , anisic acid [also formed by oxidation (30% H_2O_2 in 15% KOH) of (IV)], *s-C_6H_3(OH)_3*, and *p-OMe-C_6H_4-COMe*. (IV) is, therefore, 5:7-dihydroxy-4'-methoxyflavone; the disaccharide residue in (I) is at C_7 . (IV) is identical with acacetin (Hattori, A., 1925, i, 1443), but (I) differs from acaciin (*loc. cit.*). (II) is hydrolysed (conc. HCl) to glucose, rhamnose, and pectolinarigenin (VI), $C_{15}H_8O_4(OMe)_2$, m.p. $215-216^{\circ}$ [Ac_2 derivative, m.p. 151° ; *Me ether* (CH_2N_2), m.p. 188° ; *Me ether acetate* (VII), m.p. 168° ; *Me_2 ether* (Me_2SO_4), m.p. 162° , identical with 5:6:7:4'-tetramethoxyflavone (Robinson and Schwarzenbach, A., 1930, 735)]. The Ac_1 derivative obtained from the Ac_7 derivative, m.p. $134-138^{\circ}$, of (II) and AcOH-HBr in $CHCl_3$ is methylated to (VII). Degradation (KOH) of (VI) gives HCO_2H , anisic acid, 2:4:6-(OH) $_3C_6H_2 \cdot OMe$ and *p-OMe-C_6H_4-COMe*. (VI) is 5:7-dihydroxy-6:4'-dimethoxyflavone. (II) is the 6-OMe-derivative of (I). H. B.

Cellulose of native composition from cotton wool. II. E. SCHMIDT, W. JANDEBEUR, M. HECKER, R. SCHNEGG, and M. ATTERER [with W. HAHN and J. W. PEDLOW] (Ber., 1936, 69, [B], 366—374; cf. A., 1935, 610).—Cellulose from cotton wool and linters which has not been subjected to chemical treatment but has been purified by the ClO_2 method contains 0.28% of CO_2H . This val. is unchanged by dissolution of the material in $CuO-NH_3$ and repptn. by AcOH or $(NH_4)_2SO_4$, and is also observed in similarly treated specimens not purified with ClO_2 . Since the latter specimens are free from all known impurity, it follows that cellulose is the sole carrier of 0.28% CO_2H and is a carboxylic acid. If 0.28% of CO_2H is present the material is unaffected by the action of $CuO-NH_3$ and AcOH or $(NH_4)_2SO_4$, but a

variation from this % is accompanied by oxidation, frequently with marked increase in the % of CO_2H . Native cellulose (I) therefore consists of a chain of 96 C_6 units. The presence of 0.28% of CO_2H can be used as a criterion of the unaltered condition of (I), but natural conditions appear to exist which induce alteration in the crude material. (I) is changed by NaOH, NH_3 , $CaCO_3$, and many other substances at room temp.; possibly the fermentative degradation of (I) in the soil is preceded by the action of $CaCO_3$. The action of Cl_2 in H_2O on (I) causes increase in the % of CO_2H , and even in very dil. solution the reagent is unsuitable for the scientific investigation of polymeric carbohydrates. The technical processes of purifying cotton wool and linters cause chemical alteration in (I). H. W.

X-Ray studies of reactions of cellulose in non-aqueous systems. I. Interaction of cellulose and liquid ammonia. A. J. BARRY, F. C. PETERSON, and A. J. KING (J. Amer. Chem. Soc., 1936, 58, 333—337).—Cellulose (ramie) (I) swells in liquid NH_3 and gives NH_3 -cellulose (II) (approx. 1 mol. of NH_3 per $C_6H_{10}O_5$), the X-ray diagram of which resembles that of N_2H_4 -cellulose (Trogus and Hess, A., 1932, 149). (II) loses all its NH_3 at 105° and passes into cellulose II [the X-ray diagram of which resembles that of hydrate cellulose (III)], which regenerates (II) when treated with liquid NH_3 . (II) could not be obtained from (I) and dry NH_3 or dil. or conc. aq. NH_3 . (I) is recovered from (II) by treatment with H_2O , dil. AcOH, or dil. or conc. aq. NH_3 . (III) and liquid NH_3 give a product resembling (II). H. B.

Perchlorates as solvents for cellulose and its derivatives.—See this vol., 426.

Carbonisation of ramie cellulose studied by means of X-rays and the "net density method." C. PARK (Mem. Coll. Sci. Kyoto, 1935, A, 18, 311—313).—As the temp. of carbonisation, t , is raised from 260° to 290° , the X-ray pattern of the C changes from that of ramie cellulose to that of amorphous C, and d is a min. when t is approx. 290° . J. G. A. G.

Organic cupritetra-chlorides and -bromides.—See this vol., 438.

McCrae's test [for salicylic acid]: special test for hexamethylenetetramine. F. W. CHENG (J. Chem. Eng. China, 1935, 2, 137—138).—McCrae's test depends on the production of a pink colour with CH_2O and H_2SO_4 disappearing on dilution with H_2O . It is more sensitive than the $FeCl_3$ test and is applicable to derivatives without previous hydrolysis. The addition of H_2SO_4 to $(CH_2)_6N_4$ (I) liberates CH_2O so the test can be used for detection of (I). C. I.

[Compounds of] copper ferrocyanide ammoniate.—See this vol., 443.

Synthesis of α -amino- β -hydroxypropane. P. A. LEVENE [with M. KUNA] (J. Biol. Chem., 1936, 113, 153—156).— $CHMeBr \cdot CO_2H$ is added gradually to a solution of Li in $CH_2Ph \cdot OH$ and the mixture is heated to 150° , whereby *r- α -benzyloxypropionic acid* (I), b.p. $123-128^{\circ}/0.2$ mm., is obtained. It is slowly resolved by cinchonidine in $COMe_2$, the most sparingly sol. salt giving *l- α -benzyloxypropionic acid*, b.p. $125-$

128°/0.5 mm., $[\alpha]_D^{25} - 62.5^\circ$ in C_6H_6 . *r*- α -Benzyl-oxypropionyl chloride, b.p. 79–81°/0.5 mm., is converted by NH_3 in MeOH at -10° into *r*- α -benzyl-oxypropionamide, transformed by boiling $SOCl_2$ into *r*- α -benzyl-oxypropionitrile (II), b.p. 91–93°/1 mm. Reduction (Raney) of (II) affords α -amino- β -benzyl-oxypropane (hydrochloride; platinichloride, m.p. 207°), whilst treatment with H_2 in AcOH containing colloidal Pd gives *r*- α -amino- β -hydroxypropane (platinichloride).

H. W.

Triethyl- β -hydroxyethylammonium hydr-oxide.—See this vol., 510.

Synthesis of taurine. F. CORTESE (J. Amer. Chem. Soc., 1936, 58, 191–192).—Taurine, decomp. 300–305° (corr.) [*N*-phenylcarbamyl derivative, decomp. 195–200° (corr.)], is prepared in 80% yield from $CH_2Br \cdot CH_2 \cdot NH_2 \cdot HBr$, m.p. 174–175° (corr.) (modified prep.; cf. Gabriel, A., 1917, i, 541), and aq. Na_2SO_3 .

H. B.

Alkaline hydrolysis of polypeptides [derived from] *l*-alanine. P. S. YANG (J. Chinese Chem. Soc., 1936, 4, 37–41).—The rate of hydrolysis of *l*-alanyl-, di-, tri-, and tetra-*l*-alanyl-*l*-alanine by 0.2*N*. and *N*-NaOH at 25° is independent of the nature of the peptide, but is much greater with the more conc. alkali. Racemisation occurs only at the beginning of the reaction; at least 3 NH_2 -acid units must be present for it to occur.

R. S. C.

Behaviour of *dl*-serine, *dl*-phenylalanine, *dl*-alanine, *dl*-lactic acid, and propionic acid towards X-rays and ultra-violet light.—See this vol., 437.

Photo-decomposition of *l*-aspartic acid, *l*-asparagine, and glycylglycine.—See this vol., 437.

Action of alkaline potassium hypobromite solutions on the amides of acylated amino-acids. S. J. KANEVSKAJA (Ber., 1936, 69, [B], 266–273).—The formation of cyclic compounds during the Hofmann reaction is characteristic only of amides of acylated β - NH_2 -acids; it is very probable that the change can be used for the determination of β - NH_2 -acids even when they are present in complex natural mixtures. Succinimide is converted by treatment with KOBz followed by KOH and BzCl into β -benzamidopropionic acid, m.p. 120° (yield 51%), transformed by successive treatment with $SOCl_2$ and $NH_3 \cdot CHCl_3$ into β -benzamidopropionamide (I), m.p. 170–171°. (I) is converted by KOBz- H_2O at 80° into BzOH and tetrahydroglyoxal-2-one, m.p. 131°. Under similar conditions, hippuramide is converted into benzamidomethylamine (hydrochloride, m.p. 189–190°); occasionally, the reaction is accompanied by oxidation with production of NH_2Bz . $NH_2 \cdot [CH_2]_3 \cdot CO_2H \cdot HCl$ is transformed by KOH and a slight excess of BzCl into γ -benzamidobutyric acid (II), m.p. 75° (yield 90%), the Me ester, m.p. 59–60°, of which yields γ -benzamidobutyramide (III), m.p. 122–123°, with $NH_3 \cdot EtOH$. (III) and KOBz afford benzamidotrimethyleneamine (hydrochloride, m.p. 150–160°). (II) is converted by $SOCl_2$ or boiling Ac_2O into 1-benzoylpyrrolidone, m.p. 91–92°; if the change is effected at a very low temp. and the product

is treated with NH_3 in $CHCl_3$, γ -benzamidobutyramide, m.p. 122–123°, is isolated in about 10% yield.

H. W.

Reactions of maleimide. E. JOLLES (Gazzetta, 1935, 65, 1221–1225).—Maleimide in C_5H_5N and $NHPh \cdot OH$ yield a substance, $C_{10}H_{10}O_3N_2$, m.p. 178°, regarded as phenylhydroxyaminosuccinimide, which is oxidised by $FeCl_3$ to $PhNO$, and on prolonged heating in C_5H_5N loses H_2O to form anilinomaleimide, new m.p. 209°. $NHPh \cdot OH$ with *o*- $C_6H_4(CO)_2O$ forms *o*- $C_6H_4(CO)_2NPh$; does not react with *o*- $C_6H_4(CO)_2NH$; and with succinimide or pyrrole gives resinous products.

E. W. W.

Colorimetric determination of carbamide; its determination in blood, cerebrospinal fluid, and tissues. J. A. SANCHEZ (J. Pharm. Chim., 1936, [viii], 23, 188–199).—0.5–4 c.c. of 0.01% $CO(NH_2)_2$ solution and 1 c.c. of 0.02% $NaNO_2$ solution are mixed and made up to 10 c.c. with H_2O ; 2 c.c. of pure liquid paraffin and then 30 drops of conc. H_2SO_4 are added. The mixture is kept at 60° for 25 min. 1 c.c. of a solution of 0.5 g. of *p*- $NH_2 \cdot C_6H_4 \cdot SO_3H$ and 0.75 g. of $PhOH$ in 100 c.c. of 2.5% H_2SO_4 is added and the colour (due to azo-dye formed by the excess of HNO_2) is measured after 5 min. $CO(NH_2)_2$ is determined in defibrinated (Folin's reagent) whole blood, plasma, or serum by matching against standard solutions.

R. S. C.

Cupric and cuprous compounds of thiosemicarbazide and of its derivatives. V. HARLAY (Compt. rend., 1936, 202, 324–325).— $NH_2 \cdot NH \cdot CS \cdot NH_2$ with $CuSO_4$, $Cu(NO_3)_2$, and $CuCl_2$ gives the sulphate, nitrate, and chloride of Cu thiosemicarbazide in which the metal is linked to two org. residues through S. Acetonethiosemicarbazone in $COMe_2 \cdot H_2O$ with $Cu(NO_3)_2$ and NH_3 gives the Cu derivative [hydrochloride and sulphate (each +1 $COMe_2$) when cryst. from $COMe_2$], which when boiled with aq. $COMe_2$ gives the Cu^I derivative (sulphate and hydrochloride are unstable to H_2O). $NH_2 \cdot NH \cdot CS \cdot NH_2 \cdot HCl$ with Cu_2O gives the Cu^I derivative, $[CuS \cdot C(NH_2) \cdot N \cdot NH_2]HCl$, easily oxidised in air.

J. L. D.

Theory of biuret reaction. P. S. YANG (J. Chinese Chem. Soc., 1936, 4, 27–36).—*l*-Asparagine and the amides of *dl*-leucine, *d*-alanine, and glycine form amorphous biuret compounds, CuX_2 , m.p. 302–304° (decomp.), 248–250°, 229–231°, and 205–207°, respectively, in absence of alkali, the first two with $CuSO_4$ or $Cu(OAc)_2$, the last two only with $Cu(OH)_2$. To form a biuret compound a substance must have a N carrying a replaceable H and a N which can co-ordinate with Cu, separated by ≥ 3 atoms; in some cases the two N are provided by different mols., in which case 4 mols. of the compound combine with 1 Cu.

R. S. C.

Rubidium and caesium fulminates.—See this vol., 438.

Preparation of hydroxamic acids. G. ODDO and E. DELEO (Ber., 1936, 69, [B], 287–294).—Hydroxamic acids are immediately formed when an aldehyde sol. in H_2O is treated with 1 mol. of NH_2OH in $EtOH \cdot H_2O$ and then with 2 equivs. of 30% H_2O_2 .

As the solubility of the aldehyde in H_2O diminishes reaction takes place less readily and to a limited extent and does not occur when the solubility is slight. MeOH or EtOH cannot be substituted for H_2O , since they are immediately oxidised to the corresponding aldehyde. No change takes place in $COMe_2$. If a suspension of the aldehyde in H_2O is used, a sudden reaction leads to resinous products. Since the reaction is confined to aldehydes sol. in H_2O , the possibility is excluded that it depends on a primary production of the oxime which is then oxidised by H_2O_2 or that NH_2OH is oxidised by H_2O_2 to NOH which is added to the aldehyde. The scheme, $RCHO + NH_2OH = OH \cdot CHR \cdot NH \cdot OH$ (I), and $(I) + H_2O_2 = 2H_2O + OH \cdot CR \cdot N \cdot OH$ is suggested. In support of this view it is shown that $CCl_3 \cdot CH(OH)_2$ gives small amounts of the product $CCl_3 \cdot CH(OH) \cdot NH \cdot OH$ and $CHCl_2 \cdot CH(OH)_2$ yields the unstable adduct $CHCl_2 \cdot CH(OH) \cdot NH \cdot OH$, which immediately decomposes into chloroacetylhydroxamic acid (Cu salt) and $OH \cdot CH \cdot N \cdot OH$. Under defined conditions MeCHO and NH_2OH give the substance $OH \cdot CHMe \cdot NH \cdot OH$, immediately transformed by H_2O_2 into $OH \cdot CMe \cdot N \cdot OH$. The prep. of $OH \cdot CH \cdot N \cdot OH$, $OH \cdot CMe \cdot N \cdot OH$, $OH \cdot CEt \cdot N \cdot OH$ (Cu salt), and $OH \cdot CPr^a \cdot N \cdot OH$ (Cu salt) is described in detail. H. W.

Additive products of aldehydes with the disodium salt of nitrohydroxylamine and with benzenesulphonhydroxamic acid; non-existence of the nitrosyl of A. Angeli. G. ODDO and E. DELEO (Ber., 1936, 69, [B], 294—298).—No evidence is obtained of the intermediate formation of nitrosyl NOH , OHN , or $HN(OH)_2$ by the action of the reagents on NH_2OH and its subsequent union with the aldehyde to the hydroxamic acid and Angeli's hypothesis should be discarded. $CCl_3 \cdot CH(OH)_2$ and $SO_2Ph \cdot NH \cdot OH$ at room temp. slowly yield the adduct, $CCl_3 \cdot CH(OH) \cdot N(OH) \cdot SO_2Ph$, which does not give the reactions of hydroxamic acids and is decomposed by warm alkali into $PhSO_2K$, $CCl_3 \cdot C(OH) \cdot N \cdot OK$, H_2O , and a colourless, cryst. compound probably of cyclic nature. Similarly, $p-OMe \cdot C_6H_4 \cdot CHO$ and $SO_2Ph \cdot NH \cdot OH$ afford the compound $OMe \cdot C_6H_4 \cdot CH(OH) \cdot N(OH) \cdot SO_2Ph \cdot H_2O$, m.p. 153—154°, also obtained in presence of KOH if heating is avoided. MeCHO and $ONa \cdot N \cdot NO_2Na$ give the adduct, $OH \cdot CHMe \cdot N(ONa) \cdot NO_2Na$, $ONa \cdot N \cdot NO_2Na$, whilst under similar conditions EtCHO yields the substance $2OH \cdot CEt \cdot N(ONa) \cdot NO_2Na$, $ONa \cdot N \cdot NO_2Na$, each of which when dissolved in H_2O give the reactions of hydroxamic acids. H. W.

Formation of organo-metalloidal compounds by micro-organisms. IV. Dimethyl- and methylallyl-*n*-propylarsine. F. CHALLENGER and A. A. RAWLINGS (J.C.S., 1936, 264—267).—*P. brevicaulis* on bread crumbs with $AsMePr^aO_2H$ or $AsEtPr^aO_2H$ gives $AsMe_2Pr^a$ and methylallyl-*n*-propylarsine (also obtained, b.p. 129—130°, from $MgMeI$ and $AsEtPr^aI$) [dimercurichloride, m.p. 171—172° (decomp. 188—189°); mercurichloride, m.p. 137—138°; benzylpicrate, m.p. 65—66°; HNO_3 leads to methylallyl-*n*-propylhydroxyarsonium picrate, m.p. 108—109°], respectively. Phenyldimethylarsine mer-

curichloride, m.p. 193—194°, and phenylbenzylidimethylarsonium picrate, m.p. 125—126°, are described. R. S. C.

Basic organic salts of bismuth, soluble in organic solvents. M. PICON (Bull. Soc. chim., 1936, [v], 3, 176—185).—The prep. of bismuthyl cyclohexanolacetate, α -carbethoxy- Δ^a -nonenoate, α -carbethoxy- β -phenyl-*n*-butyrate, α -carbethoxycyclohexylacetate, camphorcarboxylate, and carboxymethylnonoate, by double decomp. between the Na salt and $Bi(NO_3)_3$ in glycerol is described. These derivatives are sol. in org. solvents, especially $CHCl_3$, C_6H_6 , CCl_4 , and CS_2 . E. S. H.

Preparation of tin alkyl and aryl trihalides. A. TOHAKIRIAN, M. LESBRE, and M. LEVINSOHN (Compt. rend., 1936 202, 138—140).— $KSnCl_3 \cdot H_2O$ (Rimbach *et al.*, A., 1916, ii, 332) reacts with the appropriate RI at 90—110° to give (%) yields in parentheses) $SnMeI_3$ (43·7), *Sn Et tri-iodide*, b.p. 181—184·5°/19 mm. (37), *Sn Pr^a tri-iodide*, b.p. 200°/16 mm. (<25), *Sn Ph tri-iodide*, decomp. > 220° (reaction temp. 210°), all formed thus: $KSnCl_3 + RI \rightarrow KI + RSnCl_3 + 3KI \rightarrow 3KCl + RSnI_3$; and *Sn Pr³ trichloride*, b.p. 75°/16 mm. (> 40). J. W. B.

Configuration of bisdimethylglyoximeammine cobaltic chloride. R. TSUCHIDA, M. KOBAYASHI, and A. NAKAMURA (Bull. Chem. Soc. Japan, 1936, 11, 38—40).—By a method for showing the optical activity of racemic substances by asymmetric adsorption on quartz when other methods are not available (J. Chem. Soc. Japan, 1935, 56, 1339), it has been found that the above compound is a *dl*-mixture, and is therefore a *cis*-compound, or has the dimethylglyoxime groups in the 1:2 instead of the 1:6 positions. M. S. B.

Substituted cyclohexyl nitrites. L. HUNTER and J. A. MARRIOTT (J.C.S., 1936, 285—286).—cycloHexyl nitrite, b.p. 31°/10 mm., rapidly decomposes yielding adipic acid. 2-Iodocyclohexyl nitrite, b.p. 110—117°/20—25 mm. (decomp.), is also unstable; 1-phenylcyclohexyl nitrite decomposes when distilled at 10 mm. 1-, b.p. 46°/12 mm., 2-, b.p. 42°/10 mm., 3-, b.p. 45°/12 mm., and 4-methyl-, b.p. 45°/14 mm., 1-ethyl-, b.p. 63°/15 mm., 2-bromo-, b.p. 87°/10 mm., and 2-chloro-cyclohexyl nitrite, b.p. 71°/12 mm., are, however, stable for > 6 months. 2-Bromocyclohexanol, b.p. 103—104°/18 mm., is unstable. R. S. C.

Bixin solutions as colorimetric standards for determination of carotene.—See this vol., 396.

Carotene. X. Comparison of absorption spectra measurements on α - and β -carotene and lycopene. J. H. C. SMITH (J. Amer. Chem. Soc., 1936, 58, 247—255).—Curves are given for α - (I) and β - (II) -carotenes and lycopene (III) using an improved photo-electric spectrophotometer (described in detail). The absorption coeffs. of solutions in EtOH-Et₂O (20%) agree well with those found by Miller *et al.* (A., 1935, 1189); the curves for (I) and (II) are essentially the same as those previously found (A., 1934, 458) for solutions in 95% EtOH. The "pure carotene" of McNicholas (A., 1931, 1110) is (II). The coeffs. for solutions of (I), (II), and (III) in CS_2 differ

considerably from those reported in the lit. (cf. Smakula, A., 1934, 1324). Variations in the positions of the absorption max. of (I) and (II), determined by spectrophotometric and spectroscopic methods (supplemented by a Cu-NH₄ filter), are probably due to superposition of the absorption of the filter on that of the pigment; the former should be the standard method.

H. B.

Significance of non-localised linkings of aromatic hydrocarbons in formation of their molecular compounds with dipolar molecules.—See this vol., 410.

Beryllium bromide as a catalyst in the bromination of benzene. M. F. TABOURY and R. PAJEAU (Compt. rend., 1936, 202, 328—330).—C₆H₆ (86 g.) is readily brominated in presence of BeBr₂ (> 3 g.). Excess of Br converts C₆H₆ or PhBr into *p*-C₆H₄Br₂ in good yield.

J. L. D.

Purification and determination of the degree of purity of toluene. W. SWIENTOSEWSKI and E. RAMOTOWSKI (Rocz. Chem., 1935, 15, 422—429).—Pure PhMe, b.p. 110.612/4°, is readily obtained by fractionation with a series of condensers, or with a special column ensuring slow distillation. Admixture of 1:1 C₆H₆-xylene does not affect the b.p., but increases the difference between the b.p. and the temp. of condensation of the vapour by 0.001° per 0.0024% of mixture present.

R. T.

Mechanism of aromatic side-chain reactions. VII.—See this vol., 433.

Action of sulphinates on 2:4-dinitrophenylsulphones. J. D. LOUDON (J.C.S., 1936, 218—221).—ArSO₂Na reacts with *o*- and *p*-(NO₂)₂-compounds, replacing 1 NO₂. The combination, 1-NO₂-3-ArSO₂, activates ArSO₂ or Cl in the 6 position, which can then be replaced by Cl, NH₂, OH, or ArSO₂, etc. Examples are given, in which Ar=Ph, *p*-C₆H₄Me, and *m*-C₆H₄NO₂. The constitutions in the PhSO₂ series are rigidly proved; the others follow by analogy. 2:4-(NO₂)₂C₆H₃·SO₂Ph and PhSO₂Na (I) in hot aq. dioxan or (CH₂OH)₂ yield 1-nitro-2:5-diphenylsulphonylbenzene (II), m.p. 157—158°, which with hot piperidine gives 3-nitro-4-piperidinodiphenylsulphone, m.p. 133°, and with NaOH-EtOH gives 3-nitro-4-ethoxy-, m.p. 147°, and -hydroxy-diphenylsulphone, m.p. 137°. 1-Nitro-2:5-di-*p*-tolylsulphonylbenzene (III) (similarly prepared), m.p. 220—221°, gives similarly 3-nitro-4-piperidino-, forms, m.p. 96—97° and (stable) 107—108°, respectively, -hydroxy-, m.p. 157—158°, and -ethoxy-4'-methyldiphenylsulphone, m.p. 143—144°. The appropriate chloronitro- or (NO₂)₂-compounds with (I) or *p*-C₆H₄Me·SO₂Na in hot (CH₂OH)₂ yield *o*-, m.p. 147°, and *p*-nitro-, m.p. 143°, and 2-, m.p. 156°, and 4-nitro-4'-methyldiphenylsulphone, m.p. 170°. Reduction by SnCl₂-HCl-EtOH affords 2-, m.p. 120—121°, and 4-amino-4'-methyldiphenylsulphone (IV), m.p. 181°. *p*-Sulphonamidodiphenylsulphone (prep. in C₂H₅N), m.p. 190°, and hot HNO₃-AcOH yield the 3-NO₂-derivative, m.p. 171°, hydrolysed by warm conc. H₂SO₄ to 3-nitro-4-aminodiphenylsulphone (V), m.p. 169—170°, which is also obtained from (II) and conc. aq. NH₃ at 130°. (IV) gives similarly its *p*-C₆H₄Me·SO₂

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derivative, m.p. 213—214°, which with hot HNO₃-AcOH affords 3:5-dinitro-, m.p. 221°, and 3-nitro-4-*p*-toluenesulphonamido-4'-methyldiphenylsulphone, m.p. 129—130°, hydrolysed to 3:5-dinitro-, m.p. 216° after softening at 205°, and 3-nitro-4-amino-4'-methyldiphenylsulphone (VI), m.p. 184° [also obtained from (III) and NH₃]. 4-Chloro-3-nitrobenzenesulphonyl chloride (modified prep.), m.p. 61—62° (lit. 40° and 60°), with AlCl₃ and C₆H₆ gives 4-chloro-3-nitrodiphenylsulphone, m.p. 127°, which is also obtained (diazo-reaction) from (V) and gives the same piperidino-, OH-, and NH₂-derivatives as does (II). 4-Chloro-3-nitro-4'-methyl- [obtained from (VI)], m.p. 120°, and 2-chloro-5-nitro-diphenylsulphone (obtained from 2-chloro-5-nitrobenzenesulphonyl chloride), m.p. 174°, undergo similar reactions; 5-nitro-2-piperidinodiphenylsulphone has m.p. 178°. Nitration of 4-chlorodiphenylsulphone yields, according to the conditions, the 3'-NO₂-, m.p. 139—140° (also obtained from *m*-NO₂·C₆H₄·SO₂Cl, AlCl₃, and PhCl), or 3:3'-(NO₂)₂-derivative, m.p. 146°, which latter leads to 3:3'-dinitro-4-piperidino-, m.p. 151—152°, and -4-amino-diphenylsulphone, m.p. 238°. 4-Chloro-4'-methyldiphenylsulphone gives similarly 4-chloro-3'-nitro-, m.p. 103°, and -3:3'-dinitro-, m.p. 152°, and 3:3'-dinitro-4-piperidino-, m.p. 149—150°, and -4-amino-4'-methyldiphenylsulphone, m.p. 231°. The requisite chloronitro-compound and Na arylsulphinate in aq. EtOH or dioxan yield (II), (III), 1-nitro-5-phenylsulphonyl-2-*p*-tolyl-, m.p. 180°, 1-nitro-2-phenylsulphonyl-5-*p*-tolyl-, m.p. 212°, 1-nitro-2-phenylsulphonyl-5-*m*-nitrophenyl-, m.p. 233°, and 1-nitro-5-*m*-nitrophenylsulphonyl-2-*p*-tolyl-sulphonylbenzene, m.p. 232°.

R. S. C.

Naphthalene series. V. 8-Chloro-1-nitronaphthalene and 8-chloro- α -naphthol. N. N. VOROSCHCOV and V. V. KOSLOV (Ber., 1936, 69, [B], 412—415).—Treatment of 1:8-NO₂·C₁₀H₆·SO₃Na with HCl (*d* 1.19) and NaClO₃-H₂O in C₆H₄Cl₂ at 96—98° and distillation of the product with steam affords the two forms of 8:1-C₁₀H₆Cl·NO₂, m.p. 94—95° (I) and 125°, respectively, and some 8:1-C₁₀H₆Cl·OH, m.p. 67°, formed by hydrolysis. Chlorination of 1-C₁₀H₇·NO₂ in presence of FeCl₃ at 60—70° affords (I), 5:1-C₁₀H₆Cl·NO₂, C₁₀H₇Cl, and 1:4:5-C₁₀H₅Cl₃.

H. W.

Preparation of halogenomethyl derivatives of naphthalene hydrocarbons. Synthesis of 1:2- and 1:4-dimethylnaphthalenes. G. DARZENS and A. LÉVY (Compt. rend., 1936, 202, 73—75).—C₁₀H₈ with a solution of trioxymethylene in AcOH-HCl at 60° gives 95% (on C₁₀H₈ used) of 1-C₁₀H₇·CH₂Cl, b.p. 148—150°/13 mm., m.p. 32°; the use of HBr leads to 1-C₁₀H₇·CH₂Br, m.p. 56°. 1-C₁₀H₇·Me similarly gives 1:4-C₁₀H₆Me·CH₂Cl, b.p. 124—125°/2 mm., m.p. 62° (picrate, m.p. 73—74°), oxidised (alkaline KMnO₄) to 1:4-C₁₀H₆(CO₂H)₂ and reduced (Al, EtOH-HCl) to 1:4-C₁₀H₆Me₂. 2-C₁₀H₇·Me affords 2:1-C₁₀H₆Me·CH₂Cl, b.p. 125—126°/2 mm., m.p. 65° (picrate, m.p. 99°), similarly reduced to 1:2-C₁₀H₆Me₂, b.p. 265°/770 mm., m.p. —3.5° (picrate, m.p. 130°). Small amounts of liquid products are also formed from the C₁₀H₇·Me. H. B.

Photochemical formation of organic diradicals III.—See this vol., 437.

Dissociable anthracene oxides: effect of meso-tolyl groups. A. WILLEMART (Compt. rend., 1936, 202, 140—141).—Reduction of the appropriate 9:10-dihydroxy-9:10-diaryldihydroanthracene with KI-AcOH affords 9:10-di-o-, m.p. 350°, di-m-, m.p. 221—222° (block) and di-p-tolylanthracene (Ingold *et al.*, A., 1927, 141), all giving dissociable oxides (evolve O₂ at 180—200°) when illuminated (sunlight) in solution in presence of air. The o-substituent is least effective in promoting reversible oxidation.

J. W. B.

Dissociable organic oxides. Naphthacene formula of the rubenes. Synthesis of 5:6:11:12-tetraphenylnaphthacene; its identity with tetraphenylrubene (old rubrene). C. DUFRASSE and L. VELLUZ (Compt. rend., 1935, 201, 1394—1396).—6:11-Dihydroxynaphthacene-5:12-quinone and MgPhBr give 5:12-diphenyl-naphthacene-6:11-quinone, m.p. 284°; with more MgPhBr this yields 6:11-dihydroxy-5:6:11:12-tetraphenylnaphthacene, converted by loss of H₂O into dehydro-rubrene (I) and by reduction into 5:6:11:12-tetraphenylnaphthacene, identical with rubrene. Bis-2:2'-(1-hydroxy-3-ketoindenyl) gives substances not belonging to the rubene series (cf. A., 1935, 1492). The formation of dissociable rubene oxides is due to the 5-, 6-, 11-, and 12-C (cf. CPh₃ and mesodiallylanthracenes).



R. S. C.

m-Nitrobenzoylthiocarbimide as a reagent for the identification of amines. W. L. TUNG, CHENG HENG KAO, CHUNG HSI KAO, and P. P. T. SAH (Sci. Rep. Tsing Hua Univ., 1935, 3, [4], 285—289).—m-Nitrobenzoylthiocarbimide, m.p. 94—95°, is obtained by heating NH₄NCS in COMe₂ with m-NO₂-C₆H₄-COCl (I) in C₆H₆. For use as a reagent its isolation is unnecessary and the m-nitrobenzoylthiocarbamates of the following amines are prepared by slow addition of their solution in warm COMe₂ to a hot mixture of NH₄NCS and (I) in COMe₂ and treatment of the product with cold H₂O:NH₂Ph, m.p. 153—154°; o-, m.p. 184—185°, m-, m.p. 194—195°, and p-, m.p. 178—179°, -NO₂-C₆H₄-NH₂: α-, m.p. 180—181°, and β-, m.p. 194—195°, -C₁₀H₇-NH₂: o-, m.p. 184—185°, m-, m.p. 126—127°, and p-, m.p. 158—159°, -C₆H₄Me-NH₂: NHPh₂, m.p. 150° (decomp.); p-C₆H₄Cl-NH₂, m.p. 160—161°; p-C₆H₄Br-NH₂, m.p. 175—176°; m-nitro-, m.p. 174—175°, and m-bromo-, m.p. 182—183°, p-toluidine; o-, m.p. 205° (decomp.), and p-, m.p. 221—222°, -NH₂-C₆H₄-CO₂H; NHPhMe, m.p. 135—136°.

H. W.

Peroxidase action. I. Oxidation of aniline. P. J. G. MANN and B. C. SAUNDERS (Proc. Roy. Soc., 1935, B, 119, 47—60).—NH₂Ph (2% solution in dil. AcOH) is readily oxidised by the peroxidase (I) from horse-radish or turnips in presence of H₂O₂ (concn. maintained at 10—20 mg.-%) at p_H 4.5 and room temp.; benzoquinone-1-anil-4-p-aminoanilinoanil (II)

is considered to be an intermediate (causing a transient bluish-violet colour), whilst the substances isolated (by fractional extraction of the brown reaction product with various solvents) are 2:5-dianilinobenzoquinone-1-imine-4-anil (III) (Ac derivative, m.p. 212°), probably induline 3B (IV) (and a little induline 6B), ψ-mauveine (V), and ungreenable aniline-black (VI) [modified structure suggested (cf. Green and Wolff, A., 1913, i, 302)]. p-Benzoquinone and azobenzene are not isolated. The following reactions are considered to occur: (a) NH₂Ph → NHPh-OH → p-NH₂-C₆H₄-NHPh → NH-C₆H₄-NHPh → (II); (b) the conversion of (II) through emeraldine (VII) and nigraniline into (VI); (c) conversion of NH-C₆H₄-NHPh into (III) and thence through the dianil and a phenazine into (IV); (d) oxidative condensation of NH₂-C₆H₄-N-C₆H₄-NHPh and NH₂Ph to give (V). Schemes (a) and (b) are supported by the observed formation of (VII) from p-NH₂-C₆H₄-NHPh and (I) (as above); (II) is again an intermediate. (VII) is also formed directly from NHPh-OH and (I), presumably by condensation of 8 mols. and subsequent oxidation. Oxidation (Fenton's reagent) of NH₂Ph in dil. AcOH gives azobenzene and 2-amino-5-anilino- (VIII) and 2:5-dianilino-benzoquinone-1-anil, m.p. 202° [also formed from (VIII) and NH₂Ph in AcOH].

H. B.

Orthanilic acid (aniline-o-sulphonic acid). E. WERTHEIM (Org. Syntheses, 1935, 15, 55—58).—o-NO₂-C₆H₄-SO₂Cl, prepared from (o-NO₂-C₆H₄-S₂), HNO₃, and Cl₂, is hydrolysed and the sulphonic acid reduced with Fe in AcOH.

CH. ABS. (f)

2:4-Dinitroaniline. F. B. WELLS and C. F. B. ALLEN (Org. Syntheses, 1935, 15, 22—23).—1:2:4-C₆H₃Cl(NO₂)₂ and AcO₂NH₄ yield 2:4-(NO₂)₂C₆H₃-NH₂. The method cannot be applied to C₆H₄Cl-NO₂.

CH. ABS. (r)

Complex salts of α-phenylethylamine. Equivalence of the four co-valencies of bivalent platinum and palladium. H. REIHLEN and E. FLOHR (Ber., 1936, 69, [B], 325—330).—Werner's hypothesis of the equivalence of covalencies is applicable without exception to hexacovalent compounds, and to quadricovalent substances with the exception of certain Pt and Pd compounds of which so many isomerides are known that their existence as stereoisomerides requires special *ad hoc* suppositions. Jørgenson's proof of the equivalence of the linkings in tetramminoplatinous dihalides is regarded as unconvincing. It is sought to obtain more suitable conditions by the use of chemically similar but readily differentiated amines [(+) and (-)-CHPhMe-NH₂], which, with Pd, afford sufficiently labile derivatives. The replacement of amine linked to Pd by amine in solution, however, takes place so readily that the results throw no light on the problem. K₂PtCl₄ and (+)-CHPhMe-NH₂ in H₂O at 15—20° afford tetra-(+)-α-phenylethylaminoplatinous dichloride, [α]_D²⁰ +62.5° in 50% EtOH. Tetra-(+)-α-phenylethylaminopalladium dichloride, [α]_D²⁰ +69.0° in abs. EtOH, from PdCl₂ and amine in abs. EtOH at > 45°, and the corresponding 1-compound, [α]_D²⁰ -72° in H₂O, -69.2° in abs. EtOH, are transformed by HCl at 60° into the trans-compounds

[Pd(CHPhMe·NH₂)₂Cl₂], [α]_D -65.5° (I) and +65.8° (II) in abs. EtOH, respectively. (I) and *r*-CHPhMe·NH₂ (2 mols.) in abs. EtOH at 35° afford *trans-di(-)di(r)-phenylethylaminopalladium dichloride*, [α]_D -33° in abs. EtOH. Similarly (I) with (+)-CHPhMe·NH₂ (2 mols.) or (II) with (-)-CHPhMe·NH₂ (2 mols.) yields the optically inactive *tetra-r- α -phenylethylaminopalladium dichloride*. (II) and (-)-CHPhMe·NH₂ (6 mols.) afford *tri(-)-mono(+)- α -phenylethylaminopalladium dichloride*, [α]_D -36° in abs. EtOH. H. W.

Naphthalene series. VI. Transformation of diazotised 8-nitro- α -naphthylamine. N. N. VOROSCHCOV and V. V. KOSLOV (Ber., 1936, 69, [B], 416—419).—1:8-NO₂·C₁₀H₆·SO₂H (I), m.p. 151—152° (Cu and Na salts), is readily obtained by adding a solution of diazotised 1:8-NO₂·C₁₀H₆·NH₂ to H₂SO₃ in presence of Cu powder. The nearly neutral diazo-solution and Na₂S+S afford 1:1'-*di-nitrodinaphthyl 8:8'-disulphide* (II), m.p. 212—214°. Attempts to prepare 1:8-NO₂·C₁₀H₆·SH were unsuccessful. Mild reduction of (II) leads to the amino-mercaptan or naphthasultam (III), m.p. 174.5°. Reduction of (I) with glucose in EtOH also gives (III). 8-Nitro- α -naphthol, m.p. 212° (decomp.) (Ba and Pb salts), does not couple with diazo-compounds, but apparently gives diazo-oxides. H. W.

Amide condensations. I. Preparation of acetoacetylphenylamide. G. V. TSCHELINCEV and E. D. OSSETROVA (Ber., 1936, 69, [B], 374—377).—NEt₂Ac is unchanged by Na in Et₂O, whereas NPh₂Ac and Na in C₆H₆ at 100° afford *acetoacetylphenylamide* (I), m.p. 86—87°, and NHPH₂ in excellent yield. (I) gives a dark violet colour with FeCl₃ in EtOH and is hydrolysed by 18% HCl to COMe₂ and NHPH₂·HCl. The analogy between the reaction and ester condensation is stressed. H. W.

Derivatives of $\alpha\beta$ -diphenylethane. D. N. KUR-SANOV and A. S. KITSCHINA (J. Gen. Chem. Russ., 1935, 5, 1342—1347).—1-Benzamido-2- β -chloroethylbenzene and C₆H₆ in presence of AlCl₃ yield 2-benzamido- $\alpha\beta$ -diphenylethane, m.p. 157—158.8°, from which the amine, b.p. 138—143°/2 mm. (*hydrochloride*, decomp. at 171°), is obtained by hydrolysis with 10% KOH at 155—160° (5—6 hr.). 4-Nitro- $\alpha\beta$ -diphenylethane is obtained from [CH₂Ph]₂ and BzNO₂ (3 hr. at room temp.). R. T.

Aromatic lactams. (MLLE.) G. GLOTZ (Bull. Soc. chim., 1936, [v], 3, 511—515).—The intensity of the ultra-violet absorption of *o*-C₆H₄(NH₂)₂, *o*-C₆H₄(NH₂)₂CO, and *ox-o-phenyleneamide*, sublimes at 330°, increases in the order quoted; one CO has a feeble bathochromic effect. The curve for *o*-C₆H₄(NHAc)₂ shows a slight inflexion at about 2650 Å.; *malon-o-phenyleneamide*, darkens at 328°, shows a max. at about 2900 Å., whilst *succin-o-phenyleneamide*, m.p. 232°, exhibits max. at 2800 and 2400 Å. and min. at 2600 and 2200 Å. The amides are prepared by Meyer's method (A., 1906, i, 765). H. B.

Ortho- and meta-tellurates of benzidine. M. PATRY (Compt. rend., 1936, 202, 64—66).—The compound Te(OH)₆(C₆H₄·NH₂)₂ was prepared by

adding an EtOH solution of benzidine (> 30% EtOH) to aq. orthotelluric acid. The compound H₂TeO₄(C₆H₄·NH₂)₂ was prepared similarly, using an aq. or EtOH solution of polymetatelluric acid. Excess of base must be used in each case. Solubility data are given. H. J. E.

Preparation of methyl-substituted azo- and azoxy-benzenes and rearrangement of the azoxy-benzenes. T. PARSONS, jun., and J. C. BAILAR, jun. (J. Amer. Chem. Soc., 1936, 58, 268—271).—3-Methoxy- and 2- and 3-methyl-azobenzenes are prepared from PhNO and C₆H₄R·NH₂ in EtOH-AcOH. 4-Methyl- and 2:2', 3:3', and 4:2'-dimethyl-diazoaminobenzenes (the positions in the ring attached to NH are indicated, e.g., 2'), prepared by Mehner's method (A., 1902, i, 576), are rearranged by a modification of Goldschmidt's procedure (A., 1888, 685, 1283) to 4'-amino-4-methyl- and 2:3', -3:2', m.p. 85—86° (lit. 80°), and 4:3', m.p. 131—132° (lit. 128°), -dimethyl-azobenzene, respectively [*benzenesulphonyl* derivatives (A), m.p. 159°, 138—139°, 144°, and 152—153°, respectively], which are subsequently deaminated (diazo-method) to the methylazobenzenes. Reduction (Fe, dil. AcOH) of (A) gives the appropriate NH₂Ar and *p*-NH₂·C₆H₄·NH·SO₂Ph, 4:2-NH₂·C₆H₃Me·NH·SO₂Ph (I), *benzenesulphon-4'-amino-3'-methylanilide*, m.p. 146° (also prepared by reduction of the 4'-NO₂-derivative, m.p. 139°), and (I), respectively. The above azobenzenes are then oxidised (30% H₂O₂ in AcOH) to the azoxybenzenes, which are rearranged by short treatment with 85% H₂SO₄ at 88° to *p*-hydroxyazobenzenes (except when the 4 and 4' positions are substituted). 2- and 3-Methylazoxybenzenes give 4-hydroxy-2- and -3-methylazobenzene, respectively; the OH thus enters the substituted ring. 4-Methyl- and 3:3'-dimethyl-azoxybenzene afford 4-hydroxy-4'-methyl- (cf. Bigiani and Sabatelli, A., 1927, 1180) and -3:3'-dimethyl-azobenzene, respectively, whilst the 4:4'-Me₂ derivative gives (probably) 20% of 3-hydroxy-4:4'-dimethyl-, m.p. 210—212° (Et ether, m.p. 50°; benzyl ether, m.p. 123°; benzoate, m.p. 122—123°), and 75% of 4-methyl-4'-hydroxymethyl-azobenzene, m.p. 208—210° (decomp.) (benzoate, m.p. 121—122°), both of which are reduced (Fe, AcOH) to *p*-C₆H₄Me·NH₂. 2-Ethoxy-4:4'-dimethylazobenzene, m.p. 76°, is prepared from 4-amino-3-ethoxytoluene and *p*-C₆H₄Me·NO. H. B.

Expulsion of the arylazo-group in *o*-amino-naphthaleneazo-derivatives. G. B. CRIPPA and G. PERRONCITO (Gazzetta, 1935, 65, 1250—1253).—4:2-C₁₀H₆Br·NH₂ (I) with PhN₂Cl dissolved in isomyl alcohol forms 4-bromo-1-benzeneazo- β -naphthylamine, m.p. 154°, which is degraded by *o*-C₆H₄(CO)₂O to 4-bromo-2-phthalimidonaphthalene, m.p. 125° [also obtained from (I)], and thus does not share the unusual stability of its isomeride, 4-bromo-2-benzeneazo- α -naphthylamine (A., 1935, 1490). E. W. W.

Action of aliphatic carbimides on hydrazine derivatives. C. C. P. FACILLY (Rec. trav. chim., 1936, 55, 101—121).—NR₂:C=O with NR'R''·NH₂ in inert solvents yields NR'R''·NH·CO·NHR. The following new *semicarbazides* were prepared and the

regularities between their m.p. noted: 1-phenyl-4-n-propyl-, m.p. 135°, -4-isopropyl-, m.p. 147°; 1-o-tolyl-4-methyl-, m.p. 143°, -4-ethyl-, m.p. 130°; -4-n-propyl-, m.p. 113°, -4-isopropyl-, m.p. 110°; 1-m-tolyl-4-methyl-, m.p. 145°, -4-ethyl-, m.p. 127°; -4-n-propyl-, m.p. 104°, -4-isopropyl-, m.p. 126°; 1-p-tolyl-4-methyl-, decomp. 192°, -4-ethyl-, m.p. 174°, -4-n-propyl-, m.p. 123°, -4-isopropyl-, m.p. 161°; 1-p-bromophenyl-4-methyl-, m.p. 191°, -4-ethyl-, m.p. 162°, -4-n-propyl-, m.p. 144°, -4-isopropyl-, decomp. 179°; 1-o-nitrophenyl-4-methyl-, decomp. 224°, -4-ethyl-, decomp. 182°, -4-n-propyl-, decomp. 176°, -4-isopropyl-, decomp. 190°; 1-m-nitrophenyl-4-methyl-, decomp. 186°, -4-ethyl-, decomp. 199°, -4-n-propyl-, decomp. 127°, -4-isopropyl-, decomp. 166°; 1-p-nitrophenyl-4-methyl-, decomp. 224°, -4-ethyl-, decomp. 231°, -4-n-propyl-, decomp. 198°, -4-isopropyl-, decomp. 226°; 1-(5-chloro-2-nitro)-phenyl-4-methyl-, decomp. 240°, -4-ethyl-, decomp. 215°, -4-n-propyl-, decomp. 200°, -4-isopropyl-, decomp. 215°; 1-(5-bromo-2-nitro)phenyl-4-methyl-, decomp. 247°, -4-ethyl-, decomp. 223°, -4-n-propyl-, decomp. 212°, -4-isopropyl-, decomp. 234°; 1-(2:4-dinitro)phenyl-4-methyl-, decomp. 222°, -4-ethyl-, decomp. 218°, -4-n-propyl-, decomp. 187°, -4-isopropyl-, decomp. 206°; 1-benzoyl-4-methyl-, m.p. 181°, -4-ethyl-, m.p. 175°, -4-n-propyl-, m.p. 172°, -4-isopropyl-, m.p. 198°; 1-β-naphthyl-4-methyl-, decomp. 192°, -4-ethyl-, m.p. 136°, -4-n-propyl-, m.p. 133°, -4-isopropyl-, decomp. 185°; 1-phenyl-1:4-dimethyl-, m.p. 183°, -1-methyl-4-ethyl-, m.p. 97°, -1-methyl-4-n-propyl-, m.p. 63°, -1-methyl-4-isopropyl-, m.p. 124°; 1-phenyl-1-benzyl-4-methyl-, m.p. 161°, -4-ethyl-, m.p. 107°, -4-n-propyl-, m.p. 65°, -4-isopropyl-, m.p. 97°; 1-p-nitrophenyl-1:4-dimethyl-, decomp. 224°, -1-methyl-4-ethyl-, decomp. 229°, -1-methyl-4-n-propyl-, decomp. 187°; 1:4-diphenyl-4-methyl-, m.p. 192°, -4-ethyl-, m.p. 188°, -4-n-propyl-, m.p. 145°, -4-isopropyl-, m.p. 193°.

F. R. G.

Action of aliphatic secondary bases on halogen derivatives of amines. C. VASSILLADES (Bull. Soc. chim., 1936, [v], 3, 160—163).— NHEt_2 (2 mols.) and the appropriate *N*-chloro-amide or -imide (1 mol.) in dry COMe_2 give benz-, m.p. 112—113°, *phthal*-, cryst., hygroscopic, and *succin*-*as*-diethylhydrazide, m.p. 105—106°, *acet*-, m.p. 168—169°, and *benz*-*as*-phenyl-diethylhydrazide, m.p. 152—153°, and *acet*-*as*-*p*-tolyl-diethylhydrazide, m.p. 140—145°. NHAcBr , however, brominates NHEt_2 ; NEt_2Cl gives NHEt_2HCl and $\text{NEt}:\text{CHMe}$, which with H_2O affords probably NH_2Et and MeCHO .

R. S. C.

Influence of nuclear substitution on [the formation and oxidation of] *as*-arylbenzylhydrazines. M. BUSCH and K. LANG (J. pr. Chem., 1936, [ii], 144, 291—312).—*as*-Arylarylmethylhydrazines, $\text{NH}_2\text{NAr}\cdot\text{CH}_2\text{Ar}'$ (I), are obtained from NH_2NAr and $\text{CH}_2\text{Ar}'\text{Cl}$ (usually in EtOH at 100—125°), except when Ar is *p*- $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot$ or, occasionally, *o*- $\text{C}_6\text{H}_4\text{Me}$ and *o*- $\text{C}_6\text{H}_4\text{Br}$ (especially if Ar' is $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot$); in these cases $\text{NHAr}\cdot\text{N}:\text{CHAR}'$ (II) are formed. Whether (II) result by rearrangement and oxidation of (I) or by dehydrogenation of $\text{NHAr}\cdot\text{NH}\cdot\text{CH}_2\text{Ar}'$ is not clear. An *o*-substituent in Ar' renders reaction more difficult. Oxidation (HgO in CHCl_3 at 0°) of (I)

usually results, especially when Ar is substituted, in the production of (II); in some cases, (II) and the tetrazene, $(\text{N}:\text{NAr}\cdot\text{CH}_2\text{Ar}')_2$ (III), are produced. It is doubtful if (II) are formed by way of (III) (cf. Flaschner, A., 1905, i, 936). The following (II) are formed directly: *p*- $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{NH}\cdot\text{N}:\text{CHPh}$ (80% yield in xylene at 135°; a little *p*- $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{NH}\cdot\text{CH}_2\text{Ph}$ also produced); *o*-, m.p. 174° (65% yield), *m*-, m.p. 169°, and *p*-, m.p. 163°, -nitrobenzaldehyde-*o*-tolyl-hydrazones; *o*-nitrobenzaldehyde-*o*-bromophenylhydrazones, m.p. 158°; *p*- $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{NH}\cdot\text{N}:\text{CH}\cdot\text{C}_6\text{H}_4\cdot\text{NO}_2\cdot\text{p}$; *p*- $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{NH}\cdot\text{N}:\text{CH}\cdot\text{C}_6\text{H}_4\cdot\text{Cl}\cdot\text{o}$ (in xylene at 140°). The following (I) are prepared: *as*-*o*-, *m*-, and *p*-tolylbenzylhydrazines (hydrochlorides, m.p. 176°, 166°, and 161°, respectively; *CHPh*: derivatives, m.p. 93°, 145°, and 138°, respectively, oxidised to $\text{C}_6\text{H}_4\text{Me}\cdot\text{NH}\cdot\text{N}:\text{CHPh}$; *as*-*o*-chlorophenylbenzylhydrazine, m.p. 67° [hydrochloride, m.p. 219° (decomp.)]; *CHPh*: derivative, m.p. 95°, oxidised to *o*- $\text{C}_6\text{H}_4\text{Cl}\cdot\text{NH}\cdot\text{N}:\text{CHPh}$ and a little *di*-*o*-chlorophenyl-dibenzyltetrazene, m.p. 137°; *as*-phenyl-*o*-nitrobenzylhydrazine (*CHPh*:), m.p. 138°, and *m*- $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{CH}$: m.p. 147°, derivatives, oxidised at 0° to diphenyldi-*o*-nitrobenzyltetrazene (66%) (Flaschner, loc. cit.) and *o*- $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{CH}\cdot\text{N}:\text{NHPh}$ (34%) (at 25° and 55°, the % are 37, 63 and 0, 100, respectively); *as*-phenyl-*m*-nitrobenzylhydrazine (hydrochloride, decomp. 185—187°; *CHPh*:, m.p. 145°, and *o*-, m.p. 125°, *m*-, m.p. 132°, and *p*-, m.p. 189°, - $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{CH}$: derivatives), accompanied by a little *m*- $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{CH}\cdot\text{N}:\text{NHPh}$; *as*-phenyl-*p*-nitrobenzylhydrazine [*CHPh*:, m.p. 96°, *o*-, m.p. 111°, and *m*-, m.p. 150°, - $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{CH}$: and *p*- $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{CH}$: m.p. 141° (lit. 132°), derivatives], oxidised to diphenyldi-*p*-nitrobenzyltetrazene (60%), red (stable) and yellow forms, both m.p. 163—164° (decomp.), and a little *p*- $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{CH}\cdot\text{N}:\text{NHPh}$; *as*-phenyl-*o*-chlorobenzylhydrazine [hydrochloride, m.p. 208° (decomp.)]; *p*- $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{CH}$: derivative, m.p. 122°, accompanied by a little *o*- $\text{C}_6\text{H}_4\text{Cl}\cdot\text{CH}\cdot\text{N}:\text{NHPh}$; *as*-*m*-tolyl-*o*- [hydrochloride, m.p. 195—197° (decomp.)]; *o*-, m.p. 136°, and *p*-, m.p. 174°, - $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{CH}$: derivatives], *m*- [hydrochloride, m.p. 188—190° (decomp.)], and *p*- (hydrochloride, decomp. 213—215°) -nitrobenzylhydrazines, oxidised to *o*-, m.p. 125°, *m*-, m.p. 124°, and *p*-, m.p. 113°, -nitrobenzaldehyde-*m*-tolyl-hydrazones, respectively; *as*-*p*-tolyl-*o*-, m.p. 96°, *m*- [hydrochloride, m.p. 180—182° (decomp.)], and *p*-, m.p. 77°, -nitrobenzylhydrazines (the last is accompanied by a little *p*-nitrobenzaldehyde-*p*-tolylhydrazones, m.p. 160°); *as*-*o*- [hydrochloride, m.p. 199—201° (decomp.)], *m*- [hydrochloride, m.p. 156—158° (decomp.)]; *p*- $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{CH}$: derivative, m.p. 129°, and *p*- [hydrochloride, m.p. 183° (decomp.)]; *p*- $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{CH}$: derivative, m.p. 168°] -tolyl-*o*-chlorobenzylhydrazines, all of which are oxidised to oily products; *as*-*o*-chlorophenyl-*o*-, m.p. 59° (hydrochloride, decomp. 160°; *p*- $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{CH}$: derivative, m.p. 176°, and *p*-, m.p. 89° [hydrochloride, m.p. 198° (decomp.)]; *p*- $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{CH}$: derivative, m.p. 186°], -nitrobenzylhydrazines, oxidised to *o*- $\text{C}_6\text{H}_4\text{Cl}\cdot\text{NH}\cdot\text{N}:\text{CH}\cdot\text{C}_6\text{H}_4\cdot\text{NO}_2$; *as*-*o*-chlorophenyl-*o*-chlorobenzylhydrazine (hydrochloride, m.p. 166°; *CHPh*: derivative, m.p. 82°), oxidised to *o*- $\text{C}_6\text{H}_4\text{Cl}\cdot\text{NH}\cdot\text{N}:\text{CH}\cdot\text{C}_6\text{H}_4\text{Cl}\cdot\text{o}$.

H. B.

Influence of degree of acidity on the velocity of the diazotisation reaction. H. A. J. SCHOUTSEN (J. Amer. Chem. Soc., 1936, 58, 259—262; cf. A., 1921, ii, 34).—The velocity of diazotisation of p - $C_6H_4MeNH_2$, o -, m -, and p - $C_6H_4ClNH_2$, and o - $NH_2C_6H_4CO_2H$ in presence of varying amounts of HCl is not inversely \propto the excess of HCl; reaction does not, therefore, occur between free NH_2Ar and HNO_2 . The results with small concns. of HCl show that reaction takes place between $[NH_3Ar]Cl$ and HNO_2 . The velocity coeffs. (which do not agree with calc. vals.) increase with rise in concn. of HCl owing to decreased hydrolysis of the salt and a sp. action (being investigated further). H. B.

Chemistry of diazoamino-compounds. J. C. EARL (Chem. and Ind., 1936, 192—193).—A brief review.

Mesohydry. V. Acyltriazenes; particularly marked instance of mesohydric isomerism. G. ODDO and A. ALGERINO (Ber., 1936, 69, [B], 279—282; cf. A., 1932, 44).—Gradual addition of diazotised NH_2Ph to NH_2Ac in H_2O at 0° gives colourless *acetylphenyltriazene* (I), m.p. 101—102°, the Ag salt of which is not affected by $PhBr$ or MeI in $MeOH$. When exposed to light (I) is rapidly transformed into a red *isomeride* (II), m.p. 96°, re-converted into (I) by dissolution in $NaOH$ and pptn. with HCl . The absence of colour in (I) cannot be explained by any of the usual formulæ, and the mesohydric constitutions $AcN \equiv N \equiv NPh$ and $O \begin{smallmatrix} H \\ \diagup \quad \diagdown \\ C \\ \diagdown \quad \diagup \\ Me \end{smallmatrix} N \equiv N \equiv NPh$ are therefore assigned to (I) and (II), respectively. Similar but very unstable compounds appear to be derived from $HCO \cdot NH_2$ and PhN_2Cl . H. W.

p -Iodophenol. F. B. DAINS and F. EBERLY (Org. Syntheses, 1935, 15, 39—40).— p - $OH \cdot C_6H_4 \cdot NH_2$ is diazotised and treated with KI and Cu .

CH. ABS. (r)

2:6-Dibromo-4-nitrophenol. W. W. HARTMAN and J. B. DICKEY (Org. Syntheses, 1935, 15, 6—7).— p - $NO_2 \cdot C_6H_4 \cdot OH$ is brominated in $AcOH$.

CH. ABS. (r)

Photochemical decomposition of nitrated phenols.—See this vol., 300.

[Metal] complex chemical behaviour of o -aminophenol. W. HIEBER and A. SCHNACKIG (Z. anorg. Chem., 1936, 226, 209—221).—The following compounds have been prepared with exclusion of air to prevent oxidation of o -aminophenol [$X = O \cdot C_6H_4 \cdot NH_2$, $Y = o \cdot NH_2 \cdot C_6H_4 \cdot OH$]: CoX_2 , NiX_2 , $NiCl_2 \cdot Y_2$, CuX_2 , ZnX_2 , $CdCl_2 \cdot Y_2$, $CdBr_2 \cdot Y_2$, $CdI_2 \cdot Y_2$, $CdClX$, CdX_2 . The existence of $ZnCl_2 \cdot Y_2$ has been confirmed. Colour and stability show that the X compounds form internal complexes, metal being co-ordinated with N ; the Y compounds, on the other hand, behave as additive compounds. On treatment of $ZnCl_2 \cdot Y_2$ and $CdCl_2 \cdot Y_2$ with gaseous NH_3 almost the whole of Y is replaced. Direct absorption of NH_3 by NiX_2 also occurs. Reaction is favoured by the presence of a little moisture. Both types of compound will also take up 2 mols. of HCl , with the exception of $CdClX$ which takes up 1 mol. Marked colour changes occur. M. S. B.

Nitration of thymol methyl ether. A. E. TSCHITSCHIBABIN and M. A. BESTUGEY (Bull. Soc. chim., 1936, [v], 3, 423—424).—1:4:3- $C_6H_3MePr^o \cdot OMe$ and 98% HNO_3 in Ac_2O at -2° to 3° give poor yields of 2:6-dinitro-3-methoxy-*p*-cymene (I), m.p. 56° (also prepared from the K salt of dinitrothymol and $KMeSO_4$ in glycerol at 180 — 200°), and 4:6-dinitro-*m*-cresol Me ether (by replacement of Pr^o). The odour of (I) is less pleasant than that of “*musc-ambrette*.” H. B.

[Application of the Friedel-Crafts reaction to methoxydiphenyl ether.] O. VON SCHICKH (Ber., 1936, 69, [B], 242—244).—Gradual addition of $AcCl$ and Ph_2O to sublimed $AlCl_3$ gives 4:4'-dichloroacetyldiphenyl ether (I), m.p. 102° , in 43% yield; its constitution is established by its oxidation by $KMnO_4$ to 4:4'-dicarboxydiphenyl ether, m.p. $>285^\circ$. [*Di-o-tolyl ether*, b.p. 146 — $147^\circ/11$ mm., is oxidised to the corresponding dicarboxylic acid, m.p. 210 — 217° . 3:3'-Dicarboxydiphenyl ether has m.p. 235 — 240° .] The new group does not invariably occupy the 4 position (if free). The directive influence of OMe for example may override that of the O between the Ph groups. H. W.

Polycyclic compounds related to the sterols.

V. Methoxy- and hydroxy-derivatives of phenanthrene. G. A. R. KON and F. C. J. RUZICKA (J.C.S., 1936, 187—192).— β -4-Methoxy-1-naphthylethyl alcohol, m.p. 87° , obtained from 1:4- $C_{10}H_6Br \cdot OMe$ and $(CH_2)_2O$, with PBr_3 gives the bromide (I), b.p. $161^\circ/1.2$ mm., which with Et cyclopentanone-2-carboxylate yields *Et* 2-(β -4-methoxy-1-naphthylethyl)cyclopentanone-2-carboxylate, b.p. 235 — $248^\circ/1.2$ mm., hydrolysed to α -(β -4-methoxy-1-naphthylethyl)adipic acid, m.p. 178° . The acid is pyrolysed to 4-methoxy-1-methylnaphthalene, b.p. $121^\circ/0.8$ mm., and not to the pentanone. (I) and cyclopentene oxide yield β -4'-methoxy-1'-naphthylethylcyclopentene, b.p. 150 — $160^\circ/0.02$ mm. [s - $C_6H_3(NO_2)_3$ complex, m.p. 107 — 108°], and α -di-(4-methoxy-1-naphthyl)-butane, m.p. 124° . The pentene and P_2O_5 give 9-methoxy-3:4-dihydro-1:2-cyclopentanophenanthrene, b.p. 185 — $186^\circ/0.8$ mm. [s - $C_6H_3(NO_2)_3$ complex, m.p. 166°]. (I) and 2-methylcyclopentanone afford 2-methyl-1- β -4'-methoxy-1'-naphthylethylcyclopentanol, b.p. 185 — $190^\circ/0.1$ mm., and another substance; the carbinol is cyclised to 9-methoxy-1-methyl-3:4-dihydro-1:2-cyclopentanophenanthrene, b.p. 165 — $170^\circ/0.1$ mm., dehydrogenated (Se) to 9-methoxy-1:2-cyclopentanophenanthrene, m.p. 129° [picrate, m.p. 124° ; s - $C_6H_3(NO_2)_3$ complex, m.p. 132°], trinitrotoluene complex, m.p. 105 — 106°]. The following are similarly obtained: 2:5-dimethyl-1- β -4'-methoxy-1'-naphthylethylcyclopentanol, b.p. 195 — $200^\circ/0.2$ mm., 9-methoxy-1:3'-dimethyl-3:4-dihydro-1:2-cyclopentanophenanthrene, b.p. 180 — $183^\circ/0.3$ mm. [picrate, m.p. 119 — 120° ; s - $C_6H_3(NO_2)_3$ complex, m.p. 140 — 141°], and 9-methoxy-3'-methyl-1:2-cyclopentanophenanthrene, m.p. 111° (picrate, m.p. 147°). 1:5- $C_{10}H_6Br \cdot OMe$ and $(CH_2)_2O$ give β -5-methoxy-1-naphthylethyl alcohol, m.p. 53 — 54° [with excess of $(CH_2)_2O$, a product, $C_{13}H_{10}O_5$, m.p. 128° , is obtained], converted (PBr_3) into the bromide (II), b.p. $180^\circ/1.7$ mm. The bromide similarly gives 2-methyl-1-(β -5-

*methoxy-1'-naphthylethyl*cyclopentanol, b.p. 190—195°/0.1 mm., and α -di-(5-methoxy-1-naphthyl)butane, m.p. 176°. The carbinol is dehydrated to 8-methoxy-1-methyl-3:4-dihydro-1:2-cyclopentanophenanthrene, b.p. 185°/0.3 mm., dehydrogenated to 8-methoxy-1:2-cyclopentenophenanthrene, m.p. 153° [picrate, m.p. 160°; $s\text{-C}_6\text{H}_3(\text{NO}_2)_3$ complex, m.p. 194°]. (II), Et malonate, and K give an ester, hydrolysed to β -5-methoxy-1-naphthylethylmalonic acid, m.p. 182° (decomp.), decarboxylated to γ -5-methoxy-1-naphthylbutyric acid, m.p. 143°. Cyclisation of this acid with SOCl_2 affords a compound, $\text{C}_{15}\text{H}_{14}\text{O}_2$, m.p. 88—89°, which does not form a semicarbazone and is demethylated to a substance, $\text{C}_{14}\text{H}_{14}\text{O}_3$, m.p. 155°; cyclisation with SnCl_4 yields 1-keto-8-methoxy-1:2:3:4-tetrahydrophenanthrene, m.p. 137°, demethylated to the hydroxy-ketone, m.p. 256°. (I), Et malonate, and Na yield an ester, b.p. 210°/3—5 mm., hydrolysed to β -4-methoxy-1-naphthylethylmalonic acid, m.p. 180° (decomp.), decarboxylated to γ -4-methoxy-1-naphthylbutyric acid, m.p. 131°. The acid is cyclised (AlCl_3) to 1-keto-9-methoxy-1:2:3:4-tetrahydrophenanthrene, m.p. 98°, demethylated to the hydroxy-ketone, m.p. 260°. F. R. S.

2-Hydroxyphenanthrene in coal tar. O. KRUBER (Ber., 1936, 69, [B], 246—247).—The isolation of 2-hydroxyphenanthrene, m.p. 168—169°, from a coal-tar fraction, b.p. 398—404°, is described. The "acid oil" content of the fraction is low in comparison with that of fractions of somewhat lower b.p.; pitch probably contains still less phenols.

H. W.

Diastereoisomeric naphthalene-1:5-disulphonylacetic acids. Equivalence of the 1:5-positions in naphthalene. F. GAJOWCZYK and J. SŁUSZKO (Bull. Acad. Polonaise, 1935, A, 349—359).—Oxidation of Et naphthalene-1:5-dithioglycollate (I) (Corbellini *et al.*, A., 1931, 748) with H_2O_2 -AcOH at room temp. affords *Et i-naphthalene-1:5-dithionylacetate*, $\text{CO}_2\text{Et}\cdot\text{CH}_2\cdot\text{SO}\cdot\text{C}_{10}\text{H}_6\cdot\text{SO}\cdot\text{CH}_2\cdot\text{CO}_2\text{Et}$, m.p. 168° (decomp.) (less sol. in C_6H_6), hydrolysed to the free *i-acid*, m.p. 235° (decomp.) [*brucine*, m.p. 179° (decomp.), $[\alpha]_{\text{D}}^{20} -8.9^\circ$ in CHCl_3 , *quinine*, m.p. 204° (decomp.), $[\alpha]_{\text{D}}^{20} -139^\circ$ in $\text{EtOH}\cdot\text{CHCl}_3$, and *cinchonine*, decomp. 175°, $[\alpha]_{\text{D}}^{20} -96.6^\circ$ in $\text{EtOH}\cdot\text{CHCl}_3$, salts], and, from the mother-liquor, the C_6H_6 -sol. *Et dl-naphthalene-1:5-dithionylacetate*, m.p. 153° (decomp.), hydrolysed to the *dl-acid*, m.p. 125° (decomp.). This is resolved by fractional crystallisation of its quinine salt from COME_2 into (+)-, m.p. 125—126° (decomp.), $[\alpha]_{\text{D}}^{20} +511^\circ$ in 1% NaOH [*quinine* salt, m.p. 158° (decomp.), $[\alpha]_{\text{D}}^{20} +61.2^\circ$ in $\text{EtOH}\cdot\text{CHCl}_3$] and from the mother-liquor, or better by fractionation of the *brucine* salt, (—)-*naphthalene-1:5-dithionylacetic acid*, m.p. 124—125° (decomp.), $[\alpha]_{\text{D}}^{20} -495.7^\circ$ in 1% NaOH [*brucine* salt, m.p. 187—188° (decomp.), $[\alpha]_{\text{D}}^{20} -183.8^\circ$ in $\text{EtOH}\cdot\text{CHCl}_3$]. The existence of a *dl*- and *i*-form proves the equivalence of the 1:5 positions in C_{10}H_8 , which must possess a centre of symmetry. Oxidation of (I) with excess of H_2O_2 at 70° affords the *Et* ester, m.p. 158°, of *naphthalene-1:5-disulphonylacetic acid*, m.p. about 300° (decomp.), which is obtained by hydrolysis. J. W. B.

Salt-forming properties of halogens. Reaction of univalent positive halogen compounds with unsaturated hydrocarbons. M. I. USCHAKOV, V. O. TSCHISTOV, and M. A. SCHLOSBERG (J. Gen. Chem. Russ., 1935, 5, 1391—1398).—Suspensions of Ag salts of different acids in CCl_4 react with I or Br as follows: $\text{R}\cdot\text{OAg} + \text{X}_2 = \text{R}\cdot\text{OX} + \text{AgX}$. Substances possessing the $\cdot\text{C}\cdot\text{C}\cdot$ group react with $\text{R}\cdot\text{OX}$ to yield compounds of the general type $\cdot\text{CX}\cdot\text{COR}$. The following substances have been prepared in this way: from cyclohexene: *iodocyclohexyl benzoate*, m.p. 54.5—56°; *bromo-*, m.p. 64—64.5°, and *chloro-*, b.p. 168—195°/14 mm., *-cyclohexylbenzoate*; *iodo-*, m.p. 92.3°, and *bromo-*, m.p. 81.5°, *-cyclohexyl m-nitrobenzoate*; *bromocyclohexyl acetate*, b.p. 108—111°/17 mm., *propionate*, b.p. 118.5°/6 mm., *n-butyrate*, b.p. 138°/8 mm., and *isovalerate*, b.p. 141—142°/9 mm.; *chlorocyclohexyl nitrate*, b.p. 108—109°/13 mm.; from C_2H_4 : β -*bromoethyl acetate*, b.p. 159—164°, and *nitrate*, b.p. 81.5°/43 mm.; from $\text{CHMe}\cdot\text{CH}_2$: β -*bromoisopropyl acetate*, b.p. 161—165°/750 mm., and *benzoate*, b.p. 152°/15 mm.; from styrene: β -*chloro- α -phenylethyl nitrate*, b.p. 107°/4 mm. R. T.

Configurative relationship of methylcyclohexylcarbinol to methylhexylcarbinol. P. A. LEVENE and S. A. HARRIS (J. Biol. Chem., 1935, 113, 55—59).—Et (—)- α -methoxypropionate is transformed by Mg_2 pentamethylene dibromide into (+)-1-*z-methoxyethylcyclohexanol*, b.p. 99—104°/22 mm., $[\alpha]_{\text{D}}^{20} +7.65^\circ$, which is not decomposed at about 205° and yields ill-defined products when distilled with KHSO_4 . When treated with K in anhyd. Et_2O followed by CS_2 and MeI and then distilled it gives (—)-1-*z-methoxyethyl- Δ^1 -cyclohexene*, b.p. 168—171°, $[\alpha]_{\text{D}}^{20} -12.43^\circ$ readily hydrogenated (Adams) in AcOH but not in C_5H_{12} to (+)- α -methoxyethylcyclohexane (I), b.p. 168—171°, $[\alpha]_{\text{D}}^{20} +2.93^\circ$. Synthetic (I) has $[\alpha]_{\text{D}}^{20}$ b.p. 170—171°, $[\alpha]_{\text{D}}^{20} +7.90^\circ$. The configurative relationship of *d*-methyl-*n*-hexylcarbinol to (I) is therefore established by chemical methods (cf. A., 1932, 1027—1028). H. W.

Reduction of the $\cdot\text{CH}(\text{OH})\cdot\text{CCl}_3$ grouping. A. N. MELDRUM and A. S. DATAR (Proc. Indian Acad. Sci., 1935, 2, A, 580—583).—This grouping in compounds of type $\text{NRR}\cdot\text{C}_6\text{H}_4\cdot\text{CH}(\text{OH})\cdot\text{CCl}_3$ (obtained by condensing amines with $\text{CCl}_3\cdot\text{CHO}$ at room temp. or at 50°) is reduced by $\text{Zn}\cdot\text{AcOH}$ to $\cdot\text{CH}_2\cdot\text{CHCl}_2$. The following are prepared. *N-Methyl-* (I), m.p. 77° (*Bz* derivative, m.p. 130°), *N-ethyl-* (II), m.p. 73° (*Bz* derivative, m.p. 75°), *NN-dimethyl-*, m.p. 76° (*picrate*, m.p. 138°), *NN-diethyl-* (*picrate*, m.p. 140°), and *N-benzyl-N-methyl-* (*picrate*, m.p. 132°) [from α -*p*-benzylmethylaminophenyl- $\beta\beta\beta$ -trichloroethyl alcohol, m.p. 85° (decomp.) (*hydrochloride*, decomp. 150°)] *-p*-($\beta\beta$ -dichloroethyl)aniline. The *NO*-derivative of (I), m.p. 87°, is reduced by Zn in $\text{EtOH}\cdot\text{AcOH}$ to α -methyl- α -*p*-($\beta\beta$ -dichloroethyl)phenylhydrazine *hydrochloride* (corresponding *PhCHO*-, m.p. 150°, and *glucose-*, m.p. 165°, *-phenylhydrazones*); the *NO*-derivative of (II), m.p. 50°, gives the similar α -ethyl-compound (corresponding *PhCHO-phenylhydrazone*, m.p. 110°). E. W. W.

***p*-Butylsaligenin.** R. V. RICE and W. C. HARDEN (J. Amer. Pharm. Assoc., 1936, 25, 7—9).— $\text{Pr}\cdot\text{CO}_2\text{H}$

treated with SOCl_2 followed successively by PhOH and AlCl_3 yields on fractional distillation $p\text{-OH}\cdot\text{C}_6\text{H}_4\cdot\text{COPr}^a$, reduced (Zn-HCl) to $p\text{-C}_6\text{H}_4\text{Bu}^a\cdot\text{OH}$ (*phenylurethane*, m.p. 113°), which affords (Reimer-Tiemann) 5-butylsalicylaldehyde, reduced (Adams) to *p-butylsaligenin*, m.p. 81° . F. O. H.

Liquid crystals of some cholesterol compounds. P. GAUBERT (Compt. rend., 202, 141—143).—The following compounds melted with cholesterol may give liquid crystals: resorcinol, pyrocatechol, phloroglucinol, pyrogallol, *p*-nitrophenol, saligenin, erythritol, phloridzin, saccharin, isosaccharin, rhamnose, nitrophthalic acid, and agaricic acid. The products are most easily obtained with equimol. proportions of the two components. Especially if quickly cooled, they may pass to a solid form preserving their optical anisotropy but gradually increasing in hardness. The melting of such hardened products is described.

B. W. R.

Liebermann-Burchard reaction velocities of sterols. I. Difference between free and ester cholesterol applied to the determination of cholesteryl esters. II. Test for coprostenol in plasma. J. G. REINHOLD (Amer. J. Med. Sci., 1935, 189, 302—303, 303).—I. Cholesteryl esters (I) and coprostenol (*allocholesterol*) develop colour with Ac_2O and H_2SO_4 more rapidly than does cholesterol (II). The difference is more marked at low temp. and with dil. H_2SO_4 , and disappears with high temp. and much acid. The Liebermann-Burchard reaction at 0° in presence of 0.025 c.c. of H_2SO_4 determines (I), a small correction being necessary for free (II). At 38° the total (II) is recorded.

II. Coprostenol is determined as (I). None occurs in plasma.

CH. ABS. (p)

Sexual hormones. XII. Amines of the androsterone series. L. RUZICKA and M. W. GOLDBERG (Helv. Chim. Acta, 1936, 19, 107—108).—Androsteroneoxime is reduced by Na and boiling EtOH to *cis*-17-amino-3-hydroxyandrostane, m.p. $187\text{--}188^\circ$ (hydrochloride, m.p. about 365° after much decomp.). Similarly *trans*- $\Delta^{5:6}$ -dehydroandrosterone gives *trans*- $\Delta^{5:6}$ -17-amino-3-hydroxyandrostene, m.p. $160\text{--}162^\circ$ [hydrochloride, m.p. about 300° (decomp.)]. Physiologically these compounds are much less active than the corresponding 17-OH-derivatives.

H. W.

Combined oestriol in human pregnancy urine.—See this vol., 503.

Colourless compounds which accompany carotenoids in plants.—See this vol., 533.

Catalytic reduction of aromatic carboxylic esters. See this vol., 436.

Hydrolysis of substituted benzoic esters.—See this vol., 432.

Preparation of calcium or ammonium salts of iodoxybenzoic acid. F. R. GREENBAUM (Amer. J. Pharm., 1936, 108, 17—22).—Very pure Ca *o*-iodoxybenzoate, free from the corresponding I- and IO-compounds and Cl, is obtained in excellent yield by oxidising *o*- $\text{C}_6\text{H}_4\text{I}\cdot\text{CO}_2\text{H}$ (prep. described) in dil. H_2SO_4 suspension with KBrO_3 at 85° . The crude acid is extracted with hot EtOH , dissolved in

NH_3 solution, decolorised with C, and pptd. as the Ca salt with CaCl_2 . S. C.

Halogenosulphobenzoic acids. M. POLACZEK (Rocz. Chem., 1935, 15, 578—582).—The position of the SO_3H of 2-bromo- (Ph_2 ester, m.p. $125\text{--}126^\circ$) and 2-chloro- (I) (Ph_2 ester) -5-sulphobenzoic acid has been established by conversion into 5-sulphosalicylic acid (II) by hydrolysis with 10% aq. K_2CO_3 at 170° , and comparison of its Ph_2 ester with that from synthetically prepared (II). (II) is obtained in 93% yield from *o*- $\text{C}_6\text{H}_4\text{Cl}\cdot\text{CO}_2\text{H}$ and 20% oleum (100° ; 3 hr.). R. T.

Preparation of 2-chloro-4-nitrobenzoic acid. A. ALBERT and W. H. LINNELL (J.S.C.I., 1936, 55, 54r).—In converting 4-nitro-*o*-toluidine (I) into *o*-chloro-*p*-nitrotoluene (II) by the Sandmeyer reaction, max. yields are realised only under carefully controlled experimental conditions. The by-products are 3:3'-dinitro-6:6'-dimethylazobenzene and 3:3'-dinitro-6:6'-dimethyldiphenyl. The oxidation of (II) to 2-chloro-4-nitrobenzoic acid (III) by $\text{K}_2\text{Cr}_2\text{O}_7$ proceeds best with 1.3 equivs. of the latter. Several unrecorded properties of (III) are given. The yields by this process are compared with those obtained by acetylating (I), oxidising with KMnO_4 , and then applying the Sandmeyer reaction. The identity of the 1:2:4-nitroanthranilic acid obtained as an intermediate with the so-called "1:2:5"-nitroanthranilic acid of Ullmann is shown, and a no. of unrecorded properties are given. The reactions (I) \rightarrow (III) gave lower yields in the case of the analogous Br-compounds.

Organic reactions with boron fluoride. XII. Preparation of esters of aromatic acids. F. J. SOWA and J. A. NIEUWLAND (J. Amer. Chem. Soc., 1936, 58, 271—272).— $\text{C}_6\text{H}_4\text{R}\cdot\text{CO}_2\text{Alk}$ are formed when $\text{C}_6\text{H}_4\text{R}\cdot\text{CO}_2\text{H}$ and AlkOH are heated with BF_3 (amount for max. yield varies with R) or $\text{BF}_3\cdot\text{Et}_2\text{O}$; in general, esterification occurs less readily than with AlkCO_2H (A., 1932, 728). The following are prepared: Me, Pr^{*β*}, Bu^{*α*}, Bu^{*β*}, and *sec*-Bu benzoates; *p*- $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{CO}_2\text{Me}$; *o*- and *p*- $\text{NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{CO}_2\text{Me}$; *o*- $\text{C}_6\text{H}_4\text{Cl}\cdot\text{CO}_2\text{Me}$; *o*- $\text{OH}\cdot\text{C}_6\text{H}_4\cdot\text{CO}_2\text{Me}$; *o*- $\text{OH}\cdot\text{C}_6\text{H}_4\cdot\text{CO}_2\text{Bu}^\beta$. Bu^{*γ*}OBz is not preparable.

H. B.

γ -Phenylbutyric acid. S. C. OVERBAUGH, C. F. H. ALLEN, E. L. MARTIN, and L. F. FIESER (Org. Syntheses, 1935, 15, 64—66).— $\text{CH}_2\text{Bz}\cdot\text{CH}_2\cdot\text{CO}_2\text{H}$ is reduced with Zn and HCl. CH. ABS. (r)

Asymmetric carbon atom CHDR'R". I. Constitution of a deuterio- β -phenylpropionic acid from cinnamic acid and deuterium. H. ERLMEYER and H. GÄRTNER (Helv. Chim. Acta, 1936, 19, 145—148).—Treatment of $\text{CHPh}\cdot\text{CH}\cdot\text{CO}_2\text{H}$ with nascent D causes complete replacement of H by D. Al_2S_3 and D_2O gives D_2S , transformed by I in D_2O into DI which, in presence of red P, converts $\text{CHPh}\cdot\text{CH}\cdot\text{CO}_2\text{H}$ into $\text{C}_6\text{H}_2_{18}\text{D}_{282}\cdot\text{C}_2\text{H}_{162}\text{D}_{238}\cdot\text{CO}_2\text{H}$ (I) which passes when treated with Br and subsequently heated into $\text{C}_6\text{H}_2_{18}\text{D}_{282}\cdot\text{C}_2\text{H}_0_{74}\text{D}_{126}\cdot\text{CO}_2\text{H}$ and is oxidised by KMnO_4 to $\text{C}_6\text{H}_2_{18}\text{D}_{282}\cdot\text{CO}_2\text{H}$. Attempts to resolve (I) into its optical antipodes have been unsuccessful. H. W.

Condensation of esters of unsaturated acids with carbamide. II. Z. JERZMANOWSKA-SIENKIEWICZOWA (Rocz. Chem., 1935, 15, 510—515).—CHPh·CH·CO₂Et and CO(NH₂)₂ (I) in EtOH in presence of NaOEt yield cinnamoylcarbamide (II) or cinnamamide (III), according to the conditions of the experiment. (II) affords cinnamic acid and (III) when heated with EtOH-NaOEt or MeOH-KOH, cyanuric acid and (III) when heated alone at 210—220°, and 6-phenyldihydrouracil when fused with (I) (180—185°; 2.5 hr.). Fumaric acid and (I) (135—140°; 2.5 hr.) yield biuret, triuret, and hydantoin-5-acetic acid. R. T.

o-Phenylpentadecic and χ -phenylbehenic acids. G. M. HILLS and R. ROBINSON (J.C.S., 1936, 281—283).—Condensation of Et sodio- ν -keto- μ -carboethoxymyristate and CH₂Ph·CH₂Cl and subsequent hydrolysis by 5% H₂SO₄ and then by 3.5% aq. KOH leads to ν -ketomyristic acid (46%; Et ester, b.p. 145—160°/0.5 mm., m.p. 28—29°), and ν -keto-o-phenylpentadecic acid (20%), m.p. 76—77° [semi-carbazone, m.p. 87—88°; Et ester (crude), m.p. 33—35°], reduced (Clemmensen) to o-phenylpentadecic acid, (I), m.p. 60—61°. κ -Phenyldecoyl chloride, b.p. 204°/14 mm. (decomp.) (anilide, m.p. 71—72°; gives the Et ester, b.p. 199°/13 mm.), leads similarly to ν -keto- χ -phenylbehenic acid, m.p. 81°, reduced to χ -phenylbehenic acid (II), m.p. 81° (Et ester, m.p. 53°). (I) and (II) cannot be injected and are unchanged when fed to rabbits. R. S. C.

Chemical constitution and local anæsthetic action of alkamine esters of p -alkoxybenzoic acids. C. ROHMANN and B. SCHEURLE (Arch. Pharm., 1936, 274, 110—126).—

p -OR·C₆H₄·CO₂·CH₂·CH₂Cl (I) (usually prepared from OR·C₆H₄·COCl and CH₂Cl·CH₂·OH) and NHET₂ at 110° give p -OR·C₆H₄·CO₂·CH₂·CH₂·NET₂ [isolated as the hydrochlorides (II)], which are local anæsthetics. The influence of R on the activity is Me < Et < H < Pr < Bu, isoamyl; Pr^a and Bu^a impart more activity than Pr^b and Bu^b. Introduction of NET₂ into R causes diminished activity. Increase in length of the alkamine group and introduction of Alk in the 3 position cause increased activity. The following are described: (I) R=H, m.p. 110°, Me, Et, m.p. 46°, Bu^a, m.p. 32°; (II) R=H, m.p. 183°, Me, m.p. 146°, Et, m.p. 174°, Pr^a, m.p. 137°, Pr^b, m.p. 128°, Bu^a, m.p. 147°, Bu^b, m.p. 131°, isoamyl, m.p. 128°, allyl, m.p. 130° (lit. 193°) [from p -C₃H₅O·C₆H₄·CO₂H (1 mol.), NET₂·CH₂·CH₂Cl (III) (1 mol.), and EtOH-NaOEt (2 mols.)], and β -diethylaminoethyl, m.p. 180° [from p -OH·C₆H₄·CO₂H and (III) in EtOH-NaOEt]. γ -Diethylaminopropyl p -ethoxybenzoate hydrochloride, m.p. 148°, is prepared from p -OEt·C₆H₄·COCl and Cl[CH₂]₃·OH followed by NHET₂. ε -Diethylaminoamyl anisate, p -ethoxybenzoate, and p -butoxybenzoate hydrochlorides, m.p. 131°, 82—83°, and 56°, respectively, are obtained from p -OR·C₆H₄·CO₂Na and (CH₂)₅Br₂ followed by NHET₂. Me p -allyloxybenzoate rearranges at 220—250° into Me 4-hydroxy-3-allylbenzoate, converted by Pr^aBr and KOH in COMeEt followed by hydrolysis (10% NaOH) into 4-propoxy-3-allylbenzoic acid, m.p. 138°, which with

(III) in EtOH-NaOEt gives the β -diethylaminoethyl ester (hydrochloride, m.p. 103°). H. B.

Aminohydroxy-acids and their degradation in the animal body. F. KNOOP, F. DITT, W. HECKSTEDEN, J. MAIER, W. MERZ, and R. HÄRLE (Z. physiol. Chem., 1936, 239, 30—46).— α -Amino- β -hydroxy-acids (I) are not degraded in the same manner as simple NH₂-acids, but are transformed by β -oxidation into N-free acids containing fewer C. α -Amino- β -keto-acids, presumably intermediate products of the degradation of (I), have a very high redox potential, much > that of ascorbic acid. CH₂Ph·CO·CH₂·CO₂Et is transformed by PhN₂Cl and NaOAc in EtOH-H₂O into the corresponding phenylhydrazone, C₁₈H₁₈O₃N₂, m.p. 67°, which is converted by hydrogenation (Pd-C in 5% HCl-EtOH followed by Pt-Fe in H₂O) and subsequent hydrolysis into α -amino- β -hydroxy- γ -phenylbutyric acid, decomp. 259° (Bz₁ derivative, decomp. 181°); (?) 2:5-dibenzyl-3:6-dihydropyrazine, m.p. 75—76°, is formed as by-product. CH₂Ph·CH₂·CHO and CH₂(CO₂H)₂ are condensed in C₅H₅N at 90° and the Na salt of the resulting acid, m.p. 103—104°, is transformed by Br into α -bromo- β -hydroxy- δ -phenyl-n-valeric acid, m.p. 94—95°. The corresponding Et ester, b.p. 157—163°/0.5 mm., is transformed by NaN₃ in EtOH-H₂O into the azido-ester, decomp. 100°/high vac., which is hydrolysed and then reduced (PtO₂ in anhyd. EtOAc) to α -amino- β -hydroxy- δ -phenyl-n-valeric acid, decomp. 246° (Bz₁ derivative, decomp. 196°). The Bz derivative, m.p. 175—176°, and the hydantoin, m.p. 191—193°, of hydroxyglutamic acid are described. α -NH₂ and α -OH-acids react with Pb(OAc)₄ in AcOH at 60—70° with loss of CO₂ and according to the principle of Criegee's glycol fission. Introduction of acyl into NH₂ or OH inhibits the reaction. Criegee's assumption that the method permits diagnosis of the groups ·NH·CH·CO₂H is therefore too general. After acylation, therefore, serines and isoserines can be distinguished from one another by Criegee's method. H. W.

Iodination of nitrotyrosine. H. BAUER and E. STRAUSS (Ber., 1936, 69, [B], 245—246; cf. A., 1935, 1122).—Slow passage of ICl vapour into a solution of l -tyrosine in dil. HCl at 10° gives 3:5-diiodotyrosine, decomp. 194°. Nitrotyrosine hydrochloride is converted similarly into 5-iodo-3-nitrotyrosine. H. W.

Synthesis of certain alkeines derived from mandelic and tropic acids. E. PŁĄZEK and Z. RODEWALD (Rocz. Chem., 1935, 15, 481—490).—The cyanohydrin obtained from CPhMe in Et₂O, AcOH, and KCN at 0° yields when heated with HCl (130°; 3 hr.) CH₂Cl·CHPh·CO₂H, the Me ester, b.p. 93°/0.4 mm., of which affords Me β -ethoxy- α -phenylpropionate (O-ethyltropate) (I), b.p. 98—100°/0.3 mm., when treated with NaOEt in EtOH. The acid has b.p. 132—134°/0.1 mm. (chloride, b.p. 88—89°/0.6 mm.; dimethylaminoethyl ester, b.p. 110—112°/0.1 mm.). β -Propoxy- α -phenylpropionic acid, b.p. 135—137°/0.15 mm. (chloride, b.p. 96—97°/0.3 mm.; Me ester, b.p. 108°/0.1 mm.; dimethylaminoethyl ester, b.p. 113°/0.1 mm.), is obtained analogously. Tropyl, b.p. 169—171°/0.4

mm. (picrate, m.p. 216—217°; picrolonate, m.p. 155—156°), and dimethylaminoethyl, b.p. 108—110°/0.2 mm. (picrolonate of methiodide, m.p. 139°), α -ethoxy- α -phenylacetate (O-ethylmandelate) have been prepared from the appropriate alcohols and ethoxy-phenylacetyl chloride, b.p. 84—85°/0.4 mm.; tropyl, b.p. 170—172°/0.4 mm. (picrate, m.p. 106°; picrolonate, m.p. 164°), and dimethylaminoethyl, b.p. 110—112°/0.2 mm. (picrate of methiodide, m.p. 162°), O-propylmandelate were obtained similarly from propoxyphenylacetyl chloride, b.p. 85—86°/0.8 mm.

R. T.

Manufacture of arylamides of 2-hydroxydiphenyl-3-carboxylic acid and of azo-dyes therefrom.—See B., 1936, 229.

Abnormal strength of 2:6-dihydroxybenzoic acids. W. BAKER (Nature, 1936, 137, 236).—The increased acidity of salicylic acid and its derivatives over that of BzOH and other hydroxybenzoic acids is probably due to chelation of the anion, which would hinder return of the proton and hence increase dissociation. By analogy with 2-nitroresorcinol, it is suggested that an ionised CO_2H can chelate with two o-OH groups.

L. S. T.

Decomposition of phenolic ethers. III. Thermal decomposition of piperonylic acid in presence of sand, acid clay, or active carbon. K. ONO and M. IMOTO (J. Chem. Soc. Japan, 1935, 56, 347—352).—When heated with the above catalysts at 260—280°/130—135 mm., piperonylic acid yields o- $\text{C}_6\text{H}_4(\text{OH})_2$ and a little pyrocatechol Me ether.

CH. ABS. (r)

Veratronitrile (3:4-dimethoxybenzonitrile). J. S. BUCK and W. S. IDE (Org. Syntheses, 1935, 15, 85—86).—3:4-(OMe) $_2\text{C}_6\text{H}_3\cdot\text{CHO}$ is converted into the oxime, which is then dehydrated with Ac_2O .

CH. ABS. (r)

Homoveratric acid. H. R. SNYDER, J. S. BUCK, and W. S. IDE (Org. Syntheses, 1935, 15, 31—34).—The prep. is described in detail.

CH. ABS. (r)

Stability of aqueous solutions of potassium hydrogen phthalate. I. HOFFMAN (J. Res. Nat. Bur. Stand., 1935, 15, 583—584).—1% aq. K H phthalate solution is permanently stable under laboratory conditions.

J. S. A.

Rabbits bile. I. α - and β -Lagodeoxycholic acid and lithocholic acid. S. KISHI (Z. physiol. Chem., 1936, 238, 210—220).—From the bile there have been isolated α -lagodeoxycholic acid (I), $\text{C}_{24}\text{H}_{40}\text{O}_4$, m.p. 156—157°, $[\alpha]_D^{25} + 80.21^\circ$ in 90% EtOH [Ba salt; Me ester, m.p. 107—108°, $[\alpha]_D^{25} + 73.97^\circ$ in 90% EtOH; Et ester, m.p. 135°; formyl derivative (II), m.p. 202°; Me ester of (II), m.p. 103—104°; acetate (III), m.p. 188—189°; Me ester of (III), m.p. 144°], β -lagodeoxycholic acid (IV), m.p. 213°, $[\alpha]_D^{25} + 37.43^\circ$ in 95% EtOH (Me ester, m.p. 175°; Et ester, m.p. 172°, $[\alpha]_D^{25} + 34.05^\circ$ in 90% EtOH), and lithocholic acid. (I) gives dehydrodeoxycholic acid when oxidised with CrO_3 in AcOH and deoxybiliary acid when oxidised with HNO_3 . Heated at 320°/about 12 mm. and distilled in a high vac. (I) gives a choladienic acid, m.p. 135—137°, which with $\text{H}_2\text{-PtO}_2$ gives cholanolic acid. (IV) with CrO_3 in

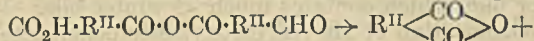
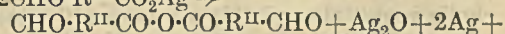
AcOH gives a dehydro-acid, m.p. 222—223°, $[\alpha]_D^{25} + 87.21^\circ$ in 90% EtOH (Me ester, m.p. 136—138°).

W. McC.

Fused rings. I. P. C. MITTER and D. K. BANERJI (Ber., 1936, 69, [B], 456—458).—Et 2-methylcyclopentan-1-one-2-carboxylate, $\text{CO}_2\text{Et}\cdot\text{CHBr}\cdot\text{CH}_2\cdot\text{CO}_2\text{Et}$, and Zn wool activated by I in anhyd. C_6H_6 give a mixture of unsaturated and OH-ester transformed by P_2O_5 in boiling C_6H_6 into the unsaturated ester, $\text{C}_{17}\text{H}_{26}\text{O}_6$, b.p. 176—178°/3 mm., which is hydrogenated ($\text{PtO}_2\text{-EtOH}$) to Et $_2$ 2-carbethoxy-2-methylcyclopentylsuccinate (I), b.p. 173—175°/4 mm. (I) with Na in boiling C_6H_6 affords Et $_2$ 7-methyldicyclo-[0:3:3]-octan-1-one-2:3-dicarboxylate, b.p. 150—178°/3 mm. (slight decomp.) (semicarbazone, m.p. 195°), hydrolysed by KOH-EtOH to the corresponding non-cryst. acid, which slowly yields a semicarbazone, decomp. 198—200°.

H. W.

Thermal decomposition of the silver salts of carboxylic acids. II. Experimental evidence of the reaction mechanism. S. J. KANEVSKAJA, M. M. SCHEMJAKIN, and E. M. BANDASS-SCHEMJAKINA (Ber., 1936, 69, [B], 257—265; cf. A., 1934, 1219).—Isolation of intermediate products and their behaviour when heated with Ag_2O shows that thermal decomp. of the Ag salts of aldehydocarboxylic acids follows the course: $2\text{CHO}\cdot\text{R}^{\text{II}}\cdot\text{CO}_2\text{Ag} \rightarrow$



$\text{R}^{\text{I}}\cdot\text{CHO} + \text{CO}_2$. Cautious heating of Ag opianate affords opianic anhydride (I) and products among which hemipinic anhydride (II) is identified. Treatment of (I) at a higher temp. with excess of Ag_2O yields about 30% of (II) and 20% of veratraldehyde. About 21% of (I) remains unchanged and 5% of opianic acid is isolated. Similarly, Ag bromopianate yields about 16% of bromo-opianic anhydride, about 25% of bromoveratraldehyde, 0.2% of bromohemipinic anhydride, and 20% of bromohemipinic acid (probably a secondary product formed from traces of H_2O in the Ag salt and the anhydride); bromoveratric acid does not appear to be formed. Bromohemipinimide has m.p. 236—237°.

H. W.

Choleic acid [complexes]. K. YAMASAKI (J. Biochem. Japan, 1935, 22, 243—249).—The mixed m.p. method (A., 1929, 925) indicates the formation of a 4:1 deoxycholic acid (I)- β -carotene complex, m.p. 167°. Treatment of the unsaponifiable fraction of cod-liver oil with EtOH-(I) yields complexes of (I) with high alcohols (mainly selachyl). The fraction, m.p. 185°, converted into the xylene derivative and hydrogenated, affords batyl alcohol (II). M.-p. curves indicate a (I)-(II) (8:1) complex, m.p. 186.5°; such a complex, m.p. 186—187°, $[\alpha]_D^{25} + 47.37^\circ$ in EtOH, crystallises from (I)+(II) in aq. EtOH. F. O. H.

Toad bile. III. Trihydroxyisosterocholenic acid, $\text{C}_{28}\text{H}_{46}\text{O}_5$, from winter bile. IV. Constitution of trihydroxybufosterocholenic acid. T. SHIMIZU and T. KAZUNO (Z. physiol. Chem., 1936, 239, 67—73, 74—75; cf. A., 1934, 1219).—III. Exhaustive extraction of the bile with Et_2O , directly or after saturation with CO_2 , and further acidification

with AcOH or mineral acid gives trihydroxybusterocholenic acid (I), which is removed as the cryst. Me ester; fractionation of the mother-liquors with 0.1*N*-NaOH affords trihydroxyisosterocholenic acid (II), $C_{28}H_{46}O_5$, m.p. 227°, $[\alpha]_D^{20} +46.95^\circ$ in MeOH, which contains three *sec*.-OH and one double linking, adds Br, and decolorises $KMnO_4$. (II) gives a Me ester, m.p. 220°, and is oxidised by CrO_3 in AcOH to triketoisosterocholenic acid (III), $C_{28}H_{40}O_5$ (Me ester, m.p. 184–186°, and its trioxime, decomp. 231°). Reduction of (III) with Zn–Hg in AcOH–HCl gives isosterocholenic acid, $C_{28}H_{46}O_5$, m.p. 186.5–187° (Me ester, m.p. 117°), which adds Br, decolorises $KMnO_4$, does not give the Liebermann reaction, and is hydrogenated (PtO₂ in EtOH) to isosterocholenic acid, m.p. 149–149.5° (Na and K salts; Me ester, m.p. 90–90.5°). Reduction (PtO₂ in AcOH) of (II) affords trihydroxyisosterocholenic acid, m.p. 200° after marked softening at 133°, $[\alpha]_D +38.96^\circ$ in MeOH (Me ester, m.p. 162°), which is oxidised by CrO_3 in AcOH to triketoisosterocholenic acid, m.p. 234° (Me ester, m.p. 223–224°), also formed by hydrogenation (Pd-black in EtOH) of (III). Bromination of (II) in AcOH yields a Br-lactone, $C_{28}H_{45}O_5Br$, m.p. 202°, insol. in NH_3 ; (II) therefore appears to contain the double linking in the side-chain and in the δ -position to CO_2H . (II) does not give the Hammarsten reaction so that the three OH are not in the same position as in (I) or cholic acid. (I) and (II) can be readily isolated from summer bile, which contains much < winter bile.

IV. Ozonisation of Me trihydroxyisosterocholenate in cold AcOH or oxidation of it with CrO_3 in warm solution gives products which do not depress the m.p. of α -bisonorcholenic acid and its Me ester. The double linking of (I) is therefore in the δ -position to the CO_2H of the side-chain.

H. W.

Lichen substances. LXIII. Components of *Baomyces* varieties. Y. ASAHINA, Y. TANASE, and I. YOSIOKA. **LXIV. Constitution of thamnolic acid.** IV. Y. ASAHINA and M. HIRAIWA. **LXV. Ramalinolic acid, a new depside.** Y. ASAHINA and T. KUSAKA (Ber., 1936, 69, [B], 125–127, 330–333, 450–455).—LXIII. Extraction of *B. placophyllus*, Ach., with Et₂O followed by $COMe_2$ affords stietic acid, m.p. 272° (decomp.) after softening at 230°. Similar treatment of *B. rosens*, Pers., yields baomycesic acid, (I) decomp. 222° [anil, m.p. 211° (decomp.)] (cf. Koller, *et al.*, A., 1935, 1432). Me baomycesate, m.p. 207°, is reduced (Pd–C in AcOH) to Me barbatate; since it is also formed by the partial methylation of atranorin, (I) is 4-3'-hydroxy-4'-aldehydo-5'-methoxy-*o*-toluoyl-2-hydroxy-3 : 6-dimethylbenzoic acid.

LXIV (cf. A., 1929, 818; 1932, 275). Examination of technical thamnolic acid (II), obtained by extraction of *Cladonia polydactyla* with $COMe_2$, discloses the presence of decarboxylthamnolic acid (III), m.p. 215° (decomp.) (anil; *p*-nitrophenylhydrazone, m.p. 219°), also obtained when (II) is heated in $COMe_2$ at 120–130. (III) and CH_2N_2 in $COMe_2$ at 0° give the Me ester, m.p. 163°, whereas treatment of (III) with MeI and Ag_2CO_3 in Et₂O gives the Me ester Me₂ ether, m.p. 183°. Exhaustive treatment of (III) with Ag_2O and MeI in boiling Et₂O yields the Me ester Me₃ ether, m.p.

154° transformed by boiling 95% HCO_2H into Me *H* orcinoldicarboxylate Me₂ ether, m.p. 124° (converted at 200° into Me *p*-orsellinate Me₂ ether, m.p. 84°), and thamnol Me₂ ether, m.p. 104° (semicarbazone, m.p. 216°), which dissolves in KOH to a yellow solution, does not give a colour with $FeCl_3$, and is unaffected by H_2O_2 in alkaline solution. (II) is therefore 6-4'-carboxy-3'-hydroxy-5'-methoxy-*o*-toluoyl-4-aldehydo-3 : 5-dihydroxy-*o*-toluic acid.

LXV. Exhaustive extraction of the thalli of *Ramalina farinacea*, Ach., var. *nervulosa*, Müll. Arg., with Et₂O affords sekikaic acid, the mother-liquors of which contain ramalinolic acid (IV), $C_{23}H_{28}O_8$, m.p. 163–164°, which gives an intense blood-red colour with alkali in EtOH, a violet-red colour with $FeCl_3$, but no colour with $CaOCl_2$. It is hydrolysed by alkali to divaricatic acid and an acid, $C_{12}H_{16}O_5$, m.p. 163°. Prolonged treatment of (IV) with CH_2N_2 in Et₂O yields the corresponding Me ester Me₃ ether, m.p. 75°, hydrolysed by KOH–EtOH to divaricatic acid Me ether, m.p. 63.5°, and Me amylpyrogallolcarboxylate Me₂ ether (V), m.p. 72–73°. Et 3 : 4 : 5-trimethoxybenzoylacetate is converted by Na and Pr^oI in EtOH into Et α -3 : 4 : 5-trimethoxybenzoyl-*n*-valerate, b.p. 214–216° (trimethoxyphenylpropylpyrazolone, m.p. 223–224°), hydrolysed by 10% KOH–EtOH to 3 : 4 : 5-trimethoxyvalerophenone (VI), b.p. 190–192°/6 mm. (semicarbazone, m.p. 145–146°). Treatment of (VI) with conc. H_2SO_4 at 38° leads to 4-hydroxy-3 : 5-dimethoxyvalerophenone, m.p. 89–90° (oxidised by $K_2Cr_2O_7$ and 10% H_2SO_4 to 2 : 6-dimethoxy-*p*-benzoquinone), which is reduced (Clemmensen) to 4-hydroxy-3 : 5-dimethoxy-1-*n*-amylbenzene (VII), b.p. 175°/7 mm. (Bz derivative, m.p. 89°). (VII) is converted by HCN–HCl– $AlCl_3$ into 3-hydroxy-2 : 4-dimethoxy-6-*n*-amylbenzaldehyde, m.p. 52°, which is treated with $ClCO_2Et$ in C_5H_5N at –15° and then oxidised by $KMnO_4$ in $COMe_2$ whereby 3-carbethoxy-2 : 4-dimethoxy-6-*n*-amylbenzoic acid, m.p. 110–111°, is produced, transformed by CH_2N_2 and subsequent hydrolysis into (V). (IV) is therefore 5-2'-hydroxy-4'-methoxy-6'-propylbenzoyl-4 : 6-dihydroxy-2-amylbenzoic acid.

H. W.

Acids contained in the wood of *Libocedrus formosna*, Florin.—See this vol., 395.

Interaction of hydrogen sulphite derivatives of aromatic aldehydes with potassium cyanide. S. SCHUSTER (J. Pharm. Chim., 1936, [viii], 23, 142–145).—The Na_2SO_3 compound of PhCHO with KCN gives OH·CHPh·CN and a 12% yield of *N*-benzylidenemandelamide [*Ac* derivative, m.p. 121° (block)], converted by HCl in Et₂O into a *Cl*-derivative. $C_{15}H_{12}ONCl$, m.p. 164°, converted by alkalis into 2 : 4-diphenylloxazole. Similarly the Na_2SO_3 derivative of *p*-OMe· C_6H_4 ·CHO gives a substance, $C_{25}H_{24}O_5N_2$, m.p. 154° (block), and resinous products.

J. W. B.

Action of acid chlorides on Schiff's bases. Additive products of these bases. I. TANASESCU and A. SILBERG (Bull. Soc. chim., 1936, [v], 3, 224–239).—Schiff's bases, CHR·NPh, and acid chlorides, R'·COCl, in neutral solvents ppt. hydrochlorides, CHR·NPh}Cl (I) and NH_2Ph ·HCl in varying proportions, whilst the solution contains R·CHO,

$R'-CO_2H$, and $R'-CO-NHPh$. Reaction does not occur in complete absence of H_2O and depends on hydrolysis first of $R'-COCl$ and then of (I) (demonstrated on the isolated compound). Experiments are quoted in which $R=Ph$, *o*-, *m*-, and *p*- $NO_2-C_6H_4$, $R'=Me$, Ph , *m*- $NO_2-C_6H_4$. Addition to Schiff's bases occurs on the N; reaction with Br proceeds thus: $CHR:NPhBr_2 \rightarrow HBr + [CHR:NPhBr]OH \rightarrow$

$OH \cdot CHR:NPhBr \rightarrow R \cdot CHO + H_2O + NHPhBr \rightarrow$
 $NH_2 \cdot C_6H_4Br$ (II), followed possibly by bromination of $R \cdot CHO$ or (II). *Hydrochlorides of benzyldene*-, m.p. 176°, *m*-, m.p. 181° after previous sintering, *o*-, m.p. 156°, and *p*-nitrobenzyldene-aniline, m.p. 190—193°, are described. R. S. C.

Hydrogen cyanide. VI. Mechanism of Gattermann's hydrogen cyanide aldehyde synthesis. L. E. HINKEL, E. E. AYLING, and J. H. BEYNON (J.C.S., 1936, 184—185).—Resorcinol (I), HCN, and HCl at room temp. give resorcyraldehyde (72%), and at 0°, the solid, m.p. 166—170° (decomp.), first formed, corresponds with a mixture of aldimine hydrochloride and dichloromethylformamide hydrochloride. Iminoformylcarbylamine, HCl, and (I) yield *resorcyldimethylformamidinium hydrochloride*, m.p. 135° (decomp.), decomposed by H_2O-HCl to the aldehyde, and also obtained from (I) and chloromethyleneformamidinium. This confirms the primary reaction as tendency to form iminoformyl chloride before derivatives of the dimeride. F. R. S.

Phenylglyoxal. H. L. RILEY and A. R. GRAY (Org. Syntheses, 1935, 15, 67—69).— $COPhMe$ is oxidised with SeO_2 . CH. ABS. (r)

Benzoin reaction. V. Effect of inhibitors on the reaction. B. F. FERREIRA and T. S. WHEELER (Proc. Indian Acad. Sci., 1935, 2, A, 604—614).—The rate of reaction of $PhCHO$ and solid KCN in presence of S (cf. A., 1935, 1329) and the inhibition caused by benzoquinone, I, $PhCNS$, and CS_2 are studied. Inhibition is due to adsorption of inhibitors on the KCN. $PhCHO$ (containing inhibitors) may be purified by keeping with a small quantity of KCN, under N_2 , and filtering, after which it gives improved yields of benzoin; 0.1 g. of KCN purifies 50 g. of $PhCHO$. E. W. W.

Kinetics of gaseous Diels-Alder reactions.—See this vol., 297.

Kinetics of the benzoin reaction in presence of organic solvents.—See this vol., 297.

Structure and absorption spectra of benzocycloalkanoneoximes. (MME.) P. RAMART-LUCAS and J. HOCH (Compt. rend., 1935, 201, 1387—1390).—Absorption spectra indicate that the oximes of indan-1-one, 2:2-dimethylindan-1-one, and α -tetralone have the $C=N \cdot OH$ structure, but that of 2:2-dimethyl-1-tetralone has the *isooxime* structure, $C \begin{smallmatrix} \text{NH} \\ \diagup \end{smallmatrix} \diagdown O$. Benzocycloheptan-1-oneoxime exists mainly in the $N \cdot OH$, but its 2:2- Me_2 derivative mainly in the *isooxime*, form. The structure of the oxime is thus dependent on the influence of valency angles on the elimination of H_2O from $OH \cdot CRR' \cdot NH \cdot OH$, which is the primary product from a ketone and NH_2OH . R. S. C.

α -Tetralone (α -ketotetrahydronaphthalene). E. L. MARTIN and L. F. FIESER (Org. Syntheses, 1935, 15, 77—79).— $Ph \cdot [CH_2]_3 \cdot COCl$ is treated with $AlCl_3$ in CS_2 . CH. ABS. (r)

Ternary catalyst $Cu-ZnO-Cr_2O_3$ as hydrogenation catalyst.—See this vol., 298.

Molecular conversion of ketones into [different] ketones by the action of zinc chloride at high temperatures. M. A. FAVORSKI [with (MLLE.) T. E. ZALESSKAJA, D. I. ROSANOV, and G. V. TSHELINCEV] (Bull. Soc. chim., 1936, [v], 3, 239—248).—Ketones, $CR_3 \cdot COPh$ (R is aliphatic), with $ZnCl_2$ at about 320° give $CPhR_2 \cdot COR$, but ketones with no *tert*-C decompose. Isomerisation may proceed by way of an oxide or by direct interchange of position between O and two radicals. $COPhEt$ with $ZnCl_2$ at 320—330° gives CO , CO_2 , $BzOH$, $EtCO_2H$, H_2O , C_2H_4 , C_6H_6 , $PhPr$, and $CHPh \cdot CHMe$; pyrolytic decomp., hydrolytic fission of the ketone, reduction to the hydrocarbon and alcohol, and dehydration of the alcohol must occur simultaneously. *cycloHexyl Ph ketone* (*semicarbazone*, m.p. 167°), obtained from *cyclohexylphenylcarbinol*, with $ZnCl_2$ at 350—450° gives CO and *phenylcyclohexane*, b.p. 247—249°. $MgBu^iBr$ and $PhCHO$ give *phenyl-tert-butylcarbinol*, m.p. 44—45°, oxidised to *Ph Bu^i ketone*, b.p. 109°/22 mm. (*semicarbazone*, m.p. 159°), which with $ZnCl_2$ at 320—330° gives α -phenylisopropyl *Me ketone*, b.p. 97—98°/11 mm. (*semicarbazone*, m.p. 190—191°; oxidised by $NaOBr$ to $CPhMe_2 \cdot CO_2H$). $CMe_2Et \cdot MgCl$ and $PhCHO$ give *phenyl-tert-amylcarbinol*, b.p. 112—114°/8.5 mm., m.p. 22°, oxidised by CrO_3 to *Ph tert-amyl ketone*, b.p. 112°/10 mm. (*semicarbazone*, m.p. 127—128°), which with $ZnCl_2$ at 320—330° gives β -phenyl-sec-butyl *Me ketone*, b.p. 114—116°/13 mm. (*semicarbazone*, m.p. 177—178°; with $NaOBr$ gives α -phenyl- α -methylbutyric acid, m.p. 64°). R. S. C.

Reactions of benzoyl chloride [fluoride]. C. L. TSENG and S. W. MAI (J. Chinese Chem. Soc., 1936, 4, 22—26).— BzF (prep. from $BzCl$ and KHF_2 in a Cu retort in 67—80% yield) is unstable and attacks glass if slightly impure; with $(NH_4)_2CO_3$ it gives NH_2Bz and with C_6H_6 and freshly prepared $AlCl_3$ in CS_2 gives 64% of $COPh_2$ more readily than does $BzCl$. R. S. C.

5:5-Dimethyl-1:3-hexanedione (5:5-dimethyldihydroresorcinol). R. L. SHRINER and H. R. TODD (Org. Syntheses, 1935, 15, 14—16).—A modified prep. from $CMe_2 \cdot CHAc$ and $CH_2(CO_2Et)_2$ is described. CH. ABS. (r)

Action of selenium dioxide on some cyclanones. M. GODCHOT and (MLLE.) G. CAUQUIL (Compt. rend., 1936, 202, 326—328; cf. A., 1932, 833).—*cyclo-Hex*-, *-hept*-, and *-oct*-anone with SeO_2 in $EtOH$ at 80° give 1:2-diones. The following are prepared similarly: 4-methyleyclohexane-1:2-dione, m.p. 37—38° [*dioxime*, m.p. 195—196° (Bz_2 derivative, m.p. 218°); *diphenylhydrazone*, m.p. 148°; affords β -methyladipic acid with H_2O_2]; 4-ethoxy-5-keto-2-methyl- Δ^6 -cyclohexene, b.p. 118°/20 mm., is formed by a side reaction], and *cycloheptane*-1:2-dione, b.p. 107—109°/17 mm. [*diphenylhydrazone*, m.p. 135°; *dioxime*, m.p. 181—

182°; oxidised to pimelic acid). 2-Methylcyclohexanone affords 2:3-diketo-1-methyl- Δ^6 -cyclohexene, b.p. 92—93°/16 mm. (diphenylhydrazone, m.p. 150°), which probably results from the dehydration of 3-hydroxy-3-methylcyclohexane-1:2-dione. cyclo-Octanone similarly affords 8-ethoxycyclooctane-1:2-dione, b.p. 133—135°/15 mm. J. L. D.

Methyl β -m-nitrophenyl- β -hydroxyethyl and m-nitrostyryl ketones. W. KRASZEWSKI and B. WEICÓWNA (Rocz. Chem., 1935, 15, 506—509).—m-NO₂·C₆H₄·CHO and COMe₂ in presence of 1% NaOH at room temp. yield a trimeride of m-nitrostyryl Me ketone, m.p. 232° (phenylhydrazone, m.p. 183°), also obtained, together with β -m-nitrophenyl- β -hydroxyethyl Me ketone (I), m.p. 62° (benzoate, m.p. 107°; semicarbazone, m.p. 162°), which is the sole product at +5°. (I) yields m-nitrostyryl Me ketone, m.p. 90° (semicarbazone, m.p. 223°; Br-derivative, m.p. 112°), with Ac₂O (1 hr. at the b.p.). R. T.

Chrysene. I. K. FUNKE and E. MÜLLER. II. K. FUNKE, E. MÜLLER, and L. VADASZ (J. pr. Chem., 1936, [ii], 144, 242—250, 265—272).—I. Chrysene (I), BzCl, and AlCl₃ in CS₂ give (probably) 2-benzoylchrysene (II), m.p. 191° [7:8-quinone, m.p. 249—250°, formed on oxidation (Na₂Cr₂O₇, AcOH)], which is reduced (Clemmensen) to 2-benzylchrysene, m.p. 200°, and converted by AlCl₃ at 130° into (probably) a naphthobenzanthrone (not characterised). (I), AcCl, and AlCl₃ in CS₂ afford 1-, m.p. 254°, and 2- (III), m.p. 144°, -acetylchrysene, reduced (Clemmensen) to 1-, m.p. 236°, and 2-ethylchrysene, m.p. 126° (Br-derivative, m.p. 122°), respectively. (III) is oxidised (NaOCl) to chrysene-2-carboxylic acid, m.p. 308° (lit. 303°) [chloride (IV), m.p. 167°; Et ester, m.p. 124° (indef.)], also prepared by Liebermann and Zsuffa's method (A., 1911, i, 202). (IV), C₆H₆, and AlCl₃ give (II).

II. BzCl (excess), (I), and AlCl₃ afford two dibenzoylchrysenes, A, m.p. 208° [also obtained from (II), BzCl, and AlCl₃ in CS₂], and B, m.p. 252°. Dibromochrysene, m.p. 270° [from (I) and Br in CCl₄], and Cu₂(CN)₂ in quinoline give dicyanochrysene, m.p. >360°, hydrolysed (powdered KOH in MeOH at 200°) to chrysenedicarboxylic acid, m.p. >360° [chloride (V), m.p. >360°, best prepared using BzCl; Et ester, m.p. 169°; amide; anilide, m.p. >360°], which could not be converted into an anhydride. Bromo-2-benzoylchrysene, m.p. 176° [from (II) and Br in AcOH], is similarly converted into the nitrile, m.p. 207°, of 2-benzoylchrysenedicarboxylic acid, m.p. 286° (previous sintering), the chloride of which could not be prepared. (V), C₆H₆, and AlCl₃ give dibenzoylchrysene-C, m.p. 232°, reduced (Clemmensen) to dibenzylchrysene-C, m.p. 254°. (V) and N₂H₄·H₂O afford a compound, C₄₀H₃₀O₄N₆, m.p. >360°. The colours of most of the above compounds in conc. H₂SO₄ are given. H. B.

Synthesis of substances related to the sterols. VIII. A ketomethoxymethylhexahydrophenanthrene. R. ROBINSON and J. WALKER (J.C.S., 1936, 192—195).—The Na compound of Me γ -acetyl- α -methylbutyrate, b.p. 110—112°/24 mm., and γ -methoxyphenylbutyryl chloride yield Me γ -methoxyphenylbutyrate and Me 5-keto-8-m-methoxy-

phenyloctane-2-carboxylate (I), b.p. 210°/1 mm. (I) and NaOEt give a dihydroresorcinol derivative, which with P₂O₅ affords 1-keto-7-methoxy-2-methyl-1:2:3:4:9:10-hexahydrophenanthrene (II), m.p. 67—68° (2:4-dinitrophenylhydrazone, m.p. 221°), mixed with some 4-Me isomeride. (I) and H₂SO₄ at -15° give Me γ -6-methoxy-3:4-dihydro-1-naphthyl- α -methylbutyrate, b.p. 181—183°/0.5 mm., the corresponding chloride being cyclised by Darzens' reaction. The ketone obtained is identical with (II); this method proves the constitution but the first method is to be preferred for prep. F. R. S.

Sexual hormones and related substances.

VII. Carboxylic derivatives of the follicle hormone. VIII. Catalytic hydrogenation of the follicle hormone and its acyl derivatives. W. DIRSCHERL (Z. physiol. Chem., 1936, 239, 49—52, 53—66).—VII. Follicle hormone (I) is largely unaffected by treatment with an equiv. amount of (C₅H₅N)₂COCl₂ in C₆H₆ but is quantitatively transformed by an excess of the reagent at 70—75° into the chloroformate (II), m.p. 101—102° (corr.). (II) is converted by EtOH at 80° into the corresponding Et carbonate, m.p. 115° (corr.), [α]_D²⁵ +114° in dioxan, also obtained from (I) and ClCO₂Et in C₆H₆-C₅H₅N at 70—75°. (II) is transformed by MeOH into the Me carbonate, m.p. 127° (corr.), and by NHET₂ in C₆H₆ into the diethylcarbamate, m.p. 194—195° (corr.). (I) and COCl₂ in alkaline solution afford the normal carbonate, m.p. 247° (corr.), and (II). (II) is about 10 times as active physiologically as (I), excelling all other hormone esters in this respect.

VIII. Hydrogenation of 17-keto-3-hydroxy- $\Delta^{1:3:5}$ -cestratriene (III) (PtO₂-EtOH; room temp.) affords the dehydrohormone (IV), m.p. 174—175°, [α]_D²⁵ +82° in dioxan, which is 5—10 times as active as (III). Similar results are obtained at 70°, in EtOH-H₂O at room or elevated temp. or when PtO₂ is reduced to Pt before hydrogenation, whereas hydrogenation does not occur with Pt-black under these conditions. Under like circumstances (IV) is also derived from the Bz, Ac, ClCO₂, or EtCO₂-derivative of (III). Hydrogenation (PtO₂) of (I) in EtOH-HCl gives a small amount of (IV) and unchanged (III) but essentially affects the nucleus; the isolation of two octahydrohormones, m.p. 210—211° (corr.), [α]_D²⁵ +7.2° in EtOH (V), and m.p. 154—155°, [α]_D²⁵ +31.4° in EtOH, respectively, and of two deoxohexahydrohormones, m.p. 104—105° after softening at 100°, [α]_D²⁵ +1.8° in EtOH, and m.p. 96—100°, [α]_D²⁵ +12.3° in EtOH, respectively, is described. Hydrogenation of (III) in AcOH affords (V) and lower-melting isomerides of it, deoxohexahydrohormones, and, apparently, a hexahydrohormone which yields a semicarbazone, m.p. 255°, [α]_D²⁵ +77.2° in CHCl₃-EtOH (3:1). In 60% or 80% AcOH hydrogenation proceeds similarly but yields the products in different ratio. In 80% AcOH at 40° the main product is a mixture of ketones from which a hexahydrohormone-2:4-dinitrophenylhydrazone, m.p. 105—110°, and a semicarbazone, m.p. 255°, [α]_D²⁵ +46° in EtOH, are derived. H. W.

Sexual hormones. XI. Partial hydrolysis of cis-trans-androstane-3:17-diol and its partial esterification. Specificity of sexual hormone

action. L. RUZICKA and M. W. GOLDBERG (Helv. Chim. Acta, 1936, 19, 99—106).—Partial hydrolyses of *cis-trans*-androstan-3 : 17-diol diacetate with KOH—EtOH gives *cis-trans*-androstan-17-ol 3-acetate, m.p. 183—184°. Partial esterification of *cis-trans*-androstan-3 : 17-diol with 90% AcOH or Ac₂O in C₅H₅N gives good yields of *cis-trans*-androstan-3-ol 17-acetate, m.p. 191—192° (corr.), oxidised by CrO₃ in AcOH to *androstan-3-one* 17-acetate, m.p. 158° (corr.), whence *trans-androstan-3-one*-17-ol (I), m.p. 180—181° (corr.), which is physiologically somewhat less active than testosterone (II). Comparison of the action of derivatives of (I) shows that 17-methyltestosterone, not observed naturally, is physiologically more active than (II) and that chemical structure has little specificity in the male hormone action. *cis*-Androstenediol 3-acetate is transformed by BzCl in C₅H₅N into *cis-trans-androstenediol-3-acetate* 17-benzoate, m.p. 198—199° (decomp.), which when partly hydrolysed by KOH—MeOH affords *cis-androstenediol* 17-benzoate, m.p. 203—204° (corr.) (the use of a difficultly hydrolysable acid residue at C-17 is particularly useful, but traces of the 3-acetate are observed), oxidised to *androstan-3-ol* 17-benzoate, m.p. 200—201° (corr.), hydrolysed to (I). H. W.

17-Ethylandrostenediol and 17-ethyltestosterone. A. BUTENANDT, H. COBLER, and J. SCHMIDT (Ber., 1936, 69, [B], 448—450).—Dehydroandrosterone is converted by MgEtI in Et₂O into Δ^{5,6}-17-ethylandrosten-3 : 17-diol, m.p. 198° (also +1H₂O) (cf. Ruzicka *et al.*, this vol., 76), which is treated successively with Br and CrO₃ in AcOH and debrominated by Zn dust in MeOH thereby giving 17-ethyltestosterone, m.p. 149° after softening at 144°, [α]_D²⁰ −35.3° in abs. EtOH [semicarbazone, m.p. 210° (decomp.)]. H. W.

Androsterone and related sterols. R. E. MARKER, F. C. WHITMORE, O. KAMM, T. S. OAKWOOD, and J. M. BLATTERMAN (J. Amer. Chem. Soc., 1936, 58, 338—340).—Oxidation (CrO₃ in dil. AcOH at 70°) of 3-chloro-5 : 6-dibromocholestane (from cholesteryl chloride and Br in Et₂O—AcOH) and reduction (Zn dust, AcOH) of the product formed gives 3-chloro-Δ⁵-dehydrocholan-ic acid and 3-chloro-Δ⁵-dehydroandrosterone (I), m.p. 156—157° (Butenandt and Dannenbaum, A., 1935, 413). Reduction (H₂, PtO₂, Et₂O) of (I) affords α-3-chloroandrosterone (II), m.p. 165—168°, converted by KOAc in valeric acid, subsequent hydrolysis (aq. EtOH—NaOH), and purification through the H succinate into androsterone, m.p. 178°. (II) is also obtained from isoandrosterone (III) (Ruzicka *et al.*, A., 1934, 1221) and SOCl₂. Hydrolysis of (I) gives Δ⁵-dehydroisoandrosterone which is reduced to (III). Reduction (H₂, PtO₂, Et₂O—AcOH) of cholesteryl bromide affords *cholesteryl bromide*, m.p. 115° [also prepared from *epicholesterol* (IV) and PBr₃ in C₆H₆], which is hydrolysed [as for (II)] to (IV). H. B.

Cortin, the hormone of the adrenal cortex. I. T. REICHSTEIN (Helv. Chim. Acta, 1936, 19, 29—63).—There is no discrepancy between the Swingle—Piffner assay on dogs and the Everse—de Fremery test on rats if it is assumed that the same material is concerned in each method; per kg.

body-wt., rats require about 500 times as much hormone as dogs. Distribution of cortin extracts between pentane and 20% MeOH permits the isolation of all the physiologically active material in sufficient purity to allow further concn. to be effected without marked loss. The total hormone can be extracted from the concentrates by suitable ketonic reagents (NH₂·CO·NH·NH₂ or Girard's reagent). The biologically active components from 1000 kg. of cortex can thus be reduced simply to about 5.4 g. without appreciable loss of activity. The preps. so obtained are essentially mixtures of OH-ketones and diketones. They are free from N, S, P, and halogen and contain about 3 rat units per mg. The following inter-related and closely allied to the active components, have been obtained partly from the active concentrates and partly from the inactive by-products; all are biologically inactive with the doses used. *Substance A*, C₂₁H₃₆O₅±2H, m.p. 222—224° (decomp.) after becoming opaque at about 160°, [α]_D²⁰ +16° (±1°) in abs. EtOH; it contains 4 or 5 OH, gives a cryst. ppt. with digitonin in 50% MeOH, is not hydrogenated at 100—140°/100 atm. in presence of Ni—SiO₂, yields a *tetra-* or *penta-acetate*, m.p. 150—151° (corr.), and a *monoisopropylidene* derivative, m.p. 209—210° (corr.), and yields CH₂O when oxidised by Pb(OAc)₄ in AcOH. *Substance B*, C₁₆H₂₈O₅ or, more probably, C₁₂H₂₀O₄, m.p. 253—255° in sealed capillary, is possibly a degradation product. *Substance C*, C₂₁H₃₄O₅, m.p. 253—256° (corr.; decomp.), [α]_D²⁰ +69.8°±2.5° in abs. EtOH [monosemicarbazone, m.p. 265—267° (corr.; decomp.)]. *Substance D*, C₂₁H₃₆O₅ or C₂₁H₃₄O₅, m.p. about 230—238° (corr.; decomp.) according to the rate of heating, [α]_D²⁰ +66°±1.5° in abs. EtOH [monosemicarbazone, m.p. 327—329° (corr.; decomp.)]. *Substance F*, probably C₁₈H₂₄O₃, m.p. 220—223° (corr.), [α]_D²⁰ +262° in abs. EtOH [disemicarbazone, gradual decomp. about 270°]. An *acid*, m.p. 223—226°, [α]_D²⁰ +166°±20° (determined as Na salt in H₂O), and *substance E*, m.p. (indef.) 126—129° [semicarbazone, C₂₅H₃₇O₅N₃, m.p. (amorphous), 208—210°, m.p. (cryst.), 280—285° (corr.; decomp.)]. Hydrolysis of the fat insol. in pentane gives a substance, C₄H₁₀O₃S, m.p. 113—114.5° (corr.), probably an aliphatic trihydroxy-sulphide or dihydroxysulphoxide, which is stable towards alkaline Ag solution but immediately decolorises KMnO₄ at 0°, glyceryl palmitate, and palmitic acid. H. W.

1 : 2 : 3-Triketotetramethylcyclopentane : a blue triketone. C. W. SHOPPEE (J.C.S., 1936, 269—274).—Francis and Willson (J.C.S., 1913, 103, 2238) state that 1 : 1-dibromo-2 : 2 : 3 : 3-tetramethylcyclopentanediol (I) and NaOAc give a colourless Br-free compound, m.p. 100°, regarded as a diacetate, and converted by KOH into a substance, m.p. 68°. (I) with NaOAc—MeOH yields 1 : 2 : 3-triketotetramethylcyclopentane hydrate (II), m.p. 95°, which forms a hydrate monosemicarbazone, m.p. 153° (decomp.), 2 : 4-dinitrophenylhydrazine, m.p. 219—220°, 2 : 4-dinitrophenyllosazone (? 1 : 3-bis-2' : 4'-dinitrophenylhydrazine), m.p. 268—270° (decomp.), and a quinoxaline, m.p. 108°, and a mol. compound of the

ketone (1 mol.) and its hydrate (1 mol.), m.p. 119—120°. (II) and KOH give the hydrate of the lactonic acid of γ -hydroxy- $\alpha\beta$ -tetramethylglutaric acid, m.p. 68°. (II) is dehydrated (80%) in vac. to the anhyd. triketone (III), m.p. 164°, bright blue prisms. (I) and AgOAc-MeOH afford 1:1-dimethoxy-2:2:3:3-tetramethylcyclopentanedione (IV), m.p. 68°, rose-red cubes [2:4-dinitrophenyllosazone, m.p. 266° (decomp.)], oxidised (H_2O_2) to the lactone of γ -hydroxy- γ -methoxy- $\alpha\beta$ -tetramethylglutaric acid, m.p. 58°, and tetramethylsuccinic acid. (IV) is hydrolysed (HCl) to (III) and 2:2-dimethoxytetramethylcyclopentane-1:3-dione, m.p. 62° (2:4-dinitrophenylhydrazones, m.p. 184°), also obtained from (I) and KOH-MeOH. The absorption spectra of (III) show that the blue colour is due to an absorption band with a max. at 685 m μ and the red colour of (IV) is due to an unsymmetrical band at 510 m μ ; the blue colour must be ascribed to the contiguous association of the three CO groups.

F. R. S.

Chelation. III. Stabilisation of Kekulé forms in *o*-hydroxy-carbonyl compounds. W. BAKER and (Miss) O. M. LOTHIAN (J.C.S., 1936, 274—281).—4-O-Allylresorpiophenone (I), b.p. 174°/14 mm. (Cu derivative, m.p. 158°), undergoes rearrangement by heating to 3-allylresorpiophenone, m.p. 124° (Me_2 ether, b.p. 180°/18 mm.), reduced to 3-n-propylresorpiophenone, m.p. 109—110°, also obtained from 2-n-propylresorcinol, EtCN, and $ZnCl_2$. (I) is methylated (Me_2SO_4) to 2-O-methyl-4-O-allylresorpiophenone, m.p. 31°, rearranged on heating to 2-O-methyl-5-allylresorpiophenone, m.p. 132—133° (Me_2 ether, m.p. 67°). 4-O-Allyl- β -resorcylaldehyde, b.p. 149—150°/3 mm., obtained from β -resorcylaldehyde and allyl bromide, is rearranged to 3-allyl- β -resorcylaldehyde (II), m.p. 129—130°, which is methylated to 2-O-methyl-4-O-allyl- β -resorcylaldehyde (III), m.p. 45°, and 2-methoxy-4-allyloxystyryl Me ketone, m.p. 39—40°. (III) is rearranged to 2-O-methyl-5-allyl- β -resorcylaldehyde, m.p. 145—146°, methylated to 2:4-dimethoxy-5-allylstyryl Me ketone, m.p. 76—77°: the isomeric 2:4-dimethoxy-3-allylstyryl Me ketone, m.p. 45°, is obtained by methylation of (II). (II) is reduced (H_2 -Pd) to 4-methyl-2-n-propylresorcinol, m.p. 96—97°, also obtained by reduction of 3-n-propyl- β -resorcylaldehyde, m.p. 92—93°, prepared from the corresponding phenol.

2-Hydroxy-5-allyloxyacetophenone (IV), m.p. 59—60°, prepared from the (OH) $_2$ -compound and allyl bromide, is rearranged to 2:5-dihydroxy-6-allylacetophenone, m.p. 105—106°, methylated to the 2:5-(OMe) $_2$ -compound, b.p. 164—165°/14 mm., which with PhCHO gives 2:5-dimethoxy-6-allylphenyl styryl ketone, m.p. 75°. (IV) is methylated to 2-methoxy-5-allyloxyacetophenone, b.p. 166°/13 mm., rearranged to 5-hydroxy-2-methoxy-6-allylacetophenone, m.p. 104°, and -4-allylacetophenone. 2:4-Dimethoxy-3-allylacetophenone gives a semicarbazone, m.p. 159—160°. These experiments do not afford evidence of a stable Kekulé form in 2:5-dihydroxyacetophenone, but are in harmony with the view that such a stable form exists.

The rearrangement of the following allyl ethers does not take place smoothly: 4-ethylresorcinol diacetate,

b.p. 162°/14 mm., and diallyl ether, b.p. 146°/10 mm., Et 4-O-allyl- β -resorcylate, m.p. 42°, and the acid, m.p. 155—156°; 4-nitroresorcinol 1-O-allyl ether, b.p. 157—158°/10 mm., rearranged (26%) to 4-nitro-6(or 2)-allylresorcinol, m.p. 85·5°; nitroquinol diallyl ether, m.p. 22°, and 2-nitroquinol 4-O-allyl ether, m.p. 48°.

F. R. S.

Reactions of *o*-hydroxybenzylidenediaceetophenones. VI. Diacetophenones derived from 3-methoxysalicylaldehyde. G. H. BEAVEN and D. W. HILL (J.C.S., 1936, 256—258).—3-Methoxysalicylaldehyde, CPhMe, and NaOH give 3-methoxysalicylidenediaceetophenone (I), m.p. 145—146°, and 3-methoxychalcone; with the appropriate ketone the following are prepared: 3-methoxysalicylidenedi-(*p*-methoxyacetophenone) (II), m.p. 163—164°, and 3:4'-dimethoxychalcone, m.p. 142°; 3-methoxysalicylidenedi-(*p*-methylacetophenone) (III), m.p. 112°, and 3-methoxy-4'-methylchalcone, m.p. 131°. (I) in boiling AcOH for 1 hr. affords 8-methoxy-4-phenacylidene-flavene, m.p. 192° (8-methoxy-4-phenacylflavylum ferrichloride, m.p. 197—198°), and for 10 min. yields 8-methoxy-4-phenacylflavene, m.p. 136—137°, and with HCl-FeCl $_3$ it forms 8-methoxyflavylum ferrichloride, m.p. 162° (lit., 157°). (II) and AcOH afford 8:4'-dimethoxy-4-(*p*-methoxyphenacylidene)flavene, m.p. 195° (ferrichloride, m.p. 193°). (III) with AcOH gives 8-methoxy-4-(*p*-methylphenacylidene)-4'-methylflavene, m.p. 200° [ferrichloride, m.p. 192° (decomp.)], with Ac $_2$ O forms 2-acetoxy-3-methoxybenzylidenedi-(*p*-methylacetophenone), m.p. 120°, and with HCl-FeCl $_3$ affords 8-methoxy-4'-methylflavylum ferrichloride, m.p. 179° (decomp.).

F. R. S.

4'-Hydroxy-2-*p*-hydroxybenzoylbenzophenone. F. F. BLICKE and R. A. PATELSKI (J. Amer. Chem. Soc., 1936, 58, 273—276).— α -Di-*p*-chlorophenylphthalide (I), m.p. 157—158° [from *o*-C $_6$ H $_4$ (COCl) $_2$, PhCl, and AlCl $_3$], is reduced (Zn dust, aq. EtOH-NaOH) to 4':4'-dichlorotriphenylmethane-2-carboxylic acid, which with conc. H_2SO_4 gives 3-chloro-9-*p*-chlorophenyl-10-anthrone (II), m.p. 143—144°. Oxidation ($Na_2Cr_2O_7$, AcOH) of (II) affords 3-chloro-9-hydroxy-9-*p*-chlorophenyl-10-anthrone (III), m.p. 223—224° (*Me* ether, m.p. 165—166°), which with HCl in C $_6$ H $_6$ -AcCl gives 3:9-dichloro-9-*p*-chlorophenyl-10-anthrone, m.p. 121—122°, converted by mol. Ag in C $_6$ H $_6$ into the deep red free radical 3-chloro-9-*p*-chlorophenyl-10-anthranyl [peroxide, m.p. 255—265° (decomp.)]. Contrary to Baeyer (A., 1880, 650). (I) could not be obtained from phenolphthalein and PCl $_5$; (III) is produced. 4'-Hydroxy-2-*p*-hydroxybenzoylbenzophenone (IV) (A., 1932, 617) [the supposed 3:9-dihydroxy-9-*p*-hydroxyphenyl-10-anthrone of Baeyer (*loc. cit.*) and PCl $_5$ at 120—125° give 4'-chloro-2-*p*-chlorobenzoylbenzophenone, m.p. 167—168° [the (III) of Baeyer] [bisphenylhydrazones, m.p. 202—203° (decomp.)], reduced (Zn dust, AcOH) to 2:5-di-*p*-chlorophenyl-3:4-benzofuran, m.p. 199—200° [the (II) of Baeyer]. Further reduction affords (probably) the 2:5-dihydrobenzofuran [the 3-chloro-10-hydroxy-9-*p*-chlorophenyl-9:10-dihydroanthracene of Baeyer (*loc. cit.*)]. Further proof of the structure of (IV) is given by the synthesis of its Me_2 ether (V), m.p. 157—159°, from *o*-CN·C $_6$ H $_4$ ·CO $_2$ Et (VI) and

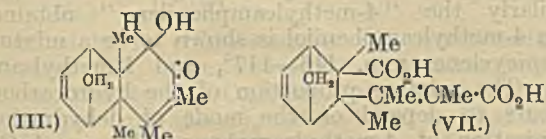
p-OMe·C₆H₄·MgI (VII). (V) is also prepared by oxidation (method: *loc. cit.*) of 2:5-dianisyl-3:4-benzofuran [from (VII) and anisylphthalide]. MgPhBr and (VI) afford *o*-benzoylbenzophenone. H. B.

Phloracetophenone. K. C. GULATI, S. R. SETH, and K. VENKATARAMAN (Org. Syntheses, 1935, 15, 70—71).—*s*-C₆H₃(OH)₃ is treated with MeCN, ZnCl₂, and HCl. CH. ABS. (r)

2:6-Dibromobenzoquinone-4-chloroimide. W. W. HARTMAN, J. B. DICKY, and J. G. STEMPFLI (Org. Syntheses, 1935, 15, 8—10).—Reduction of 2:6-dibromo-4-nitrophenol with Sn and HCl gives a quant. yield of 2:6-dibromo-4-aminophenol stannichloride, which is oxidised with NaOCl.

CH. ABS. (r)

Diene reaction between tetramethyl-*o*-benzoquinone and cyclopentadiene. L. I. SMITH and L. R. HAC (J. Amer. Chem. Soc., 1936, 58, 229—234).—Tetramethyl-*o*-benzoquinone (freshly prepared) and cyclopentadiene in boiling 95% EtOH give 3:4:9:10-tetramethyl-5:8-endomethylene-5:8:9:10-tetrahydronaphthalene-1:2-quinone (I), m.p. 181—182° [semicarbazone, m.p. 213—214° (decomp.)] (darkens at 207°); phenazine (II), m.p. 182—183° (from *o*-C₆H₄(NH₂)₂), which is reduced (Zn dust, aq. AcOH) to 1-hydroxy-2-keto-3:4:9:10-tetramethyl-5:8-endomethylene-1:2:5:8:9:10-hexahydronaphthalene (III), m.p. 95.5—96° (acetate, m.p. 77—78°; oxime, m.p. 184—185°), oxidised (CrO₃, aq. AcOH) to (I). (III) and *o*-C₆H₄(NH₂)₂ in AcOH or EtOH afford (II). Clemmensen reduction of (I) gives



a little of a product (contains O), b.p. 101—103°/14 mm.; dehydrogenation (Se at 280—300°) of this or (I) affords indefinite products. Reduction (H₂, PtO₂ or Pd-CaCO₃, EtOH) of (I) or (III) gives 1-hydroxy-2-keto-3:4:9:10-tetramethyl-5:8-endomethylene-1:2:3:4:5:8:9:10-octahydronaphthalene (IV), m.p. 82—83° (acetate, m.p. 91°; oxime, m.p. 169—170°), oxidised (CrO₃, aq. AcOH) to the 1:2-diketo-derivative (V), m.p. 141—141.5° [phenazine, m.p. 181—182°, also formed from (IV)]. Reduction [H₂ (1800 lb.), Raney Ni, 95% EtOH, 185°] of (I), (III), or (IV) affords 1:2-dihydroxy-3:4:9:10-tetramethyl-5:8-endomethylene-3:4:5:6:7:8:9:10-octahydronaphthalene (VI), m.p. 146—147° (diacetate, m.p. 81—82°), which could not be reduced further. (VI) does not give an oxime or a phenazine; on one occasion only it was oxidised (CrO₃, aq. AcOH) to the 1:2-diketodecahydro-derivative, m.p. 96—97°, indicating that it can react as the 1-hydroxy-2-ketodecahydro-form. (I) is oxidised (15% H₂O₂, aq. MeOH-NaOH) to β-(2-carboxy-1:2-dimethyl-3:6-endomethylene-Δ⁴-cyclohexenyl)-α-methyl-Δ^α-butenoic acid (VII), m.p. 239—240° (decomp.) [? 4:5-dibromide (VIII), m.p. 249—250° (decomp.)], which is reduced (H₂, Pd-CaCO₃, aq. Na₂CO₃) to the *butyric acid*, m.p. 229—230°, also formed by oxidation (H₂O₂) of (V). Ozonolysis of

(VIII) and subsequent reductive fission gives resinous products. H. B.

Naphthazarin and dibromonaphthazarin.—See this vol., 428.

Manufacture of 1:4-dihalogenoanthraquinone-2-carboxylic acids.—See B., 1936, 182.

9:10-Dihydroxy-9:10-di-*n*-amyl-9:10-dihydrophenanthrene and 2:2'-di-*n*-hexoyldiphenyl. T. W. JEZERSKI and M. MACIEJEWSKI (Rocz. Chem., 1935, 15, 543—545).—Phenanthraquinone and *n*-C₅H₁₁·MgBr in Et₂O yield 9:10-dihydroxy-9:10-di-*n*-amyl-9:10-dihydrophenanthrene, m.p. 102.7—104°, converted by CrO₃ in aq. AcOH into 2:2'-di-*n*-hexoyldiphenyl, b.p. 206°/3.5 mm. R. T.

Grignard reagent from pinene hydrochloride. Action of phthalic acid. R. BOUSSET (Bull. Soc. chim., 1936, [v], 3, 318—319).—*o*-Carboxybenzoylcamphane (Ag salt) has [α]_D +58.92°, the *Me* ester, m.p. 72—75°, [α]_D +64.7°, and the *Et* and *Pr* esters, oils, [α]_D +62.95° and +60.45°, respectively. With SOCl₂, HCl-MeOH, or Me₂SO₄ the acid gives phthaloylcamphane, m.p. 216° (corr.), [α]_D +194°. Other optical data are given. R. S. C.

Grignard reaction on α-pinene oxide. J. J. RITTER and K. L. RUSSELL (J. Amer. Chem. Soc., 1936, 58, 291—293).—Contrary to Prileschaeff and Verschuk (A., 1929, 1076), α-pinene oxide (I) and MgMeI (first in Et₂O and then in C₆H₆) give methylcampholenol (II), $\begin{matrix} \text{CMe} \cdot \text{CMe}_2 \\ | \\ \text{CH} - \text{CH}_2 \end{matrix} > \text{CH} \cdot \text{CH}_2 \cdot \text{CHMe} \cdot \text{OH}$, b.p. 82—83°/4 mm., 107—108°/12 mm., also prepared from campholenaldehyde (Arbuzov, A., 1935, 1246) and MgMeI. The formation of (II) involves a ring-fission and subsequent ring enlargement. (II) is oxidised (Na₂Cr₂O₇, dil. H₂SO₄) to methylcampholenone, b.p. 73—74°/4 mm. [semicarbazone, m.p. 175—176° (corr.)]. Ethyl-, b.p. 88—89°/4 mm., *n*-propyl-, b.p. 100—101°/4 mm., *n*-butyl-, b.p. 110—112°/4 mm., isobutyl-, b.p. 106—107°/4 mm., and phenyl-, b.p. 140—142°/1.3 mm., *campholenols* are similarly formed from (I) and MgRX. Ethylcampholenone has b.p. 80—81°/2 mm. [semicarbazone, m.p. 148—149° (corr.)]. H. B.

Norborneol and norbornylene. G. KOMPPA and S. BECKMANN (Ann. Acad. Sci. fenn., 1934, A, 39, No. 7, 9 pp.; Chem. Zentr., 1935, i, 3940).—Mostly already reported (A., 1934, 658). 2-Carbamyl-dicyclo-[1:2:2]-heptane, m.p. 205—206°, prepared from the acid in the usual way affords norbornylamine with KOH-KOBr. H. N. R.

Borneol-isoborneol question. Y. ASAHINA, M. ISHIDATE, and T. SANO (Ber., 1936, 69, [B], 343—348; cf. A., 1935, 625; Lipp, *ibid.*, 983).—*d*-trans-π-apo-Borneol-7-carboxylic acid, obtained by vigorous reduction of isoketopinic acid with Na and EtOH (slow reduction causes some production of isoborneol derivatives), is quantitatively converted by AcCl in C₅H₅N into the corresponding acetate (I), m.p. 106—107°, which with SOCl₂ affords *d*-trans-π-apoacetylborneol-7-carboxyl chloride, b.p. 124°/6 mm., transformed by H₂ in boiling xylene containing Pd-C into *d*-trans-π-apoacetylborneol-7-aldehyde [reoxidised to

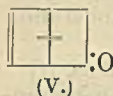
(I)], the *semicarbazone*, m.p. 195°, of which is converted by NaOEt-EtOH at 150—155° into *d*-borneol (II). Similarly, *trans*- π -apoisoacetylborneol-7-carboxylic acid, from *apocamphenecarboxylic acid* (III) by hydration according to Bertram-Walbaum, is converted successively into the corresponding *chloride*, b.p. 120°/6 mm., *trans*- π -apoisoacetylborneol-7-aldehyde (*semicarbazone*, m.p. 197°), and *isoborneol*. *trans*- π -apoCamphor-7-carboxylic acid is therefore a substituted camphor which, like the latter, on energetic reduction gives mainly a borneol derivative, whereas (III) is a substituted camphene passing, when hydrated, mainly into an *isoborneol* compound. Reduction of *d*-ketodihydroteresantalic acid by Na and EtOH yields the antipode of the Semmler-Bartelt lactone, m.p. 196°, and *d*-cis- π -apoborneol-7-carboxylic acid (IV), m.p. 278°. Treatment of (IV) with AcCl in C₆H₅N affords the corresponding *acetate*, b.p. 155—158°/5 mm., the *chloride*, b.p. 124°/6 mm., of which is converted *d*-cis- π -apoacetylborneol-7-aldehyde, the *semicarbazone*, m.p. 224°, of which affords (II). *r*-isoBorneol is unchanged by NaOEt-EtOH at 155°, but passes at 170—180° into borneol. H. W.

Oxidation of bornyl acetate. Y. ASAHINA, M. ISHIDATE, and T. TUKAMOTO (Ber., 1936, 69, [B], 349—354).—Oxidation of *l*-bornyl acetate by CrO₃ in AcOH-Ac₂O at 80° affords unchanged material, and fractions, b.p. 115—160°/15 mm. (I), and b.p. >160°/15 mm. (II), respectively. Treatment of (I) with 10% K₂CO₃ gives small amounts of 1:5:5-trimethylcyclopentan-2-one-4-acetic acid (III) (*semicarbazone*, m.p. 240°), and the unattacked portion is oxidised by Na₂Cr₂O₇ and dil. H₂SO₄ to 3:6-diketocamphane, m.p. 212°, [α]_D²⁰ -105.5° in abs. EtOH (*disemicarbazone*, m.p. 295°), (III), and ketocampholenic acid (IV), m.p. 130° (*semicarbazone*, m.p. 218°). (IV) is also obtained by the action of KOH-EtOH on 6-bromo-2:5-diketocamphane or 2-bromo-3:6-diketocamphane, m.p. 145°, [α]_D²⁰ -152.7° in abs. EtOH, from 3:6-diketocamphane (V) and Br in CHCl₃. *l*-p-Ketoborneol (VI) is oxidised by Na₂Cr₂O₇ and dil. H₂SO₄ at 100° to (IV) and (V); under like conditions, *l*-p-diketocamphane is largely unattacked. Catalytic hydrogenation (Pd-C in AcOH) of (IV) gives optically inactive 1:5:5-trimethylcyclopentan-3-one-4-acetic acid, m.p. 90° (*semicarbazone*, m.p. 229°). (II) when oxidised with H₂O₂ in alkaline solution and then heated with alkali yields (VI) and *d*-2-hydroxycamphoric acid (VII), m.p. 165°, [α]_D²³ +7.8° in abs. EtOH (*Me*₃ ester, b.p. 150—151°/11 mm., m.p. 46°). Synthesis of (VII) is effected by treating *l*-p-ketobornyl acetate, m.p. 78°, [α]_D²⁴ -87.9° in abs. EtOH, with SeO₂ in Ac₂O at 130—140°, thus yielding 6-acetoxycamphor-2:3-quinone, m.p. 109°, [α]_D²³ -191.4° in abs. EtOH, which is oxidised by NaOH and H₂O₂ to (VII). 2-Acetoxycamphor-5:6-quinone, m.p. 109°, [α]_D²³ +188.5° in abs. EtOH, is oxidised to 1-2-hydroxycamphoric acid, m.p. 165°, [α]_D²³ -8.0° in abs. EtOH. Oxidation of (VII) affords *d*-1:5:5-trimethylcyclopentan-2-one-4-carboxylic acid, m.p. 122°, [α]_D²³ +163.74° in abs. EtOH (*semicarbazone*, m.p. 215°; *Me* ester, m.p. 41°); the corresponding *l*-acid has m.p. 122°, [α]_D²³ -166.8° in abs. EtOH (*semicarbazone*, m.p. 215°), and the *r*-acid has m.p. 117°. H. W.

New camphor derivative, "ketobornylene." Y. ASAHINA, M. ISHIDATE, and T. TUKAMOTO (Ber., 1936, 69, [B], 355—357).—6-Acetoxycamphorquinone with N₂H₄·H₂O in hot EtOH gives α - (I), m.p. 175°, and β - (II), m.p. 99°, -6-acetoxycamphorquinone-3-monohydrazone. (I) with yellow HgO in boiling C₆H₆ affords 3-diazo-6-acetoxycamphor, m.p. 120°, also obtained more slowly from (II); when distilled with Cu-bronze it yields 6-acetoxy- β -pericyclocamphan-2-one (III), b.p. 145°/18 mm., hydrolysed to 6-hydroxy- β -pericyclocamphan-2-one (IV), m.p. 234°. (III) or (IV) with HBr-AcOH at room temp. gives 5-bromo-6-hydroxycamphor, m.p. 123°, transformed by Zn dust and alkali into (IV) and by Zn dust and AcOH at 100° into *keto-bornylene* [dehydrocamphor] (V), m.p. 148°, [α]_D²⁰ -735° in abs. EtOH [*semicarbazone*, m.p. 234° (decomp.)], which immediately reduces cold KMnO₄ and slowly decolorises Br in AcOH. Catalytic hydrogenation (Pd-C in AcOH) of (V) gives *d*-camphor. H. W.

Removal of water from camphenilol, 4-methylcamphenilol, and 4-methylborneol. Santene displacement and Nametkin transformation. G. KOMPPA and G. A. NYMAN (Ber., 1936, 69, [B], 334—340).—Ozonisation of camphenilene obtained by heating camphenilol (I) with KHSO₄ leads to *apocyclene* (II) unattacked by O₃, and santene diketone. Dehydration of (I) takes place partly by pinacolin transformation giving santene and partly by direct loss of H₂O and subsequent ring-closure to (II). Similarly the "4-methylcamphenilene" obtained from 4-methylcamphenilol is shown to be a mixture of *epicyclene*, m.p. 116—117°, and 1-methylsantene. The relative proportion of the hydrocarbons appears to depend on the mode of dehydration. Ozonisation of 4-methylcamphene (III) in AcOH gives, as unattacked portion, 4-methyltricyclene (IV), m.p. 109—110° (also obtained by oxidation of 4-methylcamphorhydrazone with HgO); 4-methylcamphenilone, hydroxy-3-methylcamphenilonolactone, and trimethylnorcampholide are also isolated. These normal products are accompanied by considerable amounts of *dl*-fenchone (V); apparently (III) becomes partly hydrated, and the acetate thus produced suffers the Nametkin transformation and subsequent loss of AcOH. 1-Methylcamphene is thus produced, which is ozonised to (V). Elimination of H₂O from 4-methylborneol occurs therefore in three directions. H. W.

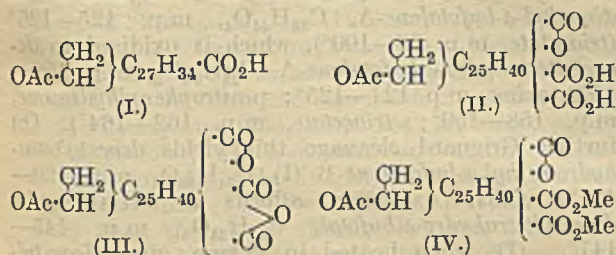
Organic catalysts. XII. Asymmetric main valency catalysis. I. W. LANGENBECK and G. TRIEM (Ber., 1936, 69, [B], 248—250).—*d*-Camphoglyoxylic acid (I) has [α]_D²⁰ +255.1° in *N*-NaOH. *dl*-Camphoglyoxylic acid (II), m.p. 84—85° [oxime (+1H₂O), m.p. 159°], is obtained from *dl*-camphor, Et₂C₂O₄, and Na wire in ligroin. (I) and *dl*-alanine (III) at 150° afford small amounts of *d*-hydroxymethylenecamphor, [α]_D²⁰ +183° in EtOH. (II) and (III) yield *dl*-hydroxymethylenecamphor, whereas (II) and *l*-alanine give a slightly levorotatory product. If *l*-leucine is used, the product appears to be optically



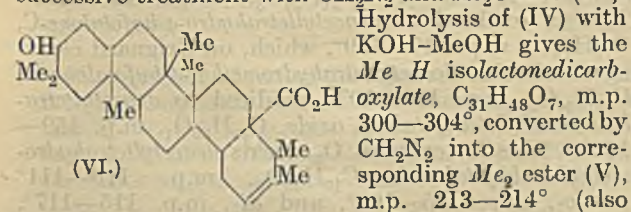
inactive. The stereochemical specificity of the carb-oxylase model is thus established. H. W.

Chios turpentine. E. EMMANUEL (Pharm. Acta Helv., 1935, 10, 12—22; Chem. Zentr., 1935, i, 3856).—The following are isolated from the resin of *Pistacia terebinthus*, L.: *terminthic acid*, $C_{14}H_{20}O_2$, m.p. 136—137°; *terminthinic acid*, $C_{16}H_{24}O_4$, m.p. 123.5—124.1°, monobasic (EtOH-insol. *Pb* salt); *termintholic acid*, m.p. 101.5—102.1°, monobasic (EtOH-sol. *Pb* salt); *termintholinic acid*, $C_{22}H_{34}O_3$, m.p. 127.5—128°, monobasic; an *etheral oil*, $d_{15}^{20} 0.8695$, $n_{20}^{25} 1.4668$, $[\alpha] +33.5^\circ$, separable into two fractions, b.p. 157—165° and 165°—190°; a *resin* and a *bitter principle*. H. N. R.

Polyterpenes and polyterpenoids. C. Transformations in rings A and E of oleanolic acid. Carbon skeleton of pentacyclic triterpenes. L. RUZICKA and K. HOFMANN (Helv. Chim. Acta, 1936, 19, 114—128).—Oxidation of acetyloleanolic acid (I) by CrO_3 in $AcOH-H_2SO_4$ gives the *substance* (II), m.p. 230°, which could not be obtained homogeneous; its formula and the function of the O atoms are



established by its conversion into the corresponding *anhydride* (III), m.p. 294—295°, (dehydrogenated by Se at 350° to 2:7- $C_{10}H_6Me_2$), its transformation by CH_2N_2 or from the *Ag*₂ salt and MeI in Et_2O into the *Me*₂ ester (IV), m.p. 203—204°, or (+1MeOH) m.p. 178—179°, and its hydrolysis to the *lactone-carboxylic acid*, $C_{30}H_{46}O_7$, m.p. 270° (decomp.), converted by successive treatment with CH_2N_2 and Ac_2O into (IV).



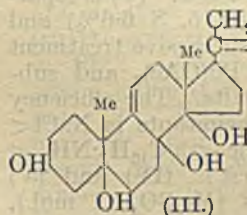
Hydrolysis of (IV) with $KOH-MeOH$ gives the *Me H isolactonedicarboxylate*, $C_{31}H_{48}O_7$, m.p. 300—304°, converted by CH_2N_2 into the corresponding *Me*₂ ester (V), m.p. 213—214° (also +1MeOH) (*Ac* derivative, m.p. 273—274°), which is very resistant to alkaline hydrolysis. Oxidation of (V) by CrO_3 (=1.5O) in $AcOH$ gives the *Me*₂ ester of the *ketoisolactonedicarboxylic acid*, m.p. 219—220° [*oxime*, m.p. 257—258° (decomp.); *OH·CH*: derivative]. *Me* oleanolate is oxidised by CrO_3 to *Me oleanonate*, m.p. 156—157° [*oxime*, m.p. 218—219° (decomp.); *OH·CH*: derivative, m.p. 197—199°]. The above results and a review of the lit. suggest the structure (VI) for oleanolic acid. H. W.

α-Tocopherol from wheat-germ oil.—See this vol., 531.

The crystalline acid of Canada balsam. F. TROST (Annali Chim. Appl., 1936, 26, 38—42).—*Canadolic acid* (A., 1900, i, 678), new formula $C_{20}H_{30}O_2$,
K K

new m.p. 165—168°, $[\alpha]_D^{20} -91^\circ$ in $EtOH$, is an isomeride of abietic acid. It is dehydrogenated (Se) to retene, gives a *compound*, m.p. 226°, with maleic anhydride, and is converted by $AcOH$ at 100° into Steele's abietic acid (A., 1922, i, 739). E. W. W.

Plant cardiac poisons. VIII. Convallatoxin. R. TSCHESCHE and W. HAUPT (Ber., 1936, 69, [B], 459—464; cf. Karrer, A., 1929, 684).—Convallatoxin (I), m.p. 238—239°, or (hydrated) m.p. 225°, is $C_{29}H_{42}O_{10}$. It contains two double linkings, one of which is saturated with great difficulty. (I) is hydrolysed with difficulty by acids to *l*-rhamnose and monoanhydroconvallatoxinigenin, isolated as the *benzoate* (II), m.p. 279—281°, $[\alpha]_D^{22} +22.2^\circ$ in $CHCl_3$. In addition to the three double linkings of the C_6H_6 group, (II) contains three double linkings, one of which is very resistant towards saturation. Its absorption curve very closely resembles that of anhydrouzarigenin benzoate. (II) contains two, probably *tert*. OH (Zerevitinov). Convallatoxinigenin (III) therefore contains one *sec.* and two *tert*. OH. Like (II) it does not



react with ketonic reagents. The positive Legal test establishes the presence of an unsaturated side-chain which is opened by alkali, thus allowing the equiv. to be determined.

Acidification of the alkaline solution leads to α-, m.p. 256—258°, and β-, m.p. 289—290°, *isoconvallatoxin*. Assuming that (III) contains the same C skeleton as digitoxigenin, strophanthidin, and uzarigenin, the constitution shown explains satisfactorily the behaviour of (III). The disposition of the double linkings and OH is discussed in detail. H. W.

Phytosterol and resin of *Fabiana denudata*.—See this vol., 533.

Punar-Nava (*Boerhaavia diffusa*).—See this vol., 533.

Two disputed properties of nitrolignin. K. KÜRSCHNER (Zellstoff-Faser, 1935, 32, 17—19; Chem. Zentr., 1935, ii, 2987).—The non-cryst. nature and the presence of oximino-keto-compounds are refuted (cf. Nijhofs, B., 1934, 395). H. N. R.

Action of benzaldehyde on lignin. N. I. NIKITIN and I. M. ORLOVA (J. Appl. Chem. Russ., 1935, 8, 1402—1409).—The product pptd. by Et_2O or light petroleum from $PhCHO$ solutions (prepared by heating at 150—160° for 7 hr.) of Willstätter lignin has a higher C and a lower OMe content than the original material. Since this undergoes similar changes when heated alone, it is not possible to decide whether the analytical data are interpretable on the basis of condensation with $PhCHO$ or of thermal transformation; possibly both processes enter.

R. T.
Lignin and related compounds. XXIII. Preparation and methylation of spruce lignin-sulphonic acids. XXIV. Formation of vanillin from waste sulphite liquor. XXV. Mechanism

of vanillin formation from spruce lignin-sulphonic acids in relation to lignin structure. G. H. TOMLINSON II and H. HIBBERT (J. Amer. Chem. Soc., 1936, **58**, 340—345, 345—348, 348—353).—XXIII. Spruce wood meal (extracted with EtOH-C₆H₆) (I) is heated with aq. Ca(HSO₃)₂+SO₂ at 125° and the liquor treated with CaCl₂, which salts out Ca α-ligninsulphonate (II); Ca β-ligninsulphonate (III) (37% of total salt) (Ca 5, S 10.4, OMe 10.45%) is isolated from the mother-liquors through the Pb salt. (II) is separated by further salting out (CaCl₂) into fractions (IIa) (19%) (Ca 3.5, S 9.4, OMe 11.2%) and (IIb) (44%) (Ca 3.8, S 9.6, OMe 11.35%). All the salts are purified by dialysis and subsequent pptn. from aq. EtOH by EtOH-Et₂O. The liquor from (I) and aq. KHSO₃+SO₂ at 110° with quinoline hydrochloride gives (cf. Hägglund, B., 1933, 584; Freudenberg *et al.*, A., 1935, 861) a quinoline salt, subsequently converted into K ligninsulphonate (IV) (70%) (K 3.7, S 5.4%); a K salt (V) (30%) (K 2.7%) is isolated from the mother-liquors (A) through the Pb salt. (V) is separable into K salts (Va) (16%) (K 5, S 6.6%) and (Vb) (14%) (K 5.8, S 5.6%) by successive treatment of (A) with β-C₁₀H₇-NH₂ and Pb(OAc)₂ and subsequent conversion into the K salts. The efficiency of the following reagents as precipitants is NaCl < CaCl₂ < quinoline, isoamylamine < β-C₁₀H₇-NH₂ < Pb(OAc)₂ (cf. Hägglund, *loc. cit.*). (IV) and (V) (in aq. COMe₂) are methylated [Me₂SO₄ (1 mol.), 30% KOH (1.1 mols.), 20°] to fully methylated products (VI) and (VII), respectively, containing 30 and 31.6% OMe (calc. on K- and SO₃H-free basis), respectively, without loss of S.

XXIV. In agreement with Kürschner (cf. B., 1928, 292), vanillin (VIII) is obtained in yields of 3.44—7.27% (based on lignin content) when waste sulphite liquor is boiled with NaOH, KOH, or (less satisfactorily) Ba(OH)₂; the mixture is acidified (H₂SO₄), extracted with CHCl₃:CCl₄, and (VIII) is then isolated with NaHSO₃ and subsequently determined as the *m*-nitrobenzoylhydrazone. The effect of the original cooking treatment on the yield of (VIII) is investigated; max. yields are obtained when sulphite liquors containing a relatively high proportion of "free" SO₂ are used at 110—125° (prolonged heating at such temp. having little effect on the yield).

XXV. The yields of (VIII), calc. on metal- and SO₃H-free basis, obtained when the following salts (see Part XXIII) are boiled with 19.4% (wt.) NaOH in N₂ for 12 hr. are: (IIa) 6.1, (IIb) 6.6, (III) 8.4, (IV) 6.4, (Va) 8.6, (Vb) 7.1. The other fission products contain less S but approx. the same OMe as the original compounds, indicating that a small non-methylated aliphatic fragment is also removed during the hydrolysis. Veratraldehyde (*m*-nitrobenzoylhydrazone, m.p. 221—223°) is formed in yields of 2.35 and 2.76%, respectively, from (VI) and (VII) with boiling 3.8% NaOH. The presence of the 4:3-(OH)(OMe)C₆H₃ group in spruce-lignin is thus proved. Unsulphonated lignin does not similarly yield (VIII). It is suggested that a group such as 4:3-(OH)(OMe)C₆H₃-CH(SO₃H)-CH₂ is hydrolysed (SO₃H replaced by OH), and that the resulting product gives (VIII) by a reversed aldol reaction;

evidence in support of this view (cf. Freudenberg *et al.*, *loc. cit.*) is given. H. B.

Aesculus saponins and their sugar-free derivatives. E. BUREŠ and K. BABOR, jun. (Časopis českoslov. Lék., 1935, **15**, 3—8, 25—34; Chem. Zentr., 1935, i, 3936).—Three saponins are isolated from chestnut seeds: *saponin B*, decomp. 80—120°; *saponin C*, m.p. 150° (decomp.), and *saponin A*, which, when purified by repeated pptn. from EtOH and by dialysis, has m.p. 190—194° (decomp.) and composition C₂₄H₃₈O₈(OH)₇ (*Br*-derivative, C₂₄H₄₅O₁₆Br, decomp. 130°; *hepta-acetate*, m.p. 155—160°). The latter is hydrolysed to the prosapogenin, aescin, decomp. 211—225° [*Br*-derivative, m.p. 217° (decomp.); *penta-acetate*, m.p. 169—170°], which is further hydrolysed to aescigenin, m.p. 179—186°. H. N. R.

Constituents of "Senso." IV. Grignard cleavage of methyl deacetyltetrahydro-ψ-bufotalinate. S. IKAWA (J. Pharm. Soc. Japan, 1935, **55**, 195—217).—Grignard cleavage of Me deacetyltetrahydro-ψ-bufotalinate yields *deacetyltetrahydro-dimethyl-ψ-bufotalene-A*, C₂₆H₄₄O₄, m.p. 125—126° (*triacetate*, m.p. 98—100°), which is oxidised to *deacetyltetrahydro-ψ-bufotalone-A*, C₂₃H₃₈O₅, m.p. 158—159° (*oxime*, m.p. 124—125°; *p*-nitrophenylhydrazone, m.p. 158—159°; *triacetate*, m.p. 163—164°). On further Grignard cleavage this yields *deacetyltetrahydromethyl-ψ-bufotalene-B* (I), C₂₄H₄₀O₄, m.p. 120—121°, whilst oxidation affords a OH-aldehyde, *deacetyltetrahydro-ψ-bufotal*, C₂₁H₃₄O₅, m.p. 145—147°. (I), when heated in xylene, gives *deacetyltetrahydromethyl-ψ-bufotalindiene*, C₂₄H₃₈O₃, m.p. 118—120°, oxidised to *deacetyltetrahydro-ψ-bufotalene-B*, C₂₀H₃₂O₄, m.p. 127—129° (*p*-nitrophenylhydrazone, m.p. 172—175°; *diacetate*, m.p. 115—117°); with AcO₂H this yields a substance, C₂₀H₃₂O₅, m.p. 135—136° (*p*-nitrophenylhydrazone, decomp. 167—169°), whilst Grignard cleavage affords *deacetyltetrahydromethyl-ψ-bufotalene-C*, C₂₁H₃₄O₃, m.p. 135—136°. This is oxidised to *deacetyltetrahydro-ψ-bufotalone-C*, C₁₈H₂₈O₄, m.p. 117—119°, which, on Grignard cleavage, affords *deacetyltetrahydromethyl-ψ-bufotalene-D*, C₁₉H₃₀O₃, m.p. 102—103°, oxidised to *deacetyltetrahydromethyl-ψ-bufotalene oxide*, C₁₉H₃₀O₄, m.p. 159—160°. This latter, with O₃, yields *deacetyltetrahydromethyl-ψ-bufotalonal*, C₁₉H₃₀O₅, m.p. 110—111° (*mono*-, m.p. 105—106°, and *di*-, m.p. 115—117°, *acetate*; *oxime*, decomp. 126—127°), which, with AcO₂H, affords *deacetyltetrahydromethyl-ψ-bufotalonic peroxide*, C₃₈H₆₀O₁₄, decomp. 193—195°, yielding, with dil. NaOH, *deacetyltetrahydromethyl-ψ-bufotalonic acid*, C₁₉H₃₀O₆, m.p. 184—185°. CH. ABS. (r)

Identity of evodin, dictamnolactone, and obakulactone. A. FUJITA, T. TAKU, and N. KUTANI (J. Pharm. Soc. Japan, 1935, **55**, 248—251).—The identity is indicated by m.p. and [α]. CH. ABS. (r)

Bilifuscin.—See this vol., 501.

Preparation of tetrahydrofurfuryl bromide and its reaction with magnesium. R. ROBINSON and L. H. SMITH (J.C.S., 1936, 195—196).—Contrary to Paul (A., 1933, 954) the product of the interaction

of Mg with tetrahydrofurfuryl bromide (I) (improved prep.) in pure dry Et_2O , wet and commercial Et_2O , and in Et_2O - EtOH (6:1) is always Δ^8 -penten- α -ol, only traces of tetrahydrofuran and of recovered (I) being obtained.

J. W. B.

Hydroxyfurans. I. 3-Hydroxy-2:4:5-triphenylfuran. E. P. KOHLER, F. H. WESTHEIMER, and M. TISHLER (J. Amer. Chem. Soc., 1936, 58, 264—267).—Successive treatment of 3-acetoxy-2:4:5-triphenylfuran (I) (Thiele, A., 1898, i, 469) with MgMeI and cold dil. H_2SO_4 gives 3-hydroxy-2:4:5-triphenylfuran (II) (not isolable), which has no phenolic properties, but resembles an active open-chain enol. (II) (in Et_2O) and O_2 afford the 2:3-peroxide (III), decomp. about 120° . Hydrolysis (dil. H_2SO_4 in AcOH and N_2) of (I) gives 3-keto-2:4:5-triphenyl-2:3-dihydrofuran, m.p. 112° [the ketonic form of (II)], which is only slowly oxidised (O_2) to (III). The deep yellow colour of (II) precludes direct titration with Br; indirect titration is vitiated owing to the production of (III). Reduction (H_2 , PtO_2 , EtOAc) of (III) gives 2-hydroxy-3-keto-2:4:5-triphenyl-2:3-dihydrofuran (IV), m.p. 191° [*Me ether* (V), m.p. 138° , formed by the action of MeOH - H_2SO_4 ; *Et ether*, m.p. 111° ; acetate (VI), m.p. 138 — 139°], converted by Br into 2-bromo-3-keto-2:4:5-triphenyl-2:3-dihydrofuran (VII), m.p. 154° [decomp. yielding (VIII) (below)], which is most conveniently prepared from (I) and Br in boiling CCl_4 . (VII) is converted by MeOH into (V). Reduction of (III) by methods other than the above affords (IV) and 3:3'-diketo-2:4:5:2':4':5'-hexaphenyl-2:3:2':3'-tetrahydro-2:2'-difuryl (VIII), 272 — 274° [also obtained from (VII) and Cu-bronze in C_6H_6]. (IV) and SOCl_2 give 2-chloro-3-keto-2:4:5-triphenyl-2:3-dihydrofuran, m.p. 149 — 150° . (IV) and Na in Et_2O give a Na derivative, which with CO_2 , AcCl , and MeI (or Me_2SO_4) affords (IV), (VI), and (V), respectively; treatment with Br gives γ -bromo- $\alpha\beta\delta$ -triketo- $\alpha\gamma\delta$ -triphenylbutane, m.p. 111° , which is reduced catalytically to (IV).

H. B.

Occurrence of furan derivatives in volatile oils.

II. α -Clausenan and di- α -clausenan. B. S. RAO and K. S. SUBRAMANIAM (Proc. Indian Acad. Sci., 1935, 2, A, 574—579).— α -Clausenan (I) (A., 1935, 134) combines with maleic anhydride to give the anhydride $\text{C}_{14}\text{H}_{14}\text{O}_4$, m.p. 85° , of the acid $\text{C}_{14}\text{H}_{16}\text{O}_5$, m.p. ($+9\text{H}_2\text{O}$) 98° , (anhyd.) 248° . With HgCl_2 (I) gives the substance $\text{C}_{10}\text{H}_{10}\text{O}(\text{HgCl})_2$. (I) is oxidised by FeSO_4 to a mixture of α -clausenyl alcohol, $\text{C}_{10}\text{H}_{14}\text{O}_2$, b.p. 89 — $90^\circ/30$ mm. (*Ac* derivative, b.p. 98 — $102^\circ/30$ mm.; phthaloyl derivative), a primary alcohol, with an isomeric tert.-alcohol, b.p. $<93^\circ/30$ mm., dehydrated by Na to (I). With KMnO_4 , (I) yields a ketone, $\text{C}_9\text{H}_{10}\text{O}_2$, b.p. 95 — $96^\circ/55$ mm. (*oxime*), with traces of an acid (*anilide*, m.p. 154°). HNO_3 (*d* 1.12) has little action on (I) at $<30^\circ$; with fuming HNO_3 in AcOH , a nitroketone, $\text{C}_9\text{H}_9\text{O}_4\text{N}$, charring at 130° , is formed. HCO_2H at 0° gives a resinous product, b.p. $240^\circ/2$ mm., and no di- α -clausenan (II) (*loc. cit.*). (II) does not combine with maleic anhydride; with fuming HNO_3 it yields a substance, $\text{C}_{18}\text{H}_{18}\text{O}_8\text{N}_2$, charring at 140° , and with HgCl_2 the compound $\text{C}_{20}\text{H}_{22}\text{O}_2(\text{HgCl})_2$. Na

in EtOH reduces (II) to a compound, b.p. 100 — $101^\circ/4$ mm.

E. W. W.

Passage from the sugar to the pyran and pyrrole series. Methylisopyromucic acid. E. VOTOCEK and S. MALACHTA (Coll. Czech. Chem. Comm., 1936, 8, 66—78).—Distillation of thamnono- (I), *d*-fucono-, and (probably) *d*-glucono-lactone, and $\alpha\beta\alpha'\beta'$ -tetrahydroxy- α -methyladipilactone gives 3-hydroxy-6-methyl-1:2-pyrone ("methylisopyromucic lactone"), m.p. 120 — 121° , which gives a green colour with FeCl_3 , reduces Fehling's solution and AgNO_3 , and gives a *Br*-, m.p. 147° , and *Bz* derivative, m.p. 121 — 122° . Peligot's sugar decomposes when distilled. Ba fuconate gives an unidentified aldehyde. (I) is resinified by HCl at 150° . Distillation of $(\text{NH}_4)_2\alpha\beta\alpha'\beta'$ -tetrahydroxy- α -methyladipate or NH_4 rhamnionate with $(\text{NH}_4)_2\text{CO}_3$, best in glycerol under NH_3 , gives 2-methylpyrrole.

R. S. C.

Synthetical experiments in the chromone group. XVIII. Demethylation with aluminium chloride. K. C. GULATI and K. VENKATARAMAN (J.C.S., 1936, 267—269).—Demethylation of 2:4:6-trimethoxyacetophenone (improved prep.) with AlCl_3 in PhCl gives the 2:4-dihydroxy-6-methoxy-compound (Sonn *et al.*, A., 1925, i, 1267) (4-benzyl ether, m.p. 72°). 2-Benzoyloxy-4:6-dimethoxyacetophenone, m.p. 91° (from BzCl - $\text{C}_2\text{H}_5\text{N}$ and the 2-OH-compound), with NaNH_2 in Et_2O and treatment of the diketone with 20% H_2SO_4 - EtOH , affords chrysin Me_2 ether (I), m.p. 143° (lit., m.p. 115 — 117°), also obtained from chrysin (II)- Me_2SO_4 - COMe_2 -20% NaOH , or by the action of 20% H_2SO_4 - EtOH on the product (containing 2-hydroxy-4:6-dimethoxy-dibenzoylmethane) of the action of AlCl_3 on 2:4:6-trimethoxybenzoylacetophenone (III) in PhNO_2 . (I) with AlCl_3 - PhNO_2 at 100° affords tecto-chrysin (IV), but when heated with solid AlCl_3 , (II) and (IV) are obtained. (III) with HI (*d* 1.7)- Ac_2O also gives (II) and (IV). The crude product of interaction of phloracetophenone and Bz_2O , with Me_2SO_4 - COMe_2 -10% aq. NaOH gave, in one experiment, (I) and its 3-*Bz* derivative, m.p. 212° , and, in another, (II) and 2-hydroxy-4:6-dibenzoyloxy- ω -benzoylacetophenone, m.p. 157° . (II) with either CH_2PhCl - COMe_2 - K_2CO_3 or CH_2PhBr -aq. EtOH - KOH affords 5-hydroxy-7-benzoyloxy-6-benzylflavone, m.p. 205° .

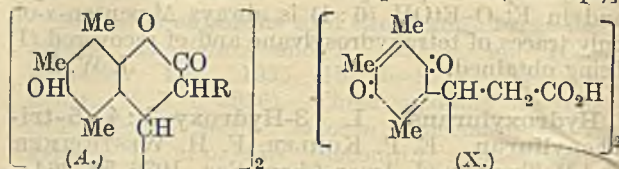
J. W. B.

Hydroxy-carbonyl compounds. X. Coumarins and chromones from *m*-4-xyleneol. D. G. FLYNN and A. ROBERTSON (J.C.S., 1936, 215—217).—Condensation of *m*-4-xyleneol (I) with $\text{CHRAc}\cdot\text{CO}_2\text{Et}$ gives (a) coumarins by Pechmann's method, and (b) chromones by that of Simonis, when $\text{R}=\text{H}$, Me , Et : when $\text{R}=\text{CH}_2\text{Ph}$ or with $\text{CH}_2\text{Bz}\cdot\text{CO}_2\text{Et}$ (b) fails to give condensation products. (I) and $\text{CH}_2\text{Ac}\cdot\text{CO}_2\text{Et}$ with 86% H_2SO_4 give 4:6:8-trimethylcoumarin (II), converted (Canter *et al.*, A., 1931, 1069) into 2-methoxy- β :3:5-trimethylcinnamic acid, m.p. 139° , oxidised to 2-methoxy-3:5-dimethylacetophenone, b.p. 134 — $135^\circ/21$ mm. (*semicarbazone*, m.p. 193°), also obtained by methylation of the 2-OH-compound (III). 3:4:6:8-Tetramethyl- (IV), 4:6:8-trimethyl-3-ethyl-, m.p. 112.5 — 113° , 4-phenyl-6:8-dimethyl-, m.p. 111° , and 3-benzyl-4:6:8-trimethyl-, m.p. 112 — 113° , -coumarin are similarly obtained,

whence 2-methoxy- α : β :3:5-tetramethyl-, m.p. 139.5—140°, and - β :3:5-trimethyl- α -ethyl-, m.p. 112°, cinnamic acid are prepared. (III) with EtOAc-Na at 100° gives 2-hydroxy- ω -acetyl-3:5-dimethylacetophenone, m.p. 85°, cyclised (AcOH-HCl) to the chromone, m.p. 125° [also from (I)-CH₂Ac·CO₂Et-P₂O₅], condensed with piperonal to give 2-(3':4'-methylenedioxystyryl)-6:8-dimethylchromone, m.p. 195°. The propionate of (I) with AlCl₃ affords 2-hydroxy-3:5-dimethylpropiophenone, m.p. 52—53°, converted by Ac₂O-NaOAc at 180° into 2:3:6:8-tetramethylchromone, m.p. 136—137° [also from (I) and CHMeAc·CO₂Et], whence 2-(3':4'-methylenedioxystyryl)-3:6:8-trimethylchromone, m.p. 196° is obtained. 2-Hydroxy-3:5-dimethyl-n-butyrophenone, b.p. 145—150°/30 mm., m.p. 30° [from the butyrate, b.p. 132—133°/17.5 mm. of (I)], 2:6:8-trimethyl-(V), m.p. 112.5°, and 2-(3':4'-methylenedioxystyryl)-6:8-dimethyl-, m.p. 202—203°, 3-ethylchromone, are obtained similarly. (III) with Ac₂O-NaOAc at 170° affords (V), its 3-Ac derivative (isolated at its oxime, m.p. 119°), and (II). (III) and (EtCO)₂O-EtCO₂Na give (IV) and 3-propionyl-6:8-dimethyl-2-ethylchromone (as its oxime, m.p. 93°); (III) with BzO-NaOBz affords 3-benzoyl-6:8-dimethylflavone, m.p. 191—192°. With EtCO₂Et and Na (III) gives 6:8-dimethyl-2-ethylchromone, m.p. 109—110°. J. W. B.

Reaction between duroquinone and sodium-malonic ester. III. Reduction products. L. I. SMITH and R. O. DENYES (J. Amer. Chem. Soc., 1936, 58, 304—309).—The Et ester (I), m.p. 183—184°, of 6-hydroxy-5:7:8-trimethylcoumarin-3-carboxylic acid (II), m.p. 256—258° (decomp.) (A., 1926, 836), is reduced (H₂, PtO₂, EtOH) to Et 6-hydroxy-5:7:8-trimethyl-3:4-dihydrocoumarin-3-carboxylate (III), m.p. 104—105° [acetate, m.p. 116—117°, also prepared by reduction of the acetate of (I)], which is hydrolysed (20% HCl in COMe₂) to 6-hydroxy-5:7:8-trimethyl-3:4-dihydrocoumarin (IV), m.p. 173—174° (acetate, m.p. 147—148°), also obtained by reduction (as above) of (II). (IV) and Me₂SO₄ in MeOH-KOH afford β -2:5-dimethoxy-3:4:6-trimethylphenylpropionic acid, m.p. 132—133° (amide, m.p. 188—189°), whilst (IV) and aq. MeOH-NaOH in C₆H₆ give trimethyl- β -carboxyethyl-p-benzoquinone (V), m.p. 113—114°, which is reduced (Zn dust, aq. AcOH) to (IV). 2:4:5-C₆H₂Me₃·CH:CH·CO₂H, m.p. 154—155°, best prepared from 2:4:5-C₆H₂Me₃·CHO, Ac₂O, and NaOAc at 170—180° in N₂, is reduced to 2:4:5-C₆H₂Me₃·CH₂·CH₂·CO₂H [Me ester (VI), b.p. 125—127°/4 mm.], which with HNO₃ (d 1.52) in CHCl₃+conc. H₂SO₄ gives β -3:6-dinitro-2:4:5-trimethylphenylpropionic acid, m.p. 206—207° [amide, m.p. 215—216°; Me ester, m.p. 164.5—165°, also prepared by similar nitration of (VI)]. This is reduced (SnCl₂, HCl, AcOH) to 6-amino-5:7:8-trimethyl-3:4-dihydrocarbostyryl, m.p. 223—224° (Ac derivative, m.p. 320°), which is oxidised (FeCl₃, dil. HCl) to (V). Reduction (Zn, AcOH) of (I) gives (III), Et 6:6'-dihydroxy-5:7:8:5':7':8'-hexamethyl-3:4:3':4'-tetrahydro-4:4'-dicoumarinyl-3:3'-dicarboxylate (VII) (A., R=CO₂Et), m.p. 212—213° (decomp.) (diacetate, m.p. 218—219°), and 6:6'-dihydroxy-5:7:8:5':7':8'-hexamethyl-3:4:3':4'-tetrahydro-

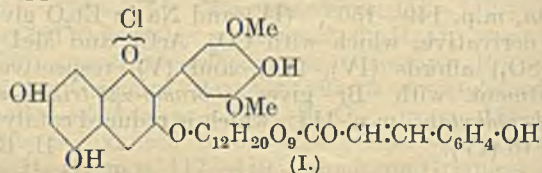
4:4'-dicoumarinyl (VIII) (A., R=H), m.p. 290—292° (decomp.) [diacetate, m.p. 298° (decomp.)].



Similar reduction of (II) affords (IV) and (VIII). (VII) is hydrolysed (50% H₂SO₄, EtOH) to (VIII) which with Me₂SO₄ in MeOH-KOH affords $\beta\beta'$ -di-(3:5-dimethoxy-3:4:6-trimethylphenyl)adipic acid (IX), m.p. 309° (decomp.) (Me₂ ester, m.p. 217—218°). Hydrolysis (3% NaOH) of (VIII) gives $\beta\beta'$ -di-(3:4:6-trimethyl-2:5-benzoquinonyl)adipic acid (X), m.p. 256—258° (decomp.) (Me₂ ester, m.p. 293—294°), reduced (Zn, AcOH) to (VIII). A ketone could not be obtained from (IX) and Ac₂O at 300° or by pyrolysis of the Th salt. No evidence has been obtained that (I) or (II) reacts in a tautomeric form. The prep. of duroquinone (*loc. cit.*) is improved. The reaction between a fully methylated quinone and Na enolates appears to be a general method of prep. of 3-substituted 6-hydroxypolymethylcoumarins.

H. B.

Colouring matters of violet potatoes. I. CHMIELEWSKA (Rocz. Chem., 1935, 15, 491—505).—Negretein (I) (picrate) and tuberlin chlorides (II) are pptd. by Et₂O from the HCl-MeOH extract of Negress potatoes. (I) (+8, 4, or 1 H₂O) yields negretin (III) (picrate; chloride) and p-hydroxycinnamic acid when hydrolysed with 10% aq. NaOH at 0°, and (III) affords malvidin chloride, glucose, and isorhodeose with 20% HCl at the b.p. (3 min.). This suggests the appended structure for (I).



(II) yields glucose and tuberidin chloride (IV) when hydrolysed with 20% HCl, and p-OH·C₆H₄·CO₂H is obtained by the alkaline hydrolysis of (IV), so that (IV) is a Me₁ ether of 3:5:6:7:8:4'-hexahydroxyflavylium chloride, and (II) is its 3-glucoside.

R. T.

Colour and constitution of dyes derived from fluorenone. M. K. MUKHERJEE and S. DUTT (Proc. Acad. Sci. Agra and Oudh, 1934—1935, 5, 234—239; cf. A., 1931, 627).—Fluorenone (1 mol.) with a phenol or aminophenol (2 mols.) at 180—200° in presence of dry HCl affords fluorenylidene-xanthenes. The following are prepared: 3:6-dihydroxy-, m.p. 232° (Br₂-, m.p. > 300°, Bz₂-, m.p. 212°, and Na₂ derivatives) (from resorcinol); 4:5-dihydroxy-, m.p. 169° (Br₂-, m.p. > 300°, Bz₂-, m.p. 141°, and Na₂ derivatives) (from phloroglucinol); 3:4:5:6-tetrahydroxy-, m.p. 181° (Na₂ derivative) (from pyrogallol); 3:6-dihydroxy-1:8-dimethyl-, m.p. > 300° (from orcinol); 3:6-tetramethyldiamino-, m.p. 111° (from m-OH·C₆H₄·NMe₂); and 3:6-tetramethyldiamino-9-fluorenylidene-xanthen, m.p. 127° (from

$m\text{-OH}\cdot\text{C}_6\text{H}_4\cdot\text{NEt}_2$). The absorption max. of these dyes are analogous to those of the phthaleins, but their colour (not due to a quinonoid form) and fluorescence are less intense. J. L. D.

Action of sulphuric acid on diarylphthalins.

I. F. F. BLICKE and R. A. PATELSKI (J. Amer. Chem. Soc., 1936, 58, 276—278).—Contrary to Baeyer (A., 1880, 650), tetrabromophenolphthalin [prepared from phenolphthalin (I) and Br in AcOH], m.p. 209—210° (lit. 205° and 208—209°) [Ac_2 derivative, m.p. 186—187° (decomp.) (lit. 165—166°)], is converted by conc. H_2SO_4 into 2:5-di-(3':5'-dibromo-4'-hydroxyphenyl)-3:4-benzofuran, m.p. 240—242° (decomp.) [Ac_2 derivative, m.p. 264—266° (decomp.)], which is oxidised (KMnO_4 , aq. NaOH) to 3:5-dibromo-4-hydroxy-2'-(3':5'-dibromo-4'-hydroxybenzoyl)benzophenone, m.p. 298—301° (decomp.), also prepared from 4'-hydroxy-2-*p*-hydroxybenzoylbenzophenone and Br in EtOH. Reduction (Zn dust, aq. NaOH) of tetrabromophenolphthalein gives (I) (cf. *loc. cit.*). *iso*Phenolphthalein, m.p. 201—202° (from 2-*o*-hydroxybenzoylbenzoic acid, PhOH, and ZnCl_2 at 90—100°), is reduced to the phthalin, m.p. 193—194° (lit. 189—190°), which is methylated (Me_2SO_4 , 10% NaOH) to 2':4''-dimethoxytriphenylmethane-2-carboxylic acid, m.p. 211—212°. This and conc. H_2SO_4 give 2-*o*-anisyl-5-*p*-anisyl-3:4-benzofuran (also prepared from *o*-OMe· $\text{C}_6\text{H}_4\cdot\text{MgI}$ and α -*p*-anisylphthalide), which is oxidised ($\text{Na}_2\text{Cr}_2\text{O}_7$, AcOH) to 4'-methoxy-2-*o*-methoxybenzoylbenzophenone, m.p. 109—110° [bis-*p*-bromophenylhydrazone, m.p. 163—165° (decomp.)]. Oxidation [$\text{K}_2\text{Fe}(\text{CN})_6$, 10% NaOH] of 2:5-di-*p*-hydroxyphenyl-3:4-benzofuran affords 4'-hydroxy-2-*p*-hydroxybenzoylbenzophenone. H. B.

Synthesis of rotenone and its derivatives.

VIII. Netoric acid and toxicaric acid. A. ROBERTSON and G. L. RUSBY (J.C.S., 1936, 212—214).—*Et* derrate, m.p. 64° (by esterification of the acid), is converted by Na in PhMe at 100° into *Et* 3-hydroxy-6:4-dimethoxy- Δ^3 -chromene-4-carboxylate, m.p. 109—110° [Ac derivative (I), m.p. 84°], reduced (Adams) to *Et* 3-hydroxy-6:7-dimethoxychroman-4-carboxylate (*Et* hydroxynetorate), m.p. 106°, dehydrated (boiling Ac_2O) and hydrolysed to 6:7-dimethoxy- Δ^3 -chromene-4-carboxylic acid, m.p. 210—211° (decomp.), identical with toxicaric acid. Reduction of (I) (Adams) and subsequent hydrolysis with aq. KOH affords 6:7-dimethoxychroman-4-carboxylic acid + H_2O , m.p. 90—91° (rapid heating), and anhyd., m.p. 132—133°, identical with netoric acid. When boiled with Ac_2O -NaOAc, derric acid affords a substance, m.p. 85°, probably 3-acetoxy-6:7-dimethoxy- Δ^3 -chromene, hydrolysed by aq. EtOH-NaOH at 25° to a substance, decomp. 203—204°, possessing ketonic properties. J. W. B.

Preparation of 1:4-dithiens. R. H. BAKER and C. BARKENBUS (J. Amer. Chem. Soc., 1936, 58, 262—264).— $\text{COAr}\cdot\text{CH}_2\cdot\text{S}_2\text{O}_3\text{Na}$ (from $\text{COAr}\cdot\text{CH}_2\text{Cl}$ and $\text{Na}_2\text{S}_2\text{O}_3$) are hydrolysed (dry or conc. HCl in EtOH) to $\text{COAr}\cdot\text{CH}_2\cdot\text{SH}$, which are immediately converted into 2:5-dihydroxy-2:5-diaryl-1:4-dithians and thence (by loss of $2\text{H}_2\text{O}$) into 2:5-diaryl-1:4-dithiens (59—74% yield). Condensation occurs much

less readily with $\text{COAr}\cdot\text{CHR}\cdot\text{SH}$; when R is Me and Ph the yields of dithien are 11% and 0, respectively. With $\text{COMe}\cdot\text{CH}_2\cdot\text{SH}$, a different condensation occurs; a compound (40.8% S), b.p. 77—78°/5 mm., is produced. The following are described: *Na phenacyl* (+ H_2O), *m-nitrophenacyl*, β -*naphthacyl*, α -*methylphenacyl* (+ H_2O), *desyl* (I), and *acetonyl* (+ $3\text{H}_2\text{O}$) *thiosulphates*; 2:5-diphenyl-, m.p. 115—117°, 2:5-di-*m-nitrophenyl*-, m.p. 220—222°, 2:5-di- β -*naphthyl*-, m.p. 198—200°, and 2:5-diphenyl-3:6-dimethyl-, m.p. 135—138°, 1:4-dithiens. Hydrolysis of (I) gives a trace of a compound (9.33% S), m.p. 184.5—185°.

H. B.

Catalytic transformations of heterocyclic compounds. I. Transformations of furan into pyrrole and thiophen. J. K. JURIEV (Ber., 1936, 69, [B], 440—443).—Passage of furan (I) or furfuraldehyde and NH_3 over non-ignited Al_2O_3 at 450° gives pyrrole (II) in 30% yield. (I) and H_2 similarly afford thiophen in 31% yield. The production of (II) from C_2H_2 and NH_3 containing traces of H_2O in presence of Al_2O_3 is probably due to intermediate formation of (I). H. W.

2:4-Dimethylpyrrole. H. FISCHER (Org. Syntheses, 1935, 15, 20—21).—The prep. from Et 2:4-dimethylpyrrole-3:5-dicarboxylate is described.

CH. ABS. (r)

Diethyl 2:4-dimethylpyrrole-3:5-dicarboxylate. H. FISCHER (Org. Syntheses, 1935, 15, 17—19).—The prep. from $\text{CH}_2\text{Ac}\cdot\text{CO}_2\text{Et}$ is described in detail.

CH. ABS. (r)

Reactivity of bromine atoms in brominated pyridines. Preparation of some 2:6-disubstituted products of pyridine. H. J. DEN HERTOOG and J. P. WIBAUT (Rec. trav. chim., 1936, 55, 122—130).—The replacement of Hal. by NH_2 in the 3 and 5 positions is described. 2:6- $\text{C}_5\text{H}_3\text{NBr}_2$ (cf. A., 1932, 522) when heated with NaOH in EtOH yields 6-bromo-2-ethoxypyridine (I), b.p. 218—219°, which when heated with NaOEt in EtOH in a sealed tube gives 2:6-diethoxypyridine, m.p. 21.5°. 6:2- $\text{C}_5\text{H}_3\text{NBr}\cdot\text{NH}_2$ (*loc. cit.*) similarly yields 2-amino-6-ethoxypyridine, b.p. 238° (*picrate*, m.p. 216—222°; *Ac* derivative, m.p. 136—137°), and with NaNO_2 and H_2SO_4 gives 6-bromo-2-hydroxypyridine, m.p. 123° (*Na* salt). 2:6- $\text{C}_5\text{H}_3\text{NBr}_2$ with $\text{C}_5\text{H}_{11}\text{N}$ in $\text{C}_5\text{H}_5\text{N}$ at 160° yields 6-bromo-2-piperidinopyridine, b.p. 120—125°/0.1 mm., which with $\text{C}_5\text{H}_{11}\text{N}$ in $\text{C}_5\text{H}_5\text{N}$ at 180° gives 2:6-dipiperidinopyridine, m.p. 39—40°. Similarly 6:2- $\text{C}_5\text{H}_3\text{NBr}\cdot\text{NH}_2$ and (I) give, respectively, 2-amino-6-piperidino-, b.p. 202°/30 mm., m.p. 38—39° (*Ac* derivative, m.p. 116—117°), and 6-piperidino-2-ethoxy-pyridine, b.p. 170°/22 mm. (*picrate*, two forms, m.p. 122° and 142°). 2- $\text{C}_6\text{H}_4\text{N}\cdot\text{Hal}$ does not react with Mg. The antiseptic properties of these compounds are described. F. R. G.

1-Methyl-2-pyridone. E. A. PRILL and S. M. McELVAIN (Org. Syntheses, 1935, 15, 41—44).—($\text{C}_5\text{H}_5\text{NMe}$) MeSO_4 (from $\text{C}_5\text{H}_5\text{N}$ and Me_2SO_4) is oxidised with alkaline $\text{K}_3\text{Fe}(\text{CN})_6$. CH. ABS. (r)

Phenylhydrazone of *N*-phenylaminochelidamic ester. E. KOENIGS and H. GURLT (Ber., 1936, 69, [B], 358).— Et_2 acetonedioxalate and $\text{NHPh}\cdot\text{NH}_2$ in boiling EtOH afford the phenyl-

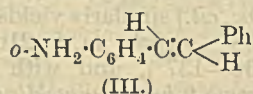
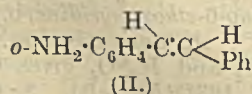
hydrazone of *Et*, 1-anilino-4-keto-1 : 4-dihydropyridine-2 : 6-dicarboxylate, m.p. 194°, which is not reduced to the corresponding NH_2 -compound by SnCl_2 and HCl . H. W.

Indole compounds. J. GNEZDA (Rad., 244, 13—15; Chem. Zentr., 1935, i, 3574).—Several colour reactions are described. H. N. R.

Halogenated ketones. IIIa. Pyrrole. IVa. Skatole. G. SANNA (Rend. Semin. Fac. Sci. Univ. Cagliari, 1934, 4, 59—61; Chem. Zentr., 1935, ii, 219; cf. A., 1933, 1169).—IIIa. Condensation of $\text{CHMeBr}\cdot\text{COCl}$ with Mg -pyrrole affords 2- α -bromopropionylpyrrole, m.p. 106°, which gives a pyrrole-black with alkali.

IVa [with F. ATHENE]. Condensation of Mg -skatole with $\text{CHCl}_2\cdot\text{COCl}$ or $\text{CCl}_3\cdot\text{COCl}$ yields 1-di- or 1-tri-chloroacetyl-3-methylindole, which cannot readily be isolated as they break down into CO_2 , CHCl_3 , and skatole; 2-substituted compounds are not obtained. H. N. R.

Ring-closures of derivatives of 2-aminostyrene. T. W. J. TAYLOR and (Miss) P. M. HOBSON (J.C.S., 1936, 181—184).—2-Acetamidostyrene (I) with POCl_3 gives quinaldine, whilst adipodi-2-vinylanilide, m.p. 202°, obtained from 2-aminostyrene and adipyl chloride, similarly forms $\alpha\delta$ -di-(2-quinolyl)butane, m.p. 98°, and 2-n-hexamidostyrene, m.p. 61°, affords 2-n-amyloquinoline (picrate, m.p. 104—105°; lit., 111—112°). (I) and Br yield (I) dibromide, m.p. 125°, which with KOH gives indole. *cis*-2-Nitro-stilbene, obtained from 2-nitro- α -phenylcinnamic acid and Cu chromate, is reduced to the NH_2 -compound, of which the *Ac* derivative, m.p. 112—113°, with POCl_3 , yields 3-benzylidene-2-methylindolenine, also obtained from the corresponding *trans*-compound. Diazotisation of the *cis*- NH_2 -compound gives phenanthrene, but none is obtained from the *trans*-compound. The results indicate the structure (II) and (III) for *cis*- and *trans*-, (III) being the compound previously known.



Diazotisation of 4-aminophenylethyl alcohol affords β -4-bromophenylethyl alcohol, m.p. 36—38° (phenylurethane, m.p. 126°). F. R. S.

Relation between chemical constitution and anaesthetic activity of 2-alkoxyquinoline derivatives. H. WOJAHN (Arch. Pharm., 1936, 274, 83—106).—2-Chloro-4-quinoloyl chloride (I) (in C_6H_6) and $\text{NH}_2\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{NHAc}$ (in H_2O) give 2-chloroquinoline-4-carboxyl- β -acetamidoethylamide, m.p. 245°, converted by $\text{EtOH}\cdot\text{NaOEt}$ into the 2-ethoxy-derivative, m.p. 209°. 2-Ethoxy-4-quinoloyl chloride (A., 1931, 1167) and $\text{NH}_2\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{NH}\cdot\text{COEt}$ similarly afford 2-ethoxyquinoline-4-carboxyl- β -propionamidoethylamide, m.p. 204°; with $\text{C}_2\text{H}_5(\text{NH}_2)_2$, *NN'*-di-2-ethoxy-4-quinolylethylenediamine, m.p. 280°, results. (I) (in PhMe) and conc. aq. NH_3 give 2-chloroquinoline-4-carboxylamide (II), m.p. 239—240°, converted by NaOAlk in AlkOH into 2-ethoxy-, m.p. 200—201°, and 2-butoxy-, m.p. 160°, -quinoline-4-carboxylamides.

2-Butoxyquinoline-4-carboxyldiethylamide* (from the 2-Cl-derivative and NaOBU) has b.p. 270°/20 mm., m.p. 62°. The above amides are converted by NaOBr into 2-chloro-4-amino-, m.p. 188° (hydrochloride, m.p. 250°), and 4-amino-2-ethoxy-, m.p. 128°, and -2-butoxy-, m.p. 85°, -quinoline, respectively. (II) is dehydrated by SOCl_2 to 2-chloro-4-cyanoquinoline, m.p. 156°, which with NaOAlk gives 4-cyano-2-ethoxy-, m.p. 86°, and -2-butoxy-, b.p. 198°/18 mm., m.p. 31°, -quinoline, reduced (H_2 , $\text{Pd}\cdot\text{BaSO}_4$, AcOH) to 2-ethoxy-* (III), b.p. 205°/20 mm., m.p. 53° [dihydrochloride, m.p. 230° (decomp.)], and 2-butoxy-* (IV), b.p. 225°/17 mm., m.p. 51° (dihydrochloride, m.p. >230°), -4-aminomethylquinoline, respectively. Catalytic reduction of the Schiff base from (III) and the appropriate RCHO or CORR' affords 2-ethoxy-4-propyl-, m.p. 207°, -4-benzyl-, m.p. 131°, and -4- β -phenylethyl-, m.p. 250°, -aminomethylquinoline hydrochlorides, and 2-ethoxy-4-isobutyl-, m.p. 115°, and -4-phenylisopropyl-, m.p. 110°, -aminomethylquinoline dihydrochlorides. (IV) similarly gives 2-butoxy-4-propyl-, m.p. 213°, -4-benzyl-, m.p. 177°, -4- β -phenylethyl-, m.p. 134°, and -4-phenylisopropyl-, m.p. 156°, -aminomethylquinoline hydrochlorides, and 2-butoxy-4-isobutyl-, m.p. 120°, and -4-phenylisopropyl-, m.p. 115°, -aminomethylquinoline dihydrochlorides. 2-Ethoxy-4- γ -methylamino- (trihydrochloride, m.p. 121°), and -4- γ -diethylamino- (trihydrochloride, m.p. 71°), - $\beta\beta$ -dimethylpropylaminomethylquinolines are similarly prepared from (III) and $\text{NHMe}\cdot\text{CH}_2\cdot\text{CMe}_2\cdot\text{CHO}$ and $\text{NEt}_2\cdot\text{CH}_2\cdot\text{CMe}_2\cdot\text{CHO}$, respectively. (III) and $\text{CH}_2\text{Cl}\cdot\text{CH}_2\cdot\text{NEt}_2\cdot\text{HCl}$ at 150—160° give 2-ethoxy-4- β -diethylaminoethylaminomethylquinoline (trihydrochloride, m.p. 128°). 4-Cyano-2-ethoxyquinoline (V) and MgMeI (± 2 mols.) in PhOMe afford 2-ethoxy-4-quinolyl *Me* ketone, m.p. 57° (hydrochloride, m.p. 108°; picrate, m.p. 101°), converted by Br in cold CS_2 into the CH_2Br ketone hydrobromide, m.p. 80°, which with $\text{EtOH}\cdot\text{NHET}_2$ affords 2-ethoxy-4-quinolyl diethylaminomethyl ketone, b.p. 175°/18 mm. (dihydrochloride, m.p. 65°), reduced (H_2 , $\text{Pd}\cdot\text{BaSO}_4$, EtOH) to 2-ethoxy-4- β -diethylamino- α -hydroxyethylquinoline (hydrochloride, m.p. 157°). (V) and MgEtI similarly give 2-ethoxy-4-quinolyl *Et* ketone, b.p. 198—203°/20 mm. (hydrochloride, m.p. 90°; picrate, m.p. 158°), and thence the α -bromoethyl (hydrobromide, m.p. 114°) and α -diethylaminoethyl, b.p. 175—180°/18 mm. (dihydrochloride, m.p. 89°), ketones. 2-Ethoxy-4-quinolyl *Pr*, b.p. 190—200°/20 mm. (picrate, m.p. 150°), α -bromopropyl (hydrobromide, m.p. 123°), and α -diethylaminopropyl, b.p. 180°/20 mm. (dihydrochloride, m.p. 100°), ketones are similarly prepared. These NEt_2 -ketones are vaso-constrictors. Of the various amines prepared, only those marked * possess anaesthetic activity. These and previous results (*loc. cit.*) show that the 2-alkoxyquinolyl is the active group; the activity of percaïne [2-butoxyquinoline-4-carboxyl- β -diethylaminoethylamide] is not due to the presence of the $\cdot\text{N}\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{N}\cdot$ grouping. The CO_2H (*cf. loc. cit.*) is not essential.

H. B.

$\alpha\beta$ -Diarylethylamines and their transformation into tetrahydroisoquinolines. I. B. REICHERT and W. HOFFMANN (Arch. Pharm., 1936,

274, 153—173).— α -Nitrostilbenes are hydrogenated (Pd-black) in C_6H_5N at 40—60° to deoxybenzoinoximes, which with 3% Na-Hg in EtOH-AcOH give the α -diarylethylamines. These bases with hot aq. CH_2O give Schiff's bases, which are cyclised in excellent yield by hot 10% HCl to 3-aryltetrahydroisoquinolines if, but only if, Ar has OR in the *p*-position. A C-C chain could be attached to the *sec*.-N thus formed, but ring-closure with the 3-aryl nucleus could not be effected. The following are prepared by the above methods, the direction of ring-closure being proved by the reactions described. β -Nitro-3-methoxy- α - β -diphenylethylene (from *m*-OMe- C_6H_4 ·CHO, CH_2Ph ·NO₂, and a little $NHMe_2$ kept in EtOH at room temp. for 4 days), m.p. 78°. Deoxybenzoinoxime, m.p. 94°; 3:4-methylenedioxy-, m.p. 138°, 3-methoxy-, m.p. 80°, 3:4-, m.p. 108°, and 2:4-dimethoxy-deoxybenzoinoxime, m.p. 91°. α -Phenyl- β -3:4-methylenedioxy-, m.p. 37—38°, b.p. 222—223°/17 mm. [acetate, m.p. 152—153°; hydrochloride, m.p. 258—259° (decomp.); Bz derivative, m.p. 180°], -4- (I), b.p. 202—203°/12 mm. (acetate, m.p. 135°; hydrochloride, m.p. 208—209°), and -3-methoxy-, b.p. 192°/11 mm. (hydrochloride, m.p. 205—207°), -3:4-, m.p. 67°, b.p. 233°/16 mm. (H oxalate, m.p. 176°; Bz derivative, m.p. 178°), and -2:4-dimethoxy-, b.p. 230—231°/18 mm. (hydrochloride, m.p. 214°; Bz derivative, m.p. 183—184°), and -4-hydroxyphenylethylamine [from (I) and 38% HCl at 150°], m.p. 159° (hydrochloride, m.p. 252° after sintering); α - β -di-3:4-methylenedioxyphenylethylamine hydrochloride, m.p. 254° (lit. 245°). 6:7-Methylenedioxy (II), m.p. 82—83° [hydrochloride, m.p. 245—246° (decomp.); NO-derivative, m.p. 125°], 6:7-dimethoxy-, m.p. 96° [hydrochloride, m.p. 258° (decomp.); NO-derivative, m.p. 100°], and 6-methoxy-3-phenyl-1:2:3:4-tetrahydroisoquinoline (III), m.p. 72—73° (hydrochloride, m.p. about 263°); 6:7-methylenedioxy-3-3':4'-methylenedioxyphenyl-1:2:3:4-tetrahydroisoquinoline (IV), m.p. 124—125° (hydrochloride, m.p. 250—251°; NO-derivative, m.p. 149°). (II) and hot aq. $KMnO_4$ afford 6:7-methylenedioxy-3-phenylisoquinoline (23% yield), m.p. 128° [hydrochloride, m.p. about 270°; methiodide, m.p. 239° (decomp.) after sintering], BzOH, and a small amount of a nitrogenous acid, m.p. 276°; (IV) and $KMnO_4$ give similarly a small amount of 6:7-methylenedioxy-3-3':4'-methylenedioxyphenylisoquinoline, m.p. 210—211°. (II) and MeI yield 6:7-methylenedioxy-3-phenyl-2-methyl-1:2:3:4-tetrahydroisoquinoline methiodide, m.p. 268°, which (a) with Na-Hg in hot H_2O gives 4:5-methylenedioxy-2- β -phenylethylbenzyl-dimethylamine (V), an oil (oxalate, m.p. 173°), the methiodide, m.p. 211°, of which with Na-Hg affords 4:5-methylenedioxy-2- β -phenylethyltoluene, m.p. 49°, and (b) with hot conc. KOH gives 4:5-methylenedioxy-2-dimethylaminomethylstilbene, an oil (oxalate, m.p. 221—222°), hydrogenated (Pd-C) in warm H_2O to (V) and oxidised by hot aq. $KMnO_4$ to BzOH and hydrastic acid. 6-Methoxy-3-phenyl-2-methyl-1:2:3:4-tetrahydroisoquinoline methiodide [from (III) and MeI], m.p. 255—258°, with hot conc. KOH gives 5-methoxy-2-dimethylaminomethylstilbene (oxalate, m.p. 181—182°), oxidised by $KMnO_4$ to $NHMe_2$, BzOH, and 4-methoxyphthalic acid (anhydride, m.p. 92°).

(II) and (IV) with excess of CH_2Br · CH_2 ·OH give poor yields of 6:7-methylenedioxy-3-phenyl-, m.p. 92—93° (hydrochloride, m.p. 220—222°), and -3-3':4'-methylenedioxy-2- β -hydroxyethyl-1:2:3:4-tetrahydroisoquinoline, m.p. 49° (hydrochloride, m.p. 258°); attempts to dehydrate these OH-bases by $NaOEt$, P_2O_5 in PhMe, and long boiling in tetralin were unsuccessful; $SOCl_2$ in $CHCl_3$ led to mixtures. R. S. C.

Synthesis of succinic acid-isoquinoliniumbetaines. O. LUTZ and A. KRAUHLIS (Ber., 1936, 69, [B], 419—422).—isoQuinoline (I) and maleic acid (II) in abs. Et_2O at room temp. afford isoquinolinium *H* maleate, m.p. 103°, which passes when heated into succinic acid-isoquinoliniumbetaine (III), C_9H_7N — $\begin{matrix} \text{CH} \cdot \text{CO}_2\text{H} \\ \text{O} \cdot \text{CO} \cdot \text{CH}_2 \end{matrix}$, m.p. (anhyd.) 151—152°, m.p. (+1H₂O) 149—150°, better obtained by keeping (I) and (II) in MeOH or H_2O for some time at room temp. or by heating them in H_2O at 50—60°. (III) is also obtained similarly from (I) and fumaric acid and also appears to be produced from *l*-bromosuccinic acid. H. W.

Carbon double linkings and nitrogen-carbon linkings. XIII. Degradation of quaternary ammonium compounds by catalytic hydrogenation. H. EMDE and H. KULL (Arch. Pharm., 1936, 274, 173—184; cf. A., 1934, 515).—Many quaternary NH_4 salts are hydrogenated to *tert*.-bases but the reaction differs in ease and often in course from the Na-Hg reduction. CH_2 · CH · CH_2 · NMe_3I with H_2 -Pt (not Pd) in AcOH or H_2O gives NMe_3 (63%), a little C_3H_6 , more C_3H_8 , and much NMe_3Pr^+I (unaffected by hydrogenation). $CHPh$ · CH · NMe_3Cl with H_2 -Pt or -Pd gives $PhPr^+$ (70%), NMe_3 , and Ph · $[CH_2]_3$ · NMe_3Cl (not degraded by hydrogenation, but slowly giving the cyclohexyl derivative). CH_2Ph · $NPhMe_2Cl$ with H_2 -Pd gives PhMe and $NPhMe_2$, with H_2 -Pt methylcyclohexane (I) and cyclohexyldimethylamine (platini-, m.p. 158°, and auri-chloride, m.p. 105°). CH_2 · CH · CH_2 · $NMeI$ · CH_2Ph , CH_2Ph · NMe_3Cl , and CH_2Ph · NMe_3I are unaffected by H_2 -Pd, but the two last salts with H_2 -Pt give NMe_3 (96%) and PhMe [or by longer hydrogenation (I)]. $(CH_2Ph)_2NMe_2I$ with H_2 -Pd in 50% AcOH or $(CH_2Ph)_2NMe_2Cl$ with H_2 -Pt in H_2O gives PhMe and NMe_3 · CH_2Ph very slowly. $NPhMe_3Cl$ in AcOH with H_2 -Pt (not Pd) gives slowly NMe_3 and C_6H_6 and then cyclohexane. 1-Methylpiperidine methiodide and methochloride, hygroscopic, cannot be hydrogenated. 1-Methyltetrahydroquinoline methiodide (methoaurichloride, m.p. 184°; methosulphate, m.p. 198°) with H_2 -Pt (not Pd) in H_2O (not AcOH) gives Ph · $[CH_2]_3$ · NMe_2 , and 2-methyltetrahydroisoquinoline methiodide, m.p. 189°, or methochloride (methoaurichloride, m.p. 187°) yields similarly β -o-tolylethyl-dimethylamine, b.p. 223—224° [hydrochloride, m.p. 221°; platinichloride, m.p. 168° (decomp.); picrate, m.p. 126—127°; methoaurichloride, m.p. 156°, and -picrate, m.p. 152°]. Hydrogenation of o - CH_2 · CH · C_6H_4 · CH_2 · NMe_2 affords *o*-ethylbenzyl-dimethylamine (auri-, m.p. 148°, and platini-chloride, m.p. 166—167°; picrate, m.p. 133—5°; methiodide, m.p. 226°; methoaurichloride, m.p. 187°). R. S. C.

2:8-Dialkoxy-10-alkylacridinium derivatives with various kinds of amino-group in the 5-position. X. Synthesis of 2:8-dialkoxy-5-*p*-aminoanilino-10-alkylacridinium derivatives and (2':8'-dialkoxy-10'-alkyl-10'-substituted-acridyl)-5:5'-*p*-phenylenediamino-2:8-dialkoxy-10-alkylacridinium derivatives. XI. Synthesis of 2:8-dialkoxy-5-piperazino-10-alkylacridinium and (2':8'-dialkoxy-10'-alkyl-10'-substituted-acridyl)-5:5'-piperazino-2:8-dialkoxy-10-alkylacridinium derivatives. K. ISHIIHARA (J. Chem. Soc. Japan, 1935, 56, 289—313, 457—485; cf. this vol., 343).—X. The following reactions are described for the 2:8-(OMe)₂- and -(OEt)₂-compounds, with OH and Cl as 10-acridinium anions: 5-chloro-2:8-dialkoxy-10-alkylacridinium chloride (I) and *p*-C₆H₄(NH₂)₂ give the hydrochloride (II) of the 5-*p*-aminoanilino-derivative (III) and the (acridinium) dialkylalide of NN'-bis-(2:8-dialkoxy-5-acridyl)-*p*-phenylenediamine, also obtained from (II) and (III).

XI. The (I) and piperazine (as above) give the hydrohalide (I as well as Cl) (IV) of the corresponding 5-piperazino-derivative and the (acridinium) dialkylalide (V) of NN'-bis-(2:8-dialkoxy-5-acridyl)-piperazine. (IV), with KOH-CHCl₃, gives (V) and with H₂O gives the 10-alkyl-5-acridone (VI), also formed by similarly treating either (V) or the (piperazinium or acridinium) dioxalate or the (acridinium) iodide or (piperazinium) oxalate corresponding with (IV). CH. ABS. (r)

Sulphonation of acridone, and certain transformations of acridone-3-sulphonic acid. M. POLACZEK (Rocz. Chem., 1935, 15, 565—577).—Acridone and conc. H₂SO₄ at 100° yield acridone-3-sulphonic acid (I) [Ba and Pb salts; chloride; amide; Et ester, m.p. 232—233° (decomp.)], also synthesised by heating *o*-C₆H₄Cl·CO₂K and K sulphanilate in H₂O in presence of Cu (115—120°; 6 hr.), and condensing the K 4'-sulphodiphenylamine-2-carboxylate obtained in presence of POCl₃ at 115° (30 min.). When fused with KOH (I) yields 3-hydroxyacridone, m.p. 330—370° (benzoate, m.p. 285—287°), identical with the product obtained from 4'-ethoxydiphenylamine-2-carboxylic acid and H₂SO₄ (100°; 15 min.). (I) in POCl₃ and NPhMe₂ (120°; 1 hr.) yield 3-*p*-dimethylaminobenzenesulphonyl-5-*p*-dimethylaminophenylacridone, m.p. 264—265°. (I) and 80% oleum at 100° afford acridone-3:7-disulphonic acid (Ba and Pb salts), also prepared from 2-chloro-5-sulphobenzoic acid and sulphanilic acid in presence of Cu and K₂CO₃ (115—120°; 8 hr.), followed by condensation of the product with H₂SO₄ at 100° R. T.

Acridine compounds and their antimalarial action. I. O. J. MAGIDSON and A. M. GRIGOROVSKI (Ber., 1936, 69, [B], 396—412).—Compounds of the type 8-chloro-5-diethylamino-R-amino-3-methoxyacridine have a very powerful antimalarial action which attains a max. when R=[CH₂]₄. Introduction of OH into the side-chain diminishes the therapeutic action if Cl is present, but increases it in the presence of NO₂. Compounds without a substituent at 7 or 8 are therapeutically inactive. Increase in the size of 3-OAlk diminishes the therapeutic activity,

which vanishes if a second OMe is present. Protracted treatment of compounds of the above type with boiling H₂O causes elimination of the 5-N-chain and production of acridones. With conc. HCl at 120—125° the 5-aminoacridone is formed, demethylation also occurring to some extent. The condensation of 5-chloroacridines with primary amines occurs only in presence of PhOH, since the 9-OPh-compounds readily react with amines under similar conditions, they appear to be intermediates.

α-Diethylaminobutan-γ-one is converted into the oxime, b.p. 141—142°/15 mm., which is reduced by Na powder in BuOH to γ-amino-α-diethylaminobutane, b.p. 72—74°/12 mm. NH₂·[CH₂]₂·NEt₂, b.p. 145—149° atm. pressure, is obtained from *o*-C₆H₄(CO)₂N·[CH₂]₂·Br and NEt₂ in boiling xylene followed by hydrolysis with 12*N*-HCl, and NH₂·[CH₂]₃·NEt₂, b.p. 55—58°/12 mm., is derived from *o*-C₆H₄(CO)₂N·[CH₂]₃·Cl and NEt₂ or from *o*-C₆H₄(CO)₂NK and NEt₂·[CH₂]₃·Cl. ε-Diethylaminomethylamine, b.p. 205—208°, is obtained from NHBz·[CH₂]₅·Cl and NEt₂ at 100—120°, followed by hydrolysis with conc. HCl at 125°. NHBz·[CH₂]₅·Cl, PBr₃, and Br give α-chloro-ε-bromopentane, b.p. 210—212°, transformed by the successive action of NaCN in MeOH and NEt₂ into ε-diethylaminohexonitrile, b.p. 92—97°/3.5 mm., reduced by powdered Na in abs. EtOH to α-amino-8-diethylaminohexane, b.p. 216—218° (aurichloride, m.p. 120—122°). *o*-C₆H₄Cl·CO₂H, K₂CO₃, and *p*-OMe·C₆H₄·NH₂ in boiling amyl alcohol containing a trace of Cu powder give *N*-*p*-anisylanthranilic acid, m.p. 183—184°, transformed by boiling POCl₃ into 5-chloro-3-methoxyacridine, m.p. 152—153°. Nitration of *o*-C₆H₄Cl·CO₂H and condensation of the product with *p*-OMe·C₆H₄·NH₂ affords 5-nitro-*N*-*p*-anisylanthranilic acid, m.p. 216—220°, transformed into 5-chloro-8-nitro-3-methoxyacridine, m.p. 220—221°. Aminoveratrole and 2:4-C₆H₃Cl₂·CO₂H afford 4-chloro-*N*-3':4'-dimethoxyphenylanthranilic acid, m.p. 190—191°, whence 5:7-dichloro-(?)2:3-dimethoxyacridine, m.p. 202—203°. Gradual addition of NH₂·[CH₂]₂·NEt₂ to a mixture of 5-chloro-3-ethoxyacridine and PhOH at 70—80° affords 5-β-diethylaminoethylamino-3-ethoxyacridine, m.p. 242—244°. The following acridines are obtained by similar methods: 7-nitro-5-β-diethylaminoethylamino-3-ethoxy-, m.p. 246—252°; 8-nitro-5-β-diethylaminoethyl-3-ethoxy-, m.p. 172—175° [dihydrochloride, m.p. 243—246° (decomp.)]; 7-nitro-5-γ-diethylaminopropylamino-3-ethoxy- [dihydrochloride (+H₂O), m.p. 226—228°]; 7-chloro-5-γ-diethylaminopropylamino-3-methoxy- [dihydrochloride (+3H₂O), m.p. 249—250°]; 8-nitro-5-γ-diethylamino-β-hydroxypropylamino-3-methoxy-, m.p. 124° (dihydrochloride, m.p. 213—214°); 7-chloro-5-β-hydroxy-γ-diethylaminopropylamino-3-methoxy-, m.p. 105—107° (dihydrochloride, m.p. 237—239°); 7-chloro-5-8-diethylaminobutylamino-3-methoxy-, m.p. 76—78° (dihydrochloride, m.p. 246—248°); 7-chloro-5-8-diethylamino-α-methylbutylamino-3-methoxy-, m.p. 86—88° (dihydrochloride, m.p. 246—248°); 5-γ-diethylaminopropylamino-3-methoxy- (dihydrochloride, m.p. 240—241°); 8-nitro-5-γ-diethylaminopropylamino-3-methoxy-, m.p. 122—123.5° (dihydrochloride, m.p. 229—230°); 7-chloro-5-γ-diethylaminopropyl-

amino-(?)2:3-dimethoxy- [dihydrochloride (+2H₂O), m.p. 227—228°]; 7-chloro-5-di-(γ -diethylaminopropyl)-amino-3-methoxy- (very unstable hydrochloride); 7-chloro-5-8-diethylamino- α -methylbutylamino-(?)2:3-dimethoxy- [dihydrochloride (+2H₂O), m.p. 217—218°]; 7-chloro-5- γ -diethylaminopropylamino-3-ethoxy- [dihydrochloride (+1H₂O), m.p. 246—247°]; 7-chloro-5-8-diethylaminobutylamino-3-ethoxy- [dihydrochloride (+2H₂O), m.p. 254—255.5°]; 7-chloro-5- γ -diethylaminopropylamino-3-methyl- [dihydrochloride (+2H₂O), m.p. 239—241°]; 7-chloro-5- ϵ -diethylaminoamylamino-3-methoxy- [dihydrochloride (+H₂O), m.p. 266—268°]; 7-chloro-5- β -diethylaminoethylamino-3-methoxy- (dihydrochloride, m.p. 258—259°); 7-chloro-5- γ -diethylamino- α -diethylamino- α -methylpropylamino-3-methoxy- [dihydrochloride (+1H₂O), m.p. 253—254°]; 7-chloro-5- ϵ -diethylaminoheptylamino-3-methoxy- (dihydrochloride, m.p. 232—235°). H. W.

Manufacture of acridine derivatives.—See B., 1936, 299.

Water-soluble salt of 3:6-diamino-10-methyl-acridinium.—See B., 1936, 220.

Optical activity dependent on co-ordinated bivalent ruthenium. F. H. BURSTALL (J.C.S., 1936, 173—175).—2:2'-Dipyridyl with RuCl₃ at 250° gives tris-2:2'-dipyridylruthenous chloride, from which the corresponding base, tris-2:2'-dipyridylruthenous bromide octahydrate, [Ru dipy₃](OH)₂·8H₂O, and the bromide, iodide, perchlorate, nitrate, carbonate, and tartrate have been prepared. All these salts form hexahydrates, the carbonate also forming a decahydrate; they are more stable than the corresponding Fe⁺⁺ and Ni⁺⁺ salts. Resolution of the *d*- and *l*-tartrates gave *d*-, [α]_D²⁵ +860°, [*M*] +7205°, and *l*-tris-2:2'-dipyridylruthenous bromide hexahydrate, [α]_D²⁵ -815°, [*M*] -6828°, respectively. L. J. J.

Preparation of NN'-disubstituted barbituric and thiobarbituric acids. N. V. KOSCHKIN (J. Gen. Chem. Russ., 1935, 5, 1460—1467).—Disubstituted barbituric acids cannot be obtained from sodiomalonic ester and substituted carbamides and thiocarbamides, under various temp. conditions. NN'-Diphenylbarbituric acid, m.p. 238.5—239°, was obtained by heating a mixture of CO(NHPh)₂ (I) and CH₂(CO₂H)₂ with AcCl in dry CHCl₃ at the b.p. for 4 hr.; NN'-di-*o*-tolylbarbituric acid, m.p. 176.5—177°, and NN'-di-*o*-tolyl-, m.p. 216.5—217°, NN'-di- α -, m.p. 250—250.5° (decomp.), and NN'-di- β -naphthylthiobarbituric acid, m.p. 247.5—248°, were obtained analogously. (I) and CH₂(CO₂Et)₂ in xylene at the b.p. yield CH₂(CO·NHPh)₂. R. T.

[Glyoxalinecarboxylic esters.] W. JOHN (Ber., 1936, 69, [B], 484; cf. this vol., 211).—The ability of glyoxalinecarboxylic esters to lose CO₂ when heated is also shown by certain indazole- and pyrazolecarboxylic esters. H. W.

Synthesis of 1-phenyl-4- β -hydroxyethylpiperazine. C. B. KREMER (J. Amer. Chem. Soc., 1936, 58, 379).—N(CH₂·CH₂·OH)₃, NH₂Ph, and conc. H₂SO₄ give 1-phenyl-4- β -hydroxyethylpiperazine, m.p. 84° (corr.) (lit. 83° and 91°). H. B.

Pyrimidines. CXLIX. Synthesis of aryl-substituted dihydrouacils and their conversion into uracils. T. B. JOHNSON and J. E. LIVAK (J. Amer. Chem. Soc., 1936, 58, 299—303).—Hydrobenzamide and CH₂(CO₂H)₂ in cold EtOH give β -amino- β -phenylethane- $\alpha\alpha$ -dicarboxylic acid, m.p. 153°; in the hot, β -amino- β -phenylpropionic acid (I) results (cf. Rodionov *et al.*, A., 1929, 557; 1933, 1307). (I) is also prepared from CH₂(CO₂H)₂, PhCHO, and EtOH·NH₃ or -NH₄OAc. β -Amino- β -anisylpropionic acid (II), m.p. 232° (decomp.), is similarly prepared using anishydramide. (I) and (II) with ArNCO give the β -arylcaramido-acids, which are converted (usually by Ac₂O) into 4-phenyl-1-aryl- (A) and 4-anisyl-1-aryl- (B) 4:5-dihydrouacils, respectively; ArNCS leads to the 2-thion analogues. Bromination of (A) in AcOH at 75—105° gives the 5-Br-derivative when aryl=Ph or *o*-tolyl; when aryl = β -C₁₀H₇ or *p*-NO₂-C₆H₄, bromination is retarded or inhibited. With (B), introduction of Br into the 3 position of the anisyl group first occurs; the resulting compounds then behave as (A). The following are described: β -caramido-, m.p. 192° [from (I) and HNCO], β -phenylcaramido-, m.p. 174°, β -*o*-tolylcaramido-, m.p. 172°, β -2-naphthylcaramido-, m.p. 201°, β -*p*-nitrophenylcaramido-, m.p. 202—203°, β -1-naphthylcaramido-, m.p. 184—186°, and β -phenylthiocaramido-, m.p. 158°, β -phenylpropionic acids; β -caramido-, m.p. 193°, β -phenylcaramido-, m.p. 167—168°, β -*o*-tolylcaramido-, m.p. 180—181°, β -1- and -2-naphthylcaramido-, m.p. 178° and 191°, respectively, β -*p*-nitrophenylcaramido-, m.p. 171—172°, β -methylcaramido-, m.p. 168—169° [from (II) and MeNCO], β -phenylthiocaramido-, m.p. 146°, and β -*o*-tolylthiocaramido-, m.p. 163°, β -anisylpropionic acids; 4-phenyl-, m.p. 217° (5-Br-derivative, m.p. 214°), 4-anisyl-, m.p. 228° [3'-Br-, m.p. 232°, and 5:3'-Br₂- (III), m.p. 193—194°, derivatives], 1:4-diphenyl-, m.p. 226° (5-Br-derivative, m.p. 220—223°), 1-phenyl-4-anisyl- (IV), m.p. 210°, 4-anisyl-1-*o*-tolyl- (V), m.p. 181°, 4-phenyl-1- β -naphthyl-, m.p. 240—241°, 4-anisyl-1- β -naphthyl- (VI), m.p. 256—257°, 4-phenyl-1-*p*-nitrophenyl-, m.p. 253—254°, 1-*p*-nitrophenyl-4-anisyl- (VII), m.p. 268—269°, 4-phenyl-1- α -naphthyl-, m.p. 192—193°, 4-anisyl-1- α -naphthyl-, m.p. 218—219°, 4-phenyl-1-methyl-, m.p. 149—151°, and 4-anisyl-1-methyl-, m.p. 138°, 4:5-dihydrouacils; 6-keto-2-thion-4-phenyl-, m.p. 238° (S-Me derivative, m.p. 163.5°), 4-anisyl-, m.p. 228°, 1:4-diphenyl-, m.p. 243°, 4-phenyl-1-*o*-tolyl-, m.p. 188°, 1-phenyl-4-anisyl-, m.p. 231—232°, and 4-anisyl-1-*o*-tolyl-, m.p. 188°, hexahydropyrimidines; 4-phenyl-, m.p. 267°, and 1:4-diphenyl-, m.p. 292—294°, -uracils, obtained by elimination of HBr from the appropriate 5-Br-derivative with C₆H₅N (general procedure); 4-3'-bromo-4'-methoxyphenyluracil, m.p. 304—305° [from (III)]. Bromination of (IV) gives 1-phenyl-4-3'-bromo-4'-methoxyphenyl-4:5-dihydrouacil, m.p. 210°, and then the 5-Br-derivative, m.p. 242°, which yields 1-phenyl-4-3'-bromo-4'-methoxyphenyluracil, m.p. 326—328°. 1-*o*-Tolyl-4-3'-bromo-4'-methoxyphenyluracil, m.p. 312°, and 4:5-dihydrouacil, m.p. 178° (5-Br-derivative, m.p. 201°), are similarly obtained from (V). (VI) gives 4-3'-bromo-4'-methoxyphenyl-1- β -naphthyl-4:5-dihydrouacil,

m.p. 238—239°, which could not be brominated further; similarly, (VII) affords 1-*p*-nitrophenyl-4-3'-bromo-4'-methoxyphenyl-4 : 5-dihydrouracil, m.p. 194—196°.

H. B.

Synthesis of 2-amino-4-ethylpyrimidine. W. T. CALDWELL and W. M. ZIEGLER (J. Amer. Chem. Soc., 1936, 58, 287—288).—6-Chloro-2-ethylthiol-4-ethylpyrimidine, b.p. 110—112°/4—5 mm. (from the 6-OH-derivative and POCl₃), is reduced (Zn dust, aq. EtOH) to 2-ethylthiol-4-ethylpyrimidine, b.p. 105—107°/4 mm., hydrolysed (conc. HCl) to 2-hydroxy-4-ethylpyrimidine hydrochloride, m.p. 211—213° (decomp.) (sinters about 200°). This and POCl₃ give 2-chloro-4-ethylpyrimidine, b.p. 89—91°/7 mm., converted by EtOH-NH₃ at 120—130° into 2-amino-4-ethylpyrimidine (I), b.p. 229°, m.p. 140—141° (picrate, m.p. 194·5—195·5°; aurichloride, m.p. 98—99°). 2-Amino-6-hydroxy-4-ethylpyrimidine, m.p. 243—245° (decomp.) (from guanidine carbonate and EtCO·CH₂·CO₂Et in EtOH), and POCl₃ give the 6-Cl-derivative, m.p. 129—130°, reduced (Zn dust, aq. EtOH) to (I). (I) differs from 6-amino-4-ethylpyrimidine (this vol., 344); the structure of the latter is thus established.

H. B.

Piria reaction. III. Mechanism. W. M. LAUER, M. M. SPRUNG, and C. M. LANGKAMMERER (J. Amer. Chem. Soc., 1936, 58, 225—228).—The isolation of 1 : 5-dimethylbenziminazole [tartrate, m.p. 185·2—185·8° (decomp.)] in 18·3% yield from the NaHSO₃-reduction products of 3-nitro-4-dimethylaminotoluene indicates the intermediate formation of the NO-derivative. If NO-compounds are formed in this way, then the Piria reaction (A., 1931, 720) should occur with either the NO₂- or NO-derivative. In agreement with this view, reduction (Na₂SO₃, NaHSO₃, or mixtures) of *p*-C₆H₄Me·NO gives *p*-C₆H₄Me·NH₂ (44—73%) and *p*-toluidine-3-sulphonic acid (I) (5·7—14·8%), i.e., the same products as are formed (*loc. cit.*) from *p*-C₆H₄Me·NO₂ (II). Details are given for the isolation of Na₂ 3-sulpho-4-methylphenylsulphamate (+H₂O) (III), from the NaHSO₃-reduction products of (II); (III) is hydrolysed (dil. HCl) to (I) in quant. yield. (III) is also prepared from (I) and 1-pyridiniumsulphonic acid (Baumgarten, A., 1926, 1130) in aq. Na₂CO₃ at 10°; Na₂ *m*- and *p*-sulphophenyl-, 4-sulpho-2-methylphenyl- (+2H₂O), and 4-sulpho-1-naphthyl- (+2H₂O) -sulphamates are similarly prepared. Reduction (alkaline Na metabisulphite) of *p*-NO₂·C₆H₄·OH gives *p*-NH₂·C₆H₄·OH and 4-aminophenol-2-sulphonic acid [since deamination (diazo-method) and subsequent bromination affords *s*-C₆H₂Br₃·OH]. 5-Nitrosalicylic acid similarly yields 5-amino- and 5-amino-3-sulphosalicylic acid (deamination and bromination gives *s*-C₆H₂Br₃·OH). In these cases, SO₃H is introduced *meta* to NH₂, presumably owing to 1 : 4-addition of NaHSO₃ to the ·N:C:C· of the intermediate nitroso-phenol (as quinoneoxime). The Piria reaction on (II) thus involves the following reactions: (a) $p\text{-C}_6\text{H}_4\text{Me}\cdot\text{NO}_2 \rightarrow p\text{-C}_6\text{H}_4\text{Me}\cdot\text{NO} \rightarrow p\text{-C}_6\text{H}_4\text{Me}\cdot\text{NH}\cdot\text{SO}_3\text{Na} \rightarrow p\text{-C}_6\text{H}_4\text{Me}\cdot\text{NH}_2$; (b) $p\text{-C}_6\text{H}_4\text{Me}\cdot\text{NO} \rightarrow 2 : 4\text{-SO}_3\text{Na}\cdot\text{C}_6\text{H}_3\text{Me}\cdot\text{SO}_3\text{Na} \rightarrow \text{SO}_3\text{H}\cdot\text{C}_6\text{H}_3\text{Me}\cdot\text{NH}_2$.

H. B.

Derivatives of quinazoline. (Miss) T. M. REYNOLDS and R. ROBINSON (J.C.S., 1936, 196—199).—In part a reply to Späth (A., 1935, 873), and a detailed account of work already summarised (A., 1934, 1014). The following data are new: 3-allylquinazolinium iodide+0·33EtOH, m.p. 104—107° (picrate, m.p. 124°). When heated with MeNO₂ in EtOH, 4-hydroxy-3-allyl-3 : 4-dihydroquinazoline affords the 4-nitromethyl compound, isolated as its picrate, m.p. 152—153°, 4-nitromethyl-3-methyl-3 : 4-dihydroquinazoline, m.p. 137°, being obtained similarly. Passage of dry HCl into a mixture of HCO·NH₂, 6-nitropiperonal, and C₆H₆ at 60° affords 6-nitropiperonylidenediformamide, m.p. 248—250° (decomp.), converted by Zn dust-ice-AcOH into 6 : 7-methylenedioxyquinazoline, and, under certain conditions, into a non-diazotisable base, C₉H₆O₃N₂, m.p. 260—261°. (I) when refluxed with MeI in EtOAc gives 6 : 7-methylenedioxy-3-methylquinazolinium iodide, m.p. 239—240° (picrate, softens 183°, m.p. 185—186°), converted by AgCl into the chloride, hydrolysed by aq. KOH at 2—10° to 4-hydroxy-6 : 7-methylenedioxy-3-methyl-3 : 4-dihydroquinazoline, softens 154°, m.p. 158—159°, converted by MeNO₂ into the 4-nitromethyl, m.p. 159—160°, by COMe₂-aq. Na₂CO₃ into the 4-acetonyl compound (picrate, sinters 184°, m.p. 187°), and by boiling 2% NaOH into 6-aminopiperonal.

J. W. B.

Reaction between benzoyl chloride and aromatic amines, and their products, compounds of the quinazoline series. K. DZIEWONSKI and L. STERNBACH (Bull. Acad. Polonaise, 1935, A, 333—348).—*p*-C₆H₄Cl·NH₂ and BzCl with anhyd. ZnCl₂ at 180—200° afford 6-chloro-4-hydroxy-2 : 4-diphenyl-3-*p*-chlorophenyl-3 : 4-dihydro- (I), m.p. 159° (hydrochloride, m.p. 353°; picrate, m.p. 178°; Et ether, m.p. 225—226°), converted by heating at 250° into 6-chloro-2-hydroxy-2 : 4-diphenyl-3-*p*-chlorophenyl-2 : 3-dihydro-quinazoline (II), m.p. 199—201°. Hydrolysis of (I) or (II) with EtOH-HCl gives 5-chloro-2-benzamidobenzophenone (III), reconverted by SOCl₂ and *p*-C₆H₄Cl·NH₂ into (II). Diazotisation of 5-chloro-2-aminobenzophenone (IV) [by EtOH-H₂SO₄ hydrolysis of (III)] and coupling with β-C₁₀H₇·OH gives 4-chloro-2-benzoylbenzeneazo-β-naphthol, m.p. 184—185°. With NH₃-EtOH at 140° (I) gives 6-chloro-2 : 4-diphenylquinazoline, m.p. 190·5°. With NH₂·OH·HCl in boiling EtOH (I) affords the oxime anhydride, C₆H₃Cl<CPh:N>O (V), m.p. 186—187°, but (II) gives the oxime, m.p. 163°, of (III). With HNO₃ (d 1·52) *p*-C₆H₄Cl·NHBz gives its 2-NO₂-derivative, m.p. 132—133°, reduced by Zn-AcOH to 6-chloro-2-phenylbenziminazole (Fischer *et al.* A., 1906, i, 895), also obtained from (V) and EtOH-HCl at 150°. Diazotisation of (IV) and treatment with Na₂SO₃-NaOH at < 10° gives 5-chloro-2-hydroxy-3-phenylindazole, m.p. 113—114°, reduced (SnCl₂-HCl) to 5-chloro-3-phenylindazole, m.p. 125—127°. By similar methods from the appropriate amine and BzCl are obtained 4-hydroxy-2 : 4-diphenyl-3-*p*-tolyl-6-methyl- +COMe₂, m.p. 141°, and solvent-free, m.p. 148—149° (hydrochloride, m.p. 320°; picrate, m.p. 143°; Et ether, m.p. 161°), and -6 : 8-dimethyl-3 : 4-

dihydro- (VI), m.p. 163—164° (*picrate*, m.p. 204°), converted into *2-hydroxy-2:4-diphenyl-3-p-tolyl-6-methyl-2:3-dihydro-*, m.p. 194—195°, *2:4-diphenyl-6-methyl-*, m.p. 176°, and *-6:8-dimethyl-*, m.p. 152°, *-quinazoline*, and the *-6-methyl-*, m.p. 190°, and *-6:8-dimethyl-*, m.p. 180°, *-oximeanhydride* [both as (V)]. From (VI) are obtained *2-amino-3:5-dimethylbenzophenone*, m.p. 128.5°, and its *Bz* derivative, m.p. 162°, and *6-benzoyl-2:4-dimethylbenzenazo-β-naphthol*, m.p. 130.5°. J. W. B.

Quinazolines. XLII. Synthesis of 3:4-dihydroquinazoline derivatives from *p*-amino-benzoic acid, formaldehyde, and hydrochloric acid. S. E. CAIRNCROSS and M. T. BOGERT (Coll. Czech. Chem. Comm., 1936, 8, 57—65; cf. A., 1935, 1134).—*p*-NH₂·C₆H₄·CO₂Et, CH₂O, and (a) HCl at 25° or (b) HCl-H₂SO₄ at 70° give *Et*₂ *methylenebis-p-aminobenzoate*, m.p. 192—193°, converted by HCl-EtOH into *Et* 3-*p*-carbethoxyphenyl-3:4-dihydroquinazoline-6-carboxylate (I), m.p. 186—187°, also obtained in small amount in (b) above or in fair yield by condensation of *p*-NH₂·C₆H₄·CO₂H, CH₂O, HCl, and H₂SO₄ at 70° and subsequent esterification. (I) leads to the amorphous acid (*Na* salt), (CH₂Cl·CH₂)₂, m.p. 173—174°, and *Me*₃ ester, m.p. 241—243°, which last with NEt₂·CH₂·CH₂·ONa in C₆H₆ affords the (NEt₂·CH₂·CH₂)₂ ester, m.p. 114—115°, with anæsthetic properties. (I) and KMnO₄-MgSO₄-COMe₂ give *Et* 3-*p*-carbethoxyphenyl-4-quinazoline-6-carboxylate, m.p. 138.5—139.5°, also obtained from the 1-Et ester, m.p. 217—219° (lit. 216.5—218°), of 4:1:3-NH₂·C₆H₃(CO₂H)₂ and *Et* *formamidobenzoate* (prep. by 40% HCO₂H at 80°), m.p. 147—148°, at 140—150°, a *product*, m.p. 182—183°, being also formed in the latter reaction. M.p. are corr. R. S. C.

Bromo-derivatives of 4-hydroxy-2-thion-3-phenyl-1:2:3:4-tetrahydroquinazoline. C. V. GHEORGHIU and (MLLE.) L. MANOLESCU (Bull. Soc. chim., 1936, [v], 3, 321—323).—5-Bromoisatin and PhNCS in NaOH-aq. EtOH give 6-bromo-4-hydroxy-2-thion-3-phenyl-1:2:3:4-tetrahydroquinazoline-4-carboxylic acid, m.p. 156—161° (decomp. from 142°), giving with EtOH 6-bromo-2-thion-4-ethoxy-3-phenyl-1:2:3:4-tetrahydroquinazoline, m.p. 197—204°, which in HClO₄ yields 6-bromo-4-hydroxy-2-thion-3-phenyl-1:2:3:4-tetrahydroquinazoline perchlorate (formulated as 4-carbonium salt), *cryst.*, red. R. S. C.

Phenazine series. III. Isomeric octahydro-phenazines. G. R. CLEMO and H. McILWAIN (J.C.S., 1936, 258—261).—Reduction of 1:2:3:4-tetrahydrophenazine (I) with Na-EtOH affords the (?) *trans*-1:2:3:4:9:10:11:12-H₈-derivative (II), m.p. 156° (A., 1935, 991, gives m.p. 150°), but with H₂-Pd-C at room temp./100 lb. per sq. in., the (?) *cis*-1:2:3:4:9:10:11:12-H₈-derivative (III), m.p. 147°, is obtained. Reduction of (I) with H₂-catalyst B [Ni from Ni(OH)₂ at 370—380° by Rupe's method] at 180° gives mainly (II) and a little (III), but with catalyst A [Ni from Ni(NO₃)₂ at 300—310° by Gattermann's method] at 180°, the product is the 1:2:3:4:5:6:7:8-H₈-derivative (IV), m.p. 109° (Wallach *et al.*, A., 1924, i, 862). The geometrical

isomerism of (II) and (III) is proved since both have the properties of an *o*-C₆H₄(NH₂)₂ and both give (NO)₂-derivatives with H₂SO₄-NaNO₂, (II) giving a (NO)₂-derivative, m.p. 126°, and (III) an (NO)₂-derivative, m.p. 109°, whereas (IV) gives no NO-derivative. (I), (II), (III), and (IV) are all dehydrogenated, by Pd-C at 200°, to phenazine. (II) is unchanged by treatment with Na-EtOH, H₂-Pd-AcOH, or when passed over catalyst-B at 180°, but with catalyst-A it is converted into (IV). (III) is unchanged by treatment with Na-EtOH or H₂-Pd-AcOH, but passage of its vapour over catalyst-A at 180° converts it into (IV), and, over catalyst-B at 180°, partial conversion into (II) occurs. J. W. B.

Hydroxy-compounds of the anthrapyrimidine series.—See B., 1936, 182.

Alkylated iminazoles of high mol. wt.—See B., 1936, 183.

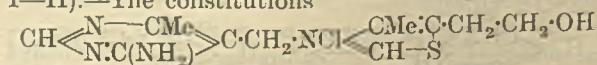
New cleavage product of guanine. G. HUNTER (Nature, 1936, 137, 405).—When guanine is auto-cleaved with an acid, approx. 20% is converted into C₄H₇N₅, probably 4- (or 5-)guanidinoglyoxaline. Reactions are described. L. S. T.

Function of halogens in hæmin. K. LINDENFELD (Rocz. Chem., 1935, 15, 516—542).—The reaction between hæmin (HmCl) and MX (M=a cation, X=Br, I, CNS, HCO₂) in C₅H₅N-AcOH is HmCl+X'=HmX+Cl'; C₅H₅N (or quinine) merely acts as a solvent, since diethylhæmin in CHCl₃-AcOH undergoes the same changes in absence of the bases, and HmCl may be recovered unchanged from C₅H₅N solutions. The prep. and properties of *formylhæmin* are described; *acetylhæmin* cannot be obtained by the above reaction. It is concluded that the Cl linking is heteropolar. R. T.

Preparation of cryptoxanthine from paprika. L. VON CHOLNOKY (Magyar chem. Fol., 1934, 40, 85—89; Chem. Zentr., 1935, ii, 230; cf. A., 1934, 657).—A chromatographic separation is described. H. N. R.

Abnormal reactions of hydroxylamine. P. DREYFUSS (Rend. Semin. Fac. Sci. Univ. Cagliari, 1934, 4, 55—58; Chem. Zentr., 1935, ii, 46).—Formulae are proposed for the compound obtained from NH₂OH and dibenzylidencyclohexanone (Poggi and Saltini, A., 1934, 773) and that from phorone and NH₂OH (Vorländer and Gästner, A., 1899, i, 259). 4:5:4':5'-Tetramethoxy-2:2'-dibenzoylbenzophenone yields a compound with NH₂OH (formula suggested). H. N. R.

Chemistry of the antineuritic vitamin. K. MAKINO and I. IMAI (Z. physiol. Chem., 1936, 239, I—II).—The constitutions



for the antineuritic vitamin (I) and

$\text{CH} \begin{array}{c} \text{NH} \text{---} \text{CO} \\ \text{N} \text{---} \text{CH}(\text{OH}) \end{array} \text{C}(\text{NO}_2) \cdot \text{CH}_2 \cdot \text{OEt}$ for the nitrate obtained therefrom (cf. Windaus *et al.*, this vol., 253) are suggested as alternative structures. The oxidation of (I) by K₃Fe(CN)₆ and NaOH to thiochrome can then be explained by simple analogy. H. W.

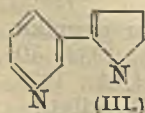
Carbocyanine dyes.—See B., 1936, 184.

Nornicotine. A. WENUSCH (Pharm. Zentr., 1936, 77, 141—143).—There is relatively little nornicotine (I) in the smoke from tobacco rich therein; oxidation of (I) either by KMnO_4 or during smoking gives an alkaloid (picrate, m.p. 217—218°) resembling myosmine. (I) is less toxic than nicotine. R. S. C.

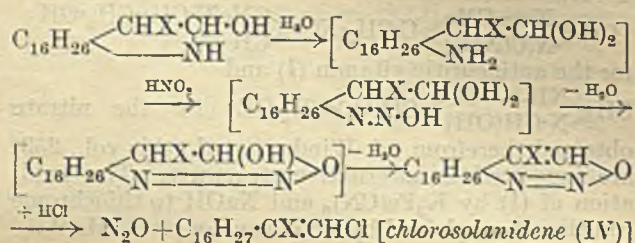
d-Nornicotine. E. SPATH, C. S. HICKS, and E. ZAJIC (Ber., 1936, 69, [B], 250—251).—Partly racemised d-nornicotine (A., 1935, 1136) is purified by conversion into the perchlorate, which is crystallised from $\text{MeOH-Et}_2\text{O}$. The most active portion has $[\alpha]_D^{20} +86.3^\circ$, whereas the optically pure substance has $[\alpha]_D^{25} +88.8^\circ$. H. W.

Tobacco bases. IV. Syntheses of l-nornicotine. E. SPATH, L. MARION, and E. ZAJIC. V. **Constitution of myosmine.** E. SPATH, A. WENUSCH, and E. ZAJIC (Ber., 1936, 69, [B], 251—255, 393—396).—IV. l-Nicotine (I) is cautiously oxidised with KMnO_4 and the more strongly basic portions are removed from the product by fractional extraction with HCl. They are then distilled with steam in vac., whereby (I) is volatilised. The residue is transformed into the dipicrate, from which, after repeated crystallisation, l-nornicotine (II), $[\alpha]_D^{20} -76.1^\circ$, raised to -83.2° after further purification through the perchlorate, is isolated. Treatment of (I) with Ag_2O and of the product dissolved in Et_2O with aq. NaCl containing HCl gives a most strongly basic fraction from which (II), $[\alpha]_D^{20} -88.8^\circ$, is isolated.

V. Myosmine (III), after purification through the picrate, m.p. 182—183° (vac.), has m.p. 42—43° (vac.), and is optically inactive in MeOH ($c=20$). It is dehydrogenated by Pd sponge at 200° to 2-3'-pyridylpyrrole. Its composition, optical inactivity (assuming that it is not a racemate and hence does not contain an asymmetric C atom), and conversion by Bz_2O in abs. Et_2O with opening of the ring into (?) 3-γ-benzamidobutyrylpyridine, m.p. 118°, suggest formula (III). H. W.



Constitution of solanidine from Solanum sodomaeum. G. ODDO and G. CARONNA (Ber., 1936, 69, [B], 283—287).—The action of HNO_2 on solanidine-s (I) gives azosolanidine (II), m.p. 260° (decomp.), which decolorises $\text{Br-H}_2\text{O}$ and does not give the Liebermann reaction, and a quinhydrone $\text{C}_{18}\text{H}_{23}\text{O}_2\text{N} \cdot \text{C}_{18}\text{H}_{31}\text{ON}$, m.p. 120°, decomposed by HCl into the hydrochloride of (I) and the quinone, $\text{C}_{16}\text{H}_{25}\text{N}(\text{CO})_2$. The reactions described by Oddo *et al.* (A., 1911, i, 671; 1914, i, 1174) are therefore interpreted thus:



$\text{C}_{16}\text{H}_{28} \cdot \text{CX}(\text{OH}) \cdot \text{CH}_2\text{Cl}$ (chlorohydroxysolanidane). The formation of (III) is established by the production of tetra-acetylsolanidine, $\text{NAc}_2 \cdot \text{C}_{16}\text{H}_{26} \cdot \text{CHX} \cdot \text{CH}(\text{OAc})_2$, m.p. 253° (acetate) by the action of $\text{AcOH-Ac}_2\text{O-H}_2\text{SO}_4$ on (I). Attempts to remove Cl from (IV) by Zn and AcOH, Na and EtOH or amyl alcohol, or through the Mg compound were unsuccessful. (IV) is smoothly oxidised by CrO_3 in AcOH or by KMnO_4 in COMe_2 ; with molten KOH it affords a monocarboxylic acid and a neutral substance, m.p. 145°. Since solanidine-t differs from (I) in the possession of C_7H_7 and a tert. N, it is suggested that it may be N-benzylsolanidine-s and that (I) is therefore the parent of all the solanidines, which differ by the presence of alkyl or aryl attached to N or to the carbocyclic groups. H. W.

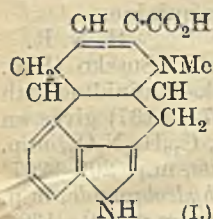
Phenyl-ψ-pelletierine. B. K. BLOUNT (J.C.S., 1936, 287—288).—Dropwise addition of NaOMe-MeOH to a solution of $\text{CH}_2\text{Ph} \cdot \text{CHO}$ and $\text{CH}_2\text{CH} \cdot \text{CHO}$ in MeOH at -18° to 0° affords $\text{CHO} \cdot [\text{CH}_2]_2 \cdot \text{CHPh} \cdot \text{CHO}$ in solution, condensed with $\text{CO}(\text{CH}_2 \cdot \text{CO}_2\text{H})_2 \cdot \text{CaCO}_3$ -aq. MeOH-33% NH_2Me to give 6-phenylgranatan-3-one (phenyl-ψ-pelletierine), isolated as its 2:4-dipiperonylidene derivative, m.p. 210°. J. W. B.

Synthetic experiments on eserine. V. Synthesis of l-eserethole. T. HOSHINO and T. KOBAYASHI (Proc. Imp. Acad. Tokyo, 1935, 11, 416—417; cf. A., 1935, 1256, 1378).—dl-Eserethole and d-tartaric acid in EtOH give the d-tartrate, m.p. 173—174°, $[\alpha]_D^{15} +115^\circ$ in H_2O , of the d-base and the mother-liquors with the l-acid give the l-tartrate, m.p. 173—174°, $[\alpha]_D^{15} -115^\circ$ in H_2O , of the l-base. The active picrates melt at 135—136°, the dl-picrate at 151—152°. R. S. C.

Synthesis of bicuculline. I. P. W. G. GROENEWOLD and R. ROBINSON (J.C.S., 1936, 199—202).—Bromonormeconin when heated with methylene sulphate in aq. $\text{COMe}_2\text{-NaOH}$ (N_2 atm.) affords 6-bromo-3:4-methylenedioxyphthalide, m.p. 196°, reduced (Al-Hg in boiling EtOH, Zn dust-aq. NaOH, or $\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O-Pd-SrCO}_3\text{-EtOH-KOH}$) to 3:4-methylenedioxyphthalide, converted by HNO_3 (d 1.42) at 0° into its 6- NO_2 -derivative (I), m.p. 222—223°, which with cotarnine in EtOH gives anhydrocotarnine-6-nitro-, m.p. 177—178°, reduced ($\text{SnCl}_2\text{-HCl}$ at 0°) to anhydrocotarnine-6-amino-3:4-methylenedioxyphthalide, m.p. 204—205° (decomp.). Local similarly condenses with (I) to give nitro-x-adlumine (anhydrolocal-6-nitro-3:4-methylenedioxyphthalide), m.p. 180—181° (decomp.), reduced to the NH_2 -derivative, m.p. 218—219°. Hydrastinine and (I) afford nitro-x-bicuculline, sinters at 176°, blackens at 179°, reduced to the NH_2 -compound, m.p. 203—204°. Diazotisation of this and treatment with aq. KI affords iodo-x-bicuculline, m.p. 208—209°, reduced (Al-Hg in boiling EtOH- C_5H_5) to x-bicuculline (anhydrohydrastinine-3:4-methylenedioxyphthalide), m.p. 215°, resolution of which gives the d-form, identical with the natural alkaloid (details later). J. W. B.

Ergot alkaloids. Structure of lysergic acid. W. A. JACOBS and L. C. CRAIG (Science, 1936, 83, 38—39).—The previous structure suggested for lysergic

acid (A., 1935, 1512) is revised to (I). The base, $C_{11}H_{11}N$, obtained by the alkali fusion of dihydrolysergic acid (II) is 1:5- $C_{10}H_6Me \cdot NH_2$. The tribasic acid, $C_{14}H_9O_3N$ (A., 1932, 1147), yields quinoline on distillation with soda-lime, and HNO_3 oxidation of (I) yields picric acid. Catalytic hydrogenation of (I) produces (II) which, unlike (I), can no longer be titrated, indicating the proximity of the double linking and CO_2H in the ring containing NMe. Further hydrogenation appears to attack the indole ring system.



(I.)

Spectroscopic similarity between ergot (lysergic acid) and the yohimbine alkaloids. M. S. KHARASCH, D. W. STANGER, M. A. BLOODGOOD, and R. R. LEGAULT (Science, 1936, 83, 36—38).—The marked similarity observed between the mol. absorption curves for ergotamine, ergotamine, and ergotocine (I) indicates a common structural skeleton, lysergic acid, responsible for their ultra-violet absorptions. Comparison of the curve for (I) with those of harmol, harmine, harmaline, and methyl- and tetrahydro-harmine indicates no structural relationship between (I) and the harmala alkaloids. The curve of yohimbine (II) is markedly similar to that of (I) in shape, but displaced toward shorter λ , whilst those of (II) and hydrogenated (I) are practically identical.

L. S. T.

New ergot alkaloid. M. S. KHARASCH, H. KING, A. STOLL, and M. R. THOMPSON (Nature, 1936, 137, 403, and Science, 1936, 83, 206—207).—Ergometrine, ergotocine, ergobasine, and ergostetrine are identical.

L. S. T.

Peganine. IX. Syntheses of Δ^9 -pegene and peganine. E. SPÄTH and N. PLATZER. **X. l-Peganine (l-vasicine) from *Adhatoda vasica*.** Nees. E. SPÄTH and F. KESZTLER. **XI. Δ^9 -Pegen-1-one.** E. SPÄTH and N. PLATZER (Ber., 1936, 69, [B], 255—257, 384—386, 387—393).—IX. o - $NH_2 \cdot C_6H_4 \cdot CH_2 \cdot NH_2$ and γ -butyrolactone (I) are heated at 200° in N_2 with intermittent removal of the H_2O formed and the product is heated with $POCl_3$, whereby Δ^9 -pegene, m.p. 99 — 100° , is obtained. It is transformed by the successive action of red P and Br and $Ba(OH)_2$ into α -hydroxybutyrolactone, b.p. 128 — $130^\circ/0.5$ mm., which affords peganine when heated with o - $NH_2 \cdot C_6H_4 \cdot CH_2 \cdot NH_2$ at 200° .

X. The dry leaves are extracted with EtOH at 15 — 20° , the extracts are conc. in vac., acidified with 1% AcOH, freed from residual EtOH, rendered ammoniacal, and extracted with Et_2O . The crude base is treated with $CHCl_3$, in which peganine dissolves, leaving a small residue. Treatment of the alkaloid with AcOH followed by NH_3 and crystallisation from Et_2O gives l-peganine (I) identical with the synthetic material. The natural alkaloid is therefore optically active, and its isolation in the inactive form is due to racemisation during extraction. (I) had $[\alpha]_D^{25} -254^\circ$ in pure $CHCl_3$, $[\alpha]_D^{25} -61.5^\circ$ in abs. EtOH, $[\alpha]_D^{25} +19.5^\circ$ as sulphate in H_2O . The optical activity in $CHCl_3$ is strongly influenced by the presence of very small amounts of EtOH.

XI. Mainly corrections of the work of Juneja *et al.* (A., 1935, 765, 995). o - $NO_2 \cdot C_6H_4 \cdot CH_2 \cdot NH_2$ and $(\cdot CH_2 \cdot CO)_2O$ in Et_2O and subsequently at 100° give succin- o -nitrobenzylamic acid (II), m.p. 123 — 124° , which passes when distilled in a high vac. into succin- o -nitrobenzylimide (III), m.p. 133° . Reduction of (II) with $FeSO_4 \cdot NH_3$ affords succin- o -aminobenzylamic acid, m.p. 145° , which passes when heated at 180 — $190^\circ/0.04$ mm., or with anhyd. NaOAc in H_2 at 140 — 150° into Δ^9 -pegen-1-one (IV), m.p. 191° (vac.). Alternatively, (III) is obtained from $(\cdot CH_2 \cdot CO)_2NK$, o - $NO_2 \cdot C_6H_4 \cdot CH_2Cl$, and NaCl at 130° and reduced by $SnCl_2$ and HCl (d 1.16) to (IV) and β -3:4-dihydro-2-quinazolypropionic acid, m.p. 228 — 230° . Reduction of (III) with Zn turnings and 10% H_2SO_4 at 20 — 25° affords succin- o -aminobenzylimide, m.p. 106 — 107° , which passes at 230 — $240^\circ/30$ mm. into (IV). Electrolytic reduction of (III) at a Pb cathode gives not pegane, but 1- o -aminobenzylpyrrolidine, m.p. 30 — 31° (picrolonate, m.p. 204 — 206°). Pegane is obtained from (IV) by reduction with Na and boiling amyl alcohol.

H. W.

Synthesis of papaverine derivatives. II. Synthesis of 1-(3':4':5'-trimethylphenyl)-6:7-diethoxyisoquinoline. S. SUGASAWA (J. Pharm. Soc. Japan, 1935, 55, 224—233).—3:4-Dimethoxyhippuric acid and Cu chromite in quinoline afford ω -benzamido-3:4-dimethoxystyrene, m.p. 138° , reduced catalytically to β -(3:4-dimethoxyphenyl)ethylbenzamide, m.p. 90° (also by benzoylation of 3:4-dimethoxy- β -phenylethylamine). With $POCl_3$, this yields 6:7-dimethoxy-1-phenyl-3:4-dihydroisoquinoline, m.p. 120 — 121° . Trimethylgalloyl chloride and aminoacetonitrile sulphate yield Et galloylglucynonitrile Me_3 ether, m.p. 186 — 187° , hydrolysed to galloylglucynonitrile Me_3 ether, m.p. 218° . This with 3:4-diethoxybenzaldehyde gives 2-(3':4':5'-trimethoxyphenyl)-4-(3':4'-diethoxybenzylidene)oxazolone, m.p. 163 — 164° . With NaOH this affords 3:4:5-trimethoxy-3':4'-diethoxybenzylidenehippuric acid, m.p. 220 — 221° , which, with Cu chromite in quinoline, yields ω -galloylamido-3:4-diethoxystyrene Me_3 ether, m.p. 157 — 158° , reduced catalytically to N-[β -(3:4-diethoxyphenyl)ethyl]galloylamine Me_3 ether, m.p. 130 — 131° . This, with $POCl_3$, affords 6:7-diethoxy-1-(3':4':5'-trimethoxyphenyl)-3:4-dihydroisoquinoline, m.p. 163 — 164° , which, with Pd in xylene, yields 6:7-diethoxy-1-(3':4':5'-trimethoxyphenyl)isoquinoline, m.p. 117 — 118° .

CH. ABS. (r)

Synthesis of benzyltetrahydroisoquinoline bases under so-called physiological conditions. E. SPÄTH, F. KUFFNER, and F. KESZTLER (Ber., 1936, 69, [B], 378—384).—Homopiperonylhomopiperonylamide is converted by successive treatment with $POCl_3$ in PhMe and Zn and fuming HCl into 6:7:3':4'-dimethylenedioxybenzyl-1:2:3:4-tetrahydroisoquinoline (I), m.p. 84 — 85° [hydrochloride, m.p. 242 — 243° (vac.)], the presence of minute amounts of which can be detected by its transformation by CH_2O in MeOH into 2:3:12:13-dimethylenedioxyberbine (II), m.p. 214° (vac.). Homopiperonal (III) is obtained by the action of dry $AgOBz$ and I in boiling C_6H_6 on saffrole and treatment of the product with boiling NaOH-50% MeOH, whereby

safrole glycol is obtained, which is oxidised by $\text{Pb}(\text{OAc})_4$. When (III) is condensed with homopiperonylamine hydrochloride (Hahn *et al.*, A., 1935, 357) the products are: (I) homopiperonylamine, which cannot contain (I), since the compounds are readily separated from one another by distillation in a high vacuum, (2) 3':4'-methylenedioxybenzylidene- β -3:4-phenylethylamine (IV), m.p. 115–117°, the formation of which is attributed to the presence of a trace of piperonal in (III), and (3) a non-cryst. material converted by CH_2O into norhydrohydrastinine unaccompanied by any trace of (II). It is therefore impossible that (I) is produced as reported by Hahn *et al.* (*loc. cit.*) and their product is very probably impure (IV). H. W.

Hydrates of quinine. G. MALQUORI and M. COVELLO (Annali Chim. Appl., 1935, 25, 647–654).—Neither the trihydrate nor the known higher hydrates can exist above 15°. Dehydration appears to be a discontinuous process, but definite hydrates do not result. Dehydration is complete at 50–60° and is "irreversible." A. M. P.

Origin of β -isocupreidine. R. LUDWICZAK and J. SUSZKO (Bull. Acad. Polonaise, 1935, A, 104–106).—A correction to previous work (A., 1935, 996) based on the observation that, when heated with H_2SO_4 , hydrocupreidine is unchanged but cupreidine is partly converted (equilibrium) into β -isocupreidine. J. W. B.

Hydriodoquinine and niquine. J. REYMAN and J. SUSZKO (Bull. Acad. Polonaise, 1935, A, 360–373).—Hydriodoquinine-I (A) $+\text{C}_6\text{H}_6$, m.p. 93°, resolidifies and decomp. 130–140°, $[\alpha]_D^{20} -18^\circ$ (Rosenmund *et al.*, A., 1924, i, 982) (methiodide, m.p. 112–114°, $[\alpha]_D^{20} -82.5^\circ$), is decomposed in boiling C_6H_6 to give β -isoquinine (B) (not isolated) and an insol. basic hydriodide, $(\text{C}_{20}\text{H}_{25}\text{O}_2\text{N}_2\text{I})_2\text{HI}$ (C), m.p. 178–204° (decomp.), reconverted into (A) by NH_3 ; but (A) is unaltered by hot P-HI (*d* 1.7) and, contrary to Skrap (ref., *loc. cit.*) is converted into (B) by AgNO_3 . Hydriodoquinine-II (D), decomp. 125–150°, $[\alpha]_D^{20} -217^\circ$, is similarly decomposed in boiling C_6H_6 to the insol. basic hydriodide (E) $+\text{CHCl}_3$, m.p. 76–80°, and solvent-free, m.p. 175–192° (decomp.), $[\alpha]_D^{20} -87^\circ$ [reconverted into (D) by cold NH_3] and (from the mother-liquor) niquine (F): $3\text{C}_{20}\text{H}_{25}\text{O}_2\text{N}_2\text{I} \rightarrow (\text{C}_{20}\text{H}_{25}\text{O}_2\text{N}_2\text{I})_2\text{HI} + \text{C}_{20}\text{H}_{24}\text{O}_2\text{N}_2$. (E) is also obtained from (D) (3 mols.) and its dihydriodide, m.p. 223° (decomp.) (1 mol.). Although it could not be prepared by admixture of (A) and (D), decomp. of the mixed hydriodides of (A) and (D) with NH_3 in presence of C_6H_6 affords a mol. compound, m.p. 93°, $[\alpha]_D^{20} -118^\circ$ [methiodide, m.p. 191–195° (decomp.)]. Thus (A) and (D) are only stereoisomerides, but (B) and (F) are structural isomerides, both of composition $\text{C}_{20}\text{H}_{24}\text{O}_2\text{N}_2$. With $\text{AcCl}-\text{C}_5\text{H}_5\text{N}$ (F) gives a Ac_2 derivative, m.p. 142–143° $[\alpha]_D^{20} +33^\circ$, partly hydrolysed by 20% HCl at room temp. to the known Ac_1 derivative: hence (F) contains a OH. Oxidation of (F) with H_2O_2 at 100° gives quinic acid. All $[\alpha]_D$ vals. are in 96% EtOH. J. W. B.

Quinine-urethane solutions. L. NOBILI (G. Farm. Chim., 1935, 84, 15–20; Chem. Zentr., 1935,

i, 3955).—The greenish-yellow colour is said to be due to the presence of a CH_2OH in quinine.

H. N. R.
Niquidine. T. DOMAŃSKI and J. SUSZKO (Bull. Acad. Polonaise, 1935, A, 457–464).—Quinidine with conc. HCl or HBr (cf. A., 1935, 874, 1137) gives an unsaturated alkaloid, niquidine (I), $\text{C}_{19}\text{H}_{24}\text{N}_2\text{O}_2$, m.p. 161°, $[\alpha]_D^{20} +171^\circ$ in EtOH [dioxalate, m.p. 206–207° (decomp.), $[\alpha]_D^{20} +189^\circ$ in H_2O ; dihydrobromide, m.p. 250° (decomp.); N-NO-derivative, m.p. 80–130°, decomp. 160–170°, $[\alpha]_D^{20} -73^\circ$ in EtOH; dibromide, m.p. 170–171° (decomp.), $[\alpha]_D^{20} +142^\circ$ in MeOH [dihydrobromide, m.p. 238° (decomp.), $[\alpha]_D^{20} +152^\circ$ in MeOH and H_2O ; dinitrate, m.p. 186–187° (decomp.)]; N-Ac, m.p. 206–207°, $[\alpha]_D^{20} +25^\circ$ in EtOH; and N-Ac₂, m.p. 80–90°, $[\alpha]_D^{20} -28^\circ$ in EtOH, derivatives. (I) with 25% AcOH in a sealed tube gives nichotoxin (nichicin) (II), m.p. 70°, $[\alpha]_D^{20} -5^\circ$ (p-nitrophenylhydrazone, m.p. about 60°), and with H_2O_2 yields quinic acid. (I) may be as shown

$$\begin{array}{c} \text{CH}_2\text{CH}(\text{CH}_2\text{CH}(\text{CH}_2)_2\text{CH}(\text{CH}_2)_2\text{CH}(\text{OH})\text{C}_5\text{H}_5\text{N}\cdot\text{OMe}) \\ | \\ \text{CH}_2\text{N}(\text{CH}_2)_2\text{CH}(\text{CH}_2)_2\text{CH}(\text{CH}_2)_2\text{CH}(\text{OH})\text{C}_5\text{H}_5\text{N}\cdot\text{OMe} \end{array}$$

and (II) $\text{C}_7\text{H}_{10}(\text{CH}_2\cdot\text{NH}_2)(\text{CH}_2\cdot\text{CO}\cdot\text{C}_5\text{H}_5\text{N}\cdot\text{OMe})$.

F. R. G.
Transformations of isoquinidines. T. DOMAŃSKI and J. SUSZKO (Bull. Acad. Polonaise, 1935, A, 465–473).—Quinidine, α -, β -, and γ -isoquinidine, nichidine, and the corresponding toxins (cf. preceding abstract) are interconvertible in presence of acids.

F. R. G.
Addition of organomagnesium halides to ϕ -codeine types. I. Deoxycodine-C. L. SMALL and K. C. YUEN (J. Amer. Chem. Soc., 1936, 58, 192–196).—Deoxycodine-C (I) (salicylate, m.p. 195–196°) (A., 1931, 1077) and MgMeI give the phenolic methyl-dihydrodeoxycodine (II), m.p. 145–146°, $[\alpha]_D^{20} +69.7^\circ$ in EtOH or CHCl_3 (hydrobromide, m.p. 245–246°; hydriodide, m.p. 155–158°; methiodide, m.p. 239°), presumably formed by 1:2- or 1:4-addition involving the $\cdot\text{O}$ linking. Zn dust distillation of (II) gives a hydrocarbon, $\text{C}_{15}\text{H}_{12}$, m.p. 103° (not sharp; sinters from 95°) [picrate, m.p. 95–98° (sinters from about 85°)], and oily hydrocarbon(s) (picrates, m.p. 118–119° and 138–141°, not identical with 2- and 4-methylphenanthrene picrates). Hydrogenation of (II) affords methyl-tetrahydrodeoxycodine, m.p. 128–129°, $[\alpha]_D^{20} -47.8^\circ$ in EtOH [hydrochloride, m.p. 240.5°; hydrobromide, m.p. 248–249°; methiodide (+EtOH), m.p. 254–255°]. (I) and MgEtI give α -ethyl-dihydrodeoxycodine (III), m.p. 156–164°, $[\alpha]_D^{20} -184.2^\circ$ in CHCl_3 (hydriodide, m.p. 205–210°; perchlorate, m.p. 187–200°; methiodide, m.p. 210–215°), and an oily product (A). (III) and (A) are reduced (H_2 , PtO_2 , aq. MeOH, N-HCl) to α -, m.p. 168.5–169°, $[\alpha]_D^{20} -54.8^\circ$ in CHCl_3 (hydriodide, m.p. 234°), and β -, m.p. 148–153°, $[\alpha]_D^{20} -37.6^\circ$ in CHCl_3 , -ethyl-tetrahydrodeoxycodines, respectively; (A) also gives an unidentified substance, m.p. 215–216°. The isomerism may be configurational or positional. (I) and MgPhBr afford $\approx 83\%$ of phenyl-dihydrodeoxycodine (IV), m.p. 184.5–185.5°, $[\alpha]_D^{20} +129.3^\circ$ in CHCl_3 [picrate (+ H_2O), m.p. (anhyd.) 129–132°; benzoate, m.p. 203–204°; methiodide, m.p. 257.5–258°], and a little of an oil (B).

(IV) could not be reduced catalytically except with PtO_2 in aq. MeOH-HCl ; a *hexahydrophenylltetrahydrodeoxycodeine* (V), m.p. 132—134°, $[\alpha]_D^{24} -48.4^\circ$ in CHCl_3 (perchlorate, m.p. 255—256°; *methiodide*, m.p. 250°), results. (B) is reduced to a *phenylltetrahydrodeoxycodeine*, m.p. 218—220°, $[\alpha]_D^{26} +16.1^\circ$ in CHCl_3 . *cyclohexyldihydrodeoxycodeine*, m.p. 131.5—132.5°, $[\alpha]_D^{25} -51^\circ$ in CHCl_3 (perchlorate, m.p. 250—251°), prepared from (I) and Mg cyclohexyl chloride in isoamyl ether (not obtained in Et_2O) at 100°, is reduced [as for (IV)] to *cyclohexylltetrahydrodeoxycodeine*, m.p. 193—193.5°, $[\alpha]_D^{25} -14.2^\circ$ in CHCl_3 (*hydriodide*, m.p. 235—236°), which differs from (V).

H. B.

Alkaloids of *Sinomenium* and *Cocculus*. XL. Alkaloids of *Stephania cepharantha*, Hayata.

III. H. KONDO and I. KEMATSU (J. Pharm. Soc. Japan, 1935, 55, 234—241).—*isoTetrandrine* (I), $\text{C}_{38}\text{H}_{42}\text{O}_6\text{N}_2$, m.p. 181—182°, $[\alpha]_D^{17} +146^\circ$ in CHCl_3 , isolated from the above, yields a *methiodide*, decomp. 242°, an α -, m.p. 171—172° [*methiodide* (II), decomp. 255°], and a β -, m.p. about 110°, *methine*. (II) with MeOH-KOH affords *de-N-isotetrandrine*, m.p. 220°, not depressed on admixture with *de-N-tetrandrine* or *de-N-berbamine* methylate. KMnO_4 oxidises (II) to a *substance*, m.p. 305°, not depressed on admixture with Et_2 6-methoxydiphenyl-3:4'-dicarboxylate. The partial formula $\text{C}_{32}\text{H}_{24}(\text{O})_2(\text{OMe})_4(\text{NMe})_2$ is proposed for (I).

CH. ABS. (r)

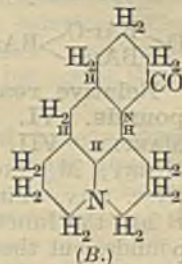
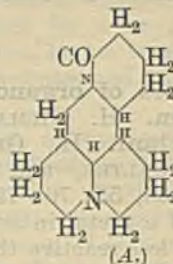
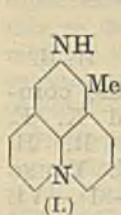
Alkaloids of *Sinomenium* and *Cocculus*. XLV. Stereochemical and biogenetic relationships of biscoclaurine alkaloids.

H. KONDO and M. TOMITA (Arch. Pharm., 1936, 274, 65—82).—The following alkaloids are considered to be derived from 2 mols. of coclaurine [7-hydroxy-6-methoxy-1-*p*-hydroxybenzyl-1:2:3:4-tetrahydroisoquinoline]: (a) oxidised to 2-methoxydiphenyl ether-5:4'-dicarboxylic acid (I): dauricine (II); oxyacanthine (III); berbamine; tetrandrine (IV) [optical isomeride of methylberbamine (= *isotetrandrine*)]; phæanthine [optical antipode of (IV)]; trilobamine; trilobine (V); isotrilobine (VI); menisarine (VII); normenisarine; cepharanthine; (b) not oxidised to (I): *isochondodendrine* (VIII); *l*-curine and its optical antipode *d*-bebeerine; insularine, probably $\text{C}_{32}\text{H}_{23}(\text{O})_3(\text{OMe})_3(\text{NMe})_2$, and not $\text{C}_{19}\text{H}_{21}\text{O}_3\text{N}$ as previously suggested (J. Pharm. Soc. Japan, 1927, 47, 815). Constitutional formulæ (and, in some cases, models) are given; those previously suggested (A., 1932, 1048) for (V) and (VI) are modified. Possible biological syntheses of (II), (III), (V), (VII), and (VIII) are discussed. The botanical sources of the alkaloids are given.

H. B.

Constitution of matrine. XVIII. K. TSUDA (Ber., 1936, 69, [B], 429—434; cf. A., 1935, 1514).—The constitutions assigned (*loc. cit.*) to dihydro-(I) and dehydro- α -matrinidine (II) lead to the conclusion that acetyl- α -matrinidine is a δ -NHAc-ketone; this is confirmed by the isolation of its *semicarbazone*, $\text{C}_{15}\text{H}_{27}\text{O}_2\text{N}_5$, decomp. 203°. Treatment of (II) in C_6H_6 with LiBu followed by EtBr gives *decarboxydehydromatrinane* (III), b.p. 200—210°/4 mm. (*hydriodide*, m.p. 193—194.5°), identical

with one of the products of the dehydrogenation of matrine by Pd-asbestos (A., 1935, 766). The chemical



behaviour of (I) and its relationship to the known leguminous alkaloids indicate for it the constitution (I). Against this view, (II) is not converted into its NH_2 -derivative by NaNH_2 , and its Bu compound is not formed from (III) and LiBu in C_6H_6 at 100°. (Conyryne and LiBu in C_6H_6 afford 2-propyl-6-butylpyridine, b.p. 228—230°.) Successive treatment of Me methylmatrate methiodide with Ag_2O and KMnO_4 gives $\text{H}_2\text{C}_2\text{O}_4$, $(\text{CH}_2\text{CO}_2\text{H})_2$, and glutaric acid but no AcCO_2H . A 3-methylpyrrolidone ring cannot therefore be present in matrine, and the only remaining possibility is a pyrrolidone ring, thus leading to a choice of constitutions (A) or (B) for the alkaloid.

H. W.

South American curare.—See this vol., 534.

Alkaloids. R. ROBINSON (Ann. Rev. Biochem., 1935, 4, 497—518).—A review of the lit. for 1933—1934.

CH. ABS. (r)

Decomposition of aromatic arsines in the Friedel and Crafts reaction. M. S. MALINOVSKI (J. Gen. Chem. Russ., 1935, 5, 1355—1358).—Aromatic arsines yield AsCl_3 and COPhMe or its derivatives when treated with AcCl or $\text{CH}_2\text{Cl}\cdot\text{COCl}$ in presence of AlCl_3 . The reaction is useful in the identification and elucidation of the structure of arsines.

R. T.

Arsenic-containing azo-dyes from 4-aminodiphenyl-4'-arsinic acid. G. I. GERSCHON and R. P. LASTOVSKI (J. Appl. Chem. Russ., 1935, 8, 1435—1438).—4-Acetamido-4'-diazodiphenyl sulphate in aq. EtOH and AsCl_3 at 100° in presence of CuCl yield 4-aminodiphenyl-4'-arsinic acid, the diazo-derivative of which yields a red-brown product with β - $\text{C}_{10}\text{H}_7\cdot\text{OH}$, and a violet dye with H-acid .

R. T.

Phenylarsinic acid. R. H. BULLARD and J. B. DICKEY (Org. Syntheses, 1935, 15, 59—61).—An improved prep. from PhN_2Cl , Na_3AsO_3 , and CuSO_4 is described.

CH. ABS. (r)

Mol. wts. of organoboric acids. C. R. KINNEY and D. F. PONTZ (J. Amer. Chem. Soc., 1936, 58, 196).— ArB(OH)_2 ($\text{Ar}=\text{Ph}$, *p*- $\text{C}_6\text{H}_4\text{Me}$, *m*- and *p*- $\text{C}_6\text{H}_4\text{Cl}$, *p*- $\text{C}_6\text{H}_4\text{Br}$, *o*- $\text{OEt-C}_6\text{H}_4$, *p*- $\text{OPh-C}_6\text{H}_4$, and α - C_{10}H_7) are unimol. in PhNO_2 (f.p. method).

H. B.

Structure of organoboron oxides. C. R. KINNEY and D. F. PONTZ (J. Amer. Chem. Soc., 1936, 58, 197).—The mol. wts. of phenyl-, *p*-tolyl-, *m*- and *p*-chlorophenyl-, *p*-bromophenyl-, and α -naphthyl-boric oxides show considerable variation

in PhNO_2 (f.-p. method) and indicate that the oxides are probably mixtures of $\text{ArB} \begin{smallmatrix} \text{O} \\ \diagup \quad \diagdown \end{smallmatrix} \text{O} \text{Ar}$ and $\text{O} \begin{smallmatrix} \text{Ar-O} \\ \diagup \quad \diagdown \end{smallmatrix} \text{O} \text{Ar}$.

H. B.

Relative reactivities of organometallic compounds. VI. Boron. H. GILMAN and K. E. MARPLE. **VII. Calcium.** H. GILMAN, R. H. KIRBY, M. LICHTENWALTER, and R. V. YOUNG (Rec. trav. chim., 1936, 55, 76—79, 79—81).—VI. B has the function of a metal in organoboron compounds, but these are less reactive than true organometallic compounds. BPh_3 with PhCHO and PhNCO yields respectively CHPh_2OH and NHBzPh . The colour test (cf. A., 1925, ii, 1011) is given more rapidly by BPr_3 than by BPh_3 , but less rapidly than by organoaluminium compounds.

VII. Contrary to Gilman and Schulze (A., 1926, 1130) CaPhI is more reactive than MgPhI , as it converts PhCN into COPh_2 5 times as rapidly, converts diphenylene oxide into its -1-carboxylic acid (MgPhI does not), and converts NPh:CPh_2 into NHPPh:CPh_2 (analogy with LiPh). F. R. G.

Mercuration of nipasol, a propyl ester of p-hydroxybenzoic acid. A. M. SAMSON and A. C. SANTOS (Univ. Philippines Nat. Appl. Sci. Bull., 1935, 4, 149—154).— $p\text{-OH}\cdot\text{C}_6\text{H}_4\cdot\text{CO}_2\text{Pr}$ with $\text{Hg}(\text{OAc})_2$ in AcOH-EtOH affords a mixture (I) of $\text{Pr } 3:5\text{-bis}(\text{acetoxymercuri})\text{-}$ and $3\text{-(acetoxymercuri)-}4\text{-hydroxybenzoates}$. (I) with I-KI yields a product of indefinite m.p., which affords $3:5\text{-di-iodo-}$, m.p. 236—237° (Me ester, m.p. 166—167°; Et ester, m.p. 123—124°), and 3-iodo- , m.p. 190—200° (Me ester, m.p. 156—157°), $4\text{-hydroxybenzoic acids}$ on hydrolysis with EtOH-KOH ; with Br (I) similarly affords $3:5\text{-dibromo-}$, m.p. 266—267° (Me ester, m.p. 125—126°), and 3-bromo- (Me ester, m.p. 106—107°), $4\text{-hydroxybenzoic acids}$. CH. ABS. (r)

Stereochemistry of some new complex thio-salts of mercury, cadmium, and zinc. W. H. MILLS and R. E. D. CLARK (J.C.S., 1936, 175—181).— $1:3:4\text{-C}_6\text{H}_3\text{Me}(\text{SO}_2\text{Cl})_2$ is reduced (Sn-HCl) to the $3:4\text{-dithiol}$ (I), b.p. $174^\circ/41\text{ mm.}$, m.p. 35° . $p\text{-C}_6\text{H}_4\text{Cl-NHAc}$ heated with conc. H_2SO_4 affords $p\text{-chloroanilinesulphonic acid}$, converted through the diazonium xanthate and oxidation (HNO_3 , d 1.4) into the $3:4\text{-disulphonic acid}$ (Ba and Na salts), the sulphonyl chloride, m.p. $82\text{--}83^\circ$, of which is reduced to $1\text{-chlorobenzene-}3:4\text{-dithiol}$ (II), b.p. $165^\circ/32.5\text{ mm.}$, m.p. 31° . When refluxed with yellow HgO , (I) in KOEt-EtOH affords $\text{K}_2\text{ bis}(\text{toluene-}3:4\text{-dithiol})\text{-mercury}$, + EtOH and solvent-free, of type $[\text{Ar} \begin{smallmatrix} \text{S} \\ \diagup \quad \diagdown \end{smallmatrix} \text{M}' \begin{smallmatrix} \text{S} \\ \diagup \quad \diagdown \end{smallmatrix} \text{Ar}] \text{M}'_2$ (III) ($\text{M}' = \text{Hg}$, $\text{M}' = \text{K}$); similar complexes are obtained with Cd and Zn. The corresponding alkaloid salts ($\text{M}' = \text{alkaloid}$, H) are obtained (i) from the K_2 salt and the base sulphate or hydrochloride in EtOH , or (ii) by the action of HgO on a solution of the base and thiol in CHCl_3 . Thus, from (II) is obtained *diquinine* $\text{H}_2\text{ bis}(\text{1-chlorobenzene-}3:4\text{-dithiol})\text{mercury}$ as its $\alpha\text{-form}$, m.p. 142° , $[\alpha]_{\text{D}}^{20} +182^\circ$ in COMe_2 , $[\alpha]_{\text{D}}^{20} -191^\circ$ in $1:1\text{ CHCl}_3\text{-COMe}_2$, which dissolves readily in COMe_2 , the solution depositing crystals of the $\beta\text{-form}$, m.p. 138° , $[\alpha]_{\text{D}}^{17} -240^\circ$

in CHCl_3 , $[\alpha]_{\text{D}}^{20} -188^\circ$ in $1:1\text{ CHCl}_3\text{-COMe}_2$. The solution of the $\beta\text{-form}$ in cold CHCl_3 sets to a jelly which slowly crystallises at $40\text{--}60^\circ$ to the $\alpha\text{-form}$. Interconversion of $\alpha\text{-}$ and $\beta\text{-forms}$ can be repeated indefinitely by such methods, using various solvents. Assuming a tetrahedral arrangement of the 4 S in the complex anion, resolution should be possible, but, probably owing to very rapid autoracemisation, the Na_2 salts were inactive and showed no mutarotation even at -35° . One form is probably of type (III) and the other is assigned a 3 co-ordinated Hg structure. By similar methods are obtained the $\alpha\text{-}$, + αCHCl_3 (effloresces), and $\beta\text{-}$, m.p. 157° , forms of *diquinine* $\text{H}_2\text{ bis}(\text{1-chlorobenzene-}3:4\text{-dithiol})\text{cadmium}$ and, from (I), the $\alpha\text{-}$, m.p. 155° , and $\beta\text{-}$, sinters 128° , m.p. 145° , forms of *diquinine* $\text{H}_2\text{ bis}(\text{toluene-}3:4\text{-dithiol})\text{zinc}$, similarly interconvertible. An apparatus for rapid low-temp. polarimetry is described. J. W. B.

Organic thallium compounds. III. Synthesis of organic thallium compounds with simple substituents in the aromatic radical. S. S. NAMETKIN, N. N. MELNIKOV, and G. P. GRATSHEV (J. Gen. Chem. Russ., 1935, 5, 1455—1459).—The following substituted aryl Tl halides have been prepared by the reactions: RB(OH)_2 (I) + $\text{TlX}_3 + \text{H}_2\text{O} \rightarrow \text{RTlX}_2$ (II) + $\text{HX} + \text{H}_3\text{BO}_3$; (I) + (II) + $\text{H}_2\text{O} \rightarrow \text{R}_2\text{TlX} + \text{HX} + \text{H}_3\text{BO}_3$: $p\text{-C}_6\text{H}_4\text{Br-TlCl}_2$, m.p. 262° (decomp.); $p\text{-C}_6\text{H}_4\text{Br-TlBr}_2$, decomp. at $190\text{--}200^\circ$; $p\text{-C}_6\text{H}_4\text{Cl-TlCl}_2$, m.p. $>250^\circ$; $p\text{-C}_6\text{H}_4\text{Cl-TlBr}_2$, m.p. $>250^\circ$; $\text{CH}_2\text{Ph-TlBr}_2$, m.p. 205° (decomp.); $(p\text{-C}_6\text{H}_4\text{Br})_2\text{TlCl}$, m.p. $>250^\circ$; $(p\text{-C}_6\text{H}_4\text{Br})_2\text{TlBr}$, m.p. $>250^\circ$; $(p\text{-OMe-C}_6\text{H}_4)_2\text{TlBr}$, m.p. $>250^\circ$; $(p\text{-C}_6\text{H}_4\text{Cl})_2\text{TlCl}$, m.p. not given; $(p\text{-C}_6\text{H}_4\text{Cl})_2\text{TlBr}$, decomp. at 240° . R. T.

Proteins in liquid ammonia. III. Reaction of sodium in liquid ammonia with proteins and related substances. R. G. ROBERTS and C. O. MILLER (J. Amer. Chem. Soc., 1936, 58, 309—310; cf. A., 1934, 638).—Dry proteins react with Na in liquid NH_3 as acids, H_2 being evolved; reaction is much slower than with $\text{NH}_2\text{-acids}$ or dipeptides. Using a slight excess of Na, the vals. of the ratio mols. H_2 evolved to g.-atoms N present for caseinogen, edestin, gelatin, and zein are 0.215, 0.285, 0.35, and 0.09, respectively; these vals. are generally $>$ those calc. from the glutamic, aspartic, and hydroxyglutamic acid content. H. B.

Physical chemistry of zein. C. C. WATSON, S. ARRHENIUS, and J. W. WILLIAMS (Nature, 1936, 137, 322—323).—By the addition of H_2O to the EtOH solution, purified zein can be divided into 3 practically homogeneous fractions, which are now characterised by their sedimentation, diffusion, and dielectric consts., and by their electrophoretic mobilities. L. S. T.

Crystalline ovalbumin. III. Fractionation of peptic hydrolysis products by dialysis. H. O. CALVERY and E. D. SCHOCK. **IV. Rate of liberation of amino-nitrogen and cystine, tyrosine, and tryptophan.** Colorigenic values during peptic, acid, and alkaline hydrolysis of ovalbumin. H. O. CALVERY, W. D. BLOCK, and E. D. SCHOCK (J. Biol. Chem., 1936, 113, 15—19, 21—25).—III. Dialysis can be used to separate

peptic hydrolysis products into fractions of different composition. Free tyrosine has been isolated from a peptic hydrolysate of cryst. ovalbumin, thus supporting the view that free NH_2 -acids are liberated when pepsin acts on protein.

IV. Uncoagulated cryst. ovalbumin is readily hydrolysed when the pepsin to protein ratio is 1:10 and the acid concn. is approx. 0.3%. During the digestion the $\text{NH}_2\text{-N}$ val. rises gradually to a max. of 25.1% in 36 days whilst the chromogenic val. obtained by the Folin-Marenzi method for cystine increases gradually to a max. of 2.1% within 12 hr. and then falls to a const. val. between 1.6 and 1.7% during the next 35 days. This is much > the highest val. (1.3%) obtained by acid hydrolysis. The acid peak was reached after a gradual rise and did not follow the same curve as that obtained by Jones *et al.* (A., 1933, 1081) for the cystine content of caseinogen. The tyrosine and tryptophan colorogenic vals. rose gradually until they reached a max. during peptic and alkaline hydrolysis; the max. are not coincident.

H. W.

Dilatometric investigations on the heat-denaturation of proteins. I. E. HEYMANN (Biochem. J., 1936, 30, 127—131).—Solutions of serum-albumin and -globulin, ovalbumin, and zein all showed an increase in total vol. on heat-denaturation; when the latter was not accompanied by coagulation the vol. changes were smaller. The vol. increases were only 3—4% of the vol. decreases on dissolving in H_2O . A sensitive dilatometer is described.

H. D.

Chemistry of heat-denaturation of proteins. A. KIESEL and S. KUSMIN (Z. physiol. Chem., 1936, 238, 145—148).—The denaturation by heat (60°) of edestin (I) is accompanied by increases in the tyrosine and histidine (II) contents. Possibly ring-closure is the cause of the (II) increase. Elimination of H_2O occurs on methylation of (I), but not in denaturation by heat.

W. McC.

Ultrafiltration of proteins. II.—See this vol., 500.

Relation of protein coagulation to oxidation-reduction potential.—See this vol., 360.

Ionic structure solubility, and coagulation of proteins.—See this vol., 426.

Nitrogen determination by ter Meulen's method. P. MAES (Bull. Assoc. anc. Elèves Gand, 1935, 36, 39—41; Chem. Zentr., 1935, i, 3821).—A modified method is described.

H. N. R.

Determination of small amounts of arsenic in organic compounds. K. WINTERFELD, E. DÖRLE, and C. RAUCH (Arch. Pharm., 1936, 274, 214).—A correction (cf. this vol., 90).

Determination of methoxyl and ethoxyl groups. C. L. PALFRAY (Documentat. sci., 1935, 4, 1—3; Chem. Zentr., 1935, i, 3821).—A volumetric Zeisel method is described.

H. N. R.

Determination of semicarbazide and semicarbazones. V. HARLAY (J. Pharm. Chim., 1936,

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[viii], 23, 199—204).—Passage of steam for 8—10 hr. through a solution of semicarbazones in 20% H_2SO_4 liberates semicarbazide which is decomposed to N_2H_4 ; this is determined by I in AcOH solution. The method is applicable to semicarbazide and semicarbazones of aldehydes and ketones, but not to those of ketonic acids.

R. S. C.

Determination of carotene and xanthophyll by a single distribution between liquid phases. S. W. CLAUSEN and A. B. MCCOORD (J. Biol. Chem., 1936, 113, 89—104).—A general colorimetric method for the determination of two substances of the same colour by a single distribution between two immiscible liquids is described, and applied to mixtures of carotene and xanthophyll using hexane and aq. diacetone alcohol. The method is applicable to pigments in plasma and serum.

J. N. A.

Ehrlich diazo-reaction with urine.—See this vol., 502.

Decomposition of salts of acetylsalicylic acid. V. GERVAY (Magyar gyóg. Társ. Ért., 1935, 11, 241—245; Chem. Zentr., 1935, ii, 250).—Owing to this decomp. the determination of free salicylic acid can only be approx.

H. N. R.

Colour reaction of ammonia and glycine with hypobromite and phenolic substances. O. FÜRTH and F. GÖTZL (Biochem. Z., 1936, 283, 358—363).—The elementary compositions of a series of blue pigments obtained by interaction of NaOBr with PhOH (or thymol) and NH_2 -acids (or NH_4 salts) are summarised in the formula $\text{C}_{15-84}\text{H}_{45-113}\text{NBr}_{1-5-3}$.

P. W. C.

Determination of phytic acid.—See this vol., 535.

Gross and Smith colorimetric method for determination of rotenone and deguelin. L. D. GOODHUE (J. Assoc. Off. Agric. Chem., 1936, 19, 118—120; cf. A., 1934, 1017).— H_2SO_4 is substituted for HNO_3 , the KOH in EtOH is diluted with H_2O , and the necessary NO_2 added as NaNO_2 to this solution. Fading is eliminated and the sensitivity increased 20-fold.

E. C. S.

Identification of alkaloids as picrates. A. IONESCO-MATIU and E. ILIESCO (J. Pharm. Chim., 1936, [viii], 23, 117—141).—Microchemical identification of alkaloids as picrates using (a) a cold saturated solution of picric acid (I) in 96% EtOH containing 5% of glycerol, or (b) picramic acid obtained by reduction of a 5% aq. solution of (I) with Na_2CO_3 -glucose, is described. Using one drop of the alkaloid solution the picrates of the following are described, the sensitivity of the reaction, in mg. unless otherwise stated, being given in parentheses: atropine, m.p. $165\text{--}166^\circ$ (b, 10^{-2}), hyoscyamine, m.p. $162\text{--}163^\circ$ (a, 0.5), nicotine, darkens 200° , m.p. 208° (a, 10^{-3}), strychnine, decomp. 200° (a, 2×10^{-3} ; b, 2×10^{-4}), brucine (a, 5×10^{-2}), morphine (a, 0.5% solution), codeine (a, 0.2% solution), dionine (a, 0.1% solution), heroin (a, 0.01% solution), papaverine, shrinks 150° , m.p. 154° (a, 10^{-2}), sparteine, darkens $195\text{--}196^\circ$, m.p. 199° (a, 0.05), hydrastinine (a, 0.08% solution), cocaine, m.p. $154\text{--}155^\circ$ (b, 2×10^{-3}), ephedrine (a, $> 0.8\%$ solution), novo-

caine, reddens 140° , m.p. $146-147^{\circ}$ (α , 0.4% solution), stovaine, m.p. $110-112^{\circ}$ (α , 0.02%), antipyrine, m.p. $180-182^{\circ}$ (α , 10^{-2}), and pyramidone, m.p. $168-170^{\circ}$ (α , 0.04% solution). Photomicrographs are given in each case. J. W. B.

Recognition of papaverines by a colour reaction with acetic anhydride and sulphuric acid. W. AWE (Pharm. Zentr., 1936, 77, 157-160; cf. A., 1923, i, 701).—Papaverine (5 mg.) in Ac_2O (3 c.c.) containing H_2SO_4 (5 drops) at 80° affords a solution with a yellowish-green fluorescence in daylight. 0.05 mg. can be recognised by observing the fluorescence in ultra-violet light. When AcCl-ZnCl_2 is used as condensing agent, the fluorescence in daylight is

obscured by the colour of the solution. Cryptopine (A., 1910, i, 502) does not interfere. J. L. D.

Use of Zimmermann's reagent for detection of glycine and for determining its position in polypeptides. E. ABDERHALDEN and A. NEUMANN (Z. physiol. Chem., 1936, 238, 177-182; cf. A., 1930, 897).—When free glycine (I) is present a ppt. is always produced. Of the other NH_2 -acids (not mentioned by Zimmermann) of the protein mol. only tryptophan (which gives a brown ppt. and green solution) interferes. With polypeptides containing the (I) residue the reaction is positive only when this residue carries the NH_2 (negative with silk fibroin, positive with silk peptone). W. McC.

Biochemistry.

Biochemistry and biophysics. P. L. DU NOÛY (Bull. Soc. Chim. biol., 1936, 18, 138-156).—A lecture.

Response of the chemical receptors of the carotid sinuses to the tension of carbon dioxide in the arterial blood in the cat. A. SAMAAH and G. STELLA (J. Physiol., 1935, 85, 309-319).

R. N. C.

Retention of carbonic acid in the dormouse (*Myoxus glis*) in course of carbon dioxide narcosis and rôle of the tissues in the maintenance of the alkaline reserve. L. DONTCHEFF and C. KAYSER (Compt. rend. Soc. Biol., 1936, 121, 447-449).—The anaesthetised animal retains considerable quantities of CO_2 , suggesting the presence of an "alkaline reserve" in the tissues equiv. to that of the blood.

R. N. C.

Nitrogen solubility in blood at increased air pressures. J. A. HAWKINS and C. W. SHILLING (J. Biol. Chem., 1936, 113, 273-278).—The solubility coeff. of N_2 (at atm. pressure) in dog's and ox blood is 0.0138-0.0148 and 0.0135-0.0140, respectively. With pressures of N_2 of 1-6 atm., the val. follows Henry's law.

H. G. R.

Regulation of the oxygen output of erythrocytes. I. F. HIMMERICH. II. **Blood-glycolysis.** F. HIMMERICH and R. S. FEINBERG (Biochem. Z., 1936, 284, 146-151, 152-162).—I. An apparatus for measuring the output is described.

II. The glycolysis resulting from addition of glucose to human erythrocytes increases (up to 200%) their O_2 output. Similarly, in defibrinated human and rabbits' blood the increased glycolysis due to an increase of 0.25-0.3 in p_{H} results in increases (up to > 300%) in the O_2 output. Apparently all factors which stimulate glycolysis increase O_2 output. Probably the glycolysis occurs at the surface of the erythrocytes and the accompanying production of acid and liberation of heat may play important parts in the process.

W. McC.

Determination of colloid-osmotic pressure. H. NAGAOKA (J. Biochem. Japan, 1935, 22, 351-366).—The colloid-osmotic pressure of horse serum, measured by a collodion membrane with a standard

membrane potential of 2-5 mv., attains equilibrium after 24 hr.; comparative measurements can be taken after 3-24 hr. Relationships between the pressure and concn. of colloid and temp. are determined.

F. O. H.

Electrodialysis of serum. A. V. MARKOVITSCH (J. Appl. Chem. Russ., 1935, 8, 1444-1451).—The p_{H} of serum falls during electrodialysis (parchment cathode and bakelite-paper anode membranes) from the original val. to 5.2. Max. pptn. of globulins takes place at p_{H} 5.6-5.7, at low concn. of electrolytes.

R. T.

Effect of continued passage of current through the external medium on the composition of blood in *Scyllium canicula*, the bronchial region being near the cathode. E. A. PORA (Compt. rend. Soc. Biol., 1936, 121, 411-413).—The osmotic pressure and corpuscular vol. increase with the intensity of the current. Ca and proteins also increase, whilst K and alkaline reserve decrease progressively. Vals. afterwards tend to return to normal. Serum- H_2O falls, but inorg. salts and org. substances both increase at the expense of the muscles, which take up H_2O .

R. N. C.

Modifications of the blood of *Perca fluviatilis*, consecutive to deep-sea fishing. L. BAUDIN (Compt. rend. Soc. Biol., 1936, 121, 437-439).

R. N. C.

Determination of the alkaline reserve in small mammals. L. DONTCHEFF and C. KAYSER (Compt. rend. Soc. Biol., 1936, 121, 446-447).—The Van Slyke const.-vol. apparatus is used. Local anaesthetisation during the drawing of blood is necessary.

R. N. C.

Effect of physical training on blood-volume, hæmoglobin, alkaline reserve, and osmotic resistance of erythrocytes. J. E. DAVIS and N. BREWER (Amer. J. Physiol., 1935, 113, 586-591).—Blood-vol. and hæmoglobin per unit vol. (I) in the dog fall during the first week of training, and later rise, but (I) is never > normal. The alkaline reserve is increased. Erythrocyte osmotic resistance rises in swimming but falls in running animals.

R. N. C.

Analysis of the constituents of suspensions of erythrocytes by the method of neutralisation

curves. G. ACHARD (Compt. rend. Soc. Biol., 1936, 121, 478—481).—The buffering effect of erythrocyte suspensions, their excipients, and laked erythrocyte solutions is due to factors other than the inorg. salts present. R. N. C.

Alteration, with time, of the buffering power of suspensions of erythrocytes. G. ACHARD (Compt. rend. Soc. Biol., 1936, 121, 481—484).—After prolonged action of acids or alkalis on erythrocyte suspensions the neutralisation curves resemble those obtained in suspensions laked with H_2O . R. N. C.

Reduction of oxyhæmoglobin in the human skin. L. NICOLAI (Pflüger's Archiv, 1932, 230, 238—245; cf. A., 1932, 1270).—Reduction of oxyhæmoglobin in the skin follows the equation $c=c_0e^{-kt}$. The rate of reduction is unchanged in hyperæmia following anoxæmia. R. N. C.

Fate of hæmoglobin in the organism. K. BINGOLD (Klin. Woch., 1934, 13, 1451—1452).—A pigment (I) with a band at 535 $m\mu$ is formed by the action of alkaline $Na_2S_2O_4$ on bilirubin-rich urine. It is found in old pleural exudates, but not in serum; its appearance in the urine is unaltered if the liver is choked. (I) is considered to be free from Fe and not bound to proteins, the colour being due to formation of a S derivative. Pigeons' blood or hæmin decolorised with H_2O_2 and boiled with KOH gives a band at 535 $m\mu$; $Na_2S_2O_4$ is often necessary for production of the spectrum. Cultures of *Pneumococci* on catalase-free blood-agar break down the blood to (I). R. N. C.

Effect of diet on the hæmoglobin concentration of the blood. L. N. ELLIS and O. A. BESSEY (Amer. J. Physiol., 1935, 113, 582—585).—Hæmoglobin in the rat at 1 month \propto the Fe content of the diet, but is independent at 1 year, when it falls into one of two ranges of vals., according to the sp. diet given. R. N. C.

Occurrence of several kinds of hæmoglobin in human blood. R. BRINKMAN and J. H. P. JONXIS (J. Physiol., 1935, 85, 117—127).—Fœtal hæmoglobin is replaced by a "less resistant" adult hæmoglobin after 7 months, and this in turn is replaced after 3 years by a hæmoglobin more resistant to alkaline denaturation. The three hæmoglobins differ in rate of alkaline denaturation and in isoelectric point, and so far have been detected only in human blood. R. N. C.

Relationship between specific gravity and protein content in plasma, serum, and transudate from dogs. A. A. WEECH, E. B. REEVES, and E. GOETTSCH (J. Biol. Chem., 1936, 113, 167—174).—The d of blood-plasma, -serum, or -transudate \propto the protein concn. H. D.

Serum electrolytes. X. Water of serum and factors for calculation of molality of a solute in serum from measurement of specific gravity. F. W. SUNDERMAN (J. Biol. Chem., 1936, 113, 111—115).—The d of serum bears to the total solids a linear relation (consts. given) from which concns. of a solid related to $[H_2O]$ may be obtained. F. A. A.

Conductometric method for investigation of colloidal suspensions. A. SLAVINSKI (Bull. Soc. Chim. biol., 1936, 18, 195—202).—The author's method (A., 1934, 860) for determining the vol. of colloidal particles is applied to blood-plasma. Human and horse plasma contain about 9% of albumin associated with 4.5% of liquid, the tonicity of the plasma being that of 0.85% aq. NaCl. Measurements with hæmolyzed blood indicate that the corpuscles contain "hæmoglobules" occupying 55% of the vol. of the corpuscles and containing 52% of hæmoglobin and 48% of liquid. A. L.

Effect of hæmorrhage of varying degree on blood and plasma volume, on blood-sugar, and on arterial blood pressure. J. D. ROBERTSON (J. Physiol., 1935, 84, 393—409). R. N. C.

Effect of splenic extracts on the blood picture. T. IMAI (Tohoku J. Exp. Med., 1933, 22, 293—313). CH. ABS. (p)

Cyclic variations in the composition of fish blood. L. BAUDIN (Compt. rend. Soc. Biol., 1936, 121, 501—502). R. N. C.

Ultrafiltration studies with normal horse serum. W. J. ELFORD, P. GRABAR, and W. FISCHER (Biochem. J., 1936, 30, 92—99).—Analysis of the state of aggregation of horse serum-proteins by ultrafiltration through graded collodion membranes shows that the simplest protein units correspond in particle size with mol. serum-albumin (I) and pseudoglobulin in dil. solutions, and that a second fraction is present which is more readily retained by membranes and in particle size about twice that of (I). This fraction is essentially a globulin (II) aggregate and may correspond with the euglobulin of serum. The antibody of an aged sample of type I pneumococcus antiserum was retained by membranes simultaneously with the more complex (II) fraction. P. W. C.

Activity of the globulins of blood as alexins. M. DOLADILHE (Compt. rend., 1935, 201, 689—690).—The globulins (I) pptd. from diluted serum with CO_2 are sol. in saline and are then separated by CO_2 into an insol. (0.2036% P) and a sol. (0.0782% P) fraction, which may be components of a sol. complex. The sol. fraction exhibits the central-group properties of alexin, of the same intensity as does the saline solution of (I). J. L. D.

Total plasma-protein in normal and fasting rats. W. C. CUTTING and R. D. CUTTER (Amer. J. Physiol., 1935, 113, 150—158).—Total plasma-protein (I) is measured by determination of the blood vol. (for which a method is described) and protein concn. Decrease of (I) during fasting \propto time. Lymph- and plasma-proteins resemble each other in composition and participation in body functions. R. N. C.

Tyramine as a pressor substance in pallid hypertension. H. A. HEINSEN and H. J. WOLF (Klin. Woch., 1934, 13, 1688).—Blood fractions obtained by extraction of the deproteinised blood with C_2H_5OH and H_2SO_4 give the colour reaction with 1:2- $NO \cdot C_{10}H_6 \cdot OH$ and HNO_3 , suggesting that tyramine is a cause of pallid hypertension. R. N. C.

Pharmacological determination of adenosine and histamine in blood. G. S. BARSOUM and J. H. GADDUM (*J. Physiol.*, 1935, 85, 1—14).—Tests described can detect 2×10^{-8} g. of histamine (I) and 0.5×10^{-6} g. of adenosine (II). (I) is present in normal human, rabbit's, guinea-pig's, dog's, and probably cat's blood. Corpuscular (I) and (II) are $>$ plasma-(I) and -(II), respectively. Clotting of blood or shaking of citrated blood increases (II) without affecting (I). R. N. C.

Appearance of histamine in venous blood during muscular contraction. G. V. ANREP and G. S. BARSOUM (*J. Physiol.*, 1935, 85, 409—420).—The histamine (I) contents of the arterial and venous blood to and from resting muscle are the same. Venous (I) is increased by diminution of the blood supply and by muscular contraction. R. N. C.

Presence of creatinine in blood. I. S. DANIELSON (*J. Biol. Chem.*, 1936, 113, 181—195).—The major part of the chromogenic substance (in the Folin-Wu determination; A., 1919, ii, 308) in blood H_2WO_4 filtrates and plasma ultra-filtrates is adsorbed by kaolin. The colour developed in a kaolin-treated filtrate heated with aq. NaOH is approx. the same as that obtained with an ordinary filtrate, whereas pure solutions of creatinine (I), or the material eluted from the kaolin, on treatment with NaOH give no colour with alkaline picrate. It is concluded that the chromogenic material in blood filtrates is (I). H. D.

Variations of concentration of conjugated phenols in blood in passing different organs. A. D. MARENZI (*An. Farm. Biochim.*, 1933, 4, 36—38; *Chem. Zentr.*, 1935, i, 3562).—The conjugated phenol content of portal blood is $>$ that of the carotid and vena cava inferior. R. N. C.

Lipochromes of human blood-serum. E. VON DANIEL and T. BÉRES (*Z. physiol. Chem.*, 1936, 238, 160—162).—The material obtained from 3 litres of the serum by chromatographic adsorption on $Ca(OH)_2$ (after pptg. with $EtOH$, etc.) consisted of 0.33 mg. of a yellowish-brown pigment (absorption max. at 502.5 and 472 $m\mu$), 0.15 mg. of lycopen, 0.08 mg. of a light yellow pigment (max. at 455 and 425 $m\mu$), and 0.28 mg. of carotene. The unidentified pigments may be biologically active. The proportions in which the pigments occur in the serum and the amounts of the individual pigments vary greatly. W. McC.

Determination of fat in 0.1 c.c. of blood or serum. J. SURÁNYI and P. VÉGHÉLYI (*Biochem. Z.*, 1936, 283, 415—421).—Blood (0.05 c.c. in each case) was extracted with $EtOH$ and $COMe_2$ at 100° and 75° and the filtered extracts were treated with $HCl-H_2O-BuOH$. The resulting turbidities were measured by the step-photometer. The total fat was thus obtained in the $EtOH$ extract whilst lecithin was absent from the $COMe_2$ extract. P. W. C.

Spectrophotometric determination of blood-cholesterol by means of silica. H. FOY and A. KONDI (*Brit. J. Exp. Path.*, 1935, 16, 349—357).—Variations in the state of hydration of plaster of Paris render the Myers and Wardell method unsatis-

factory. A modified method replacing this by SiO_2 and using a photometer is described.

NUTR. ABS. (m)

Effect of glucose ingestion on the cholesterol fractions of blood. F. FITZ and M. BRUGER (*J. Biol. Chem.*, 1936, 113, 297—302).—The increase in total cholesterol when glucose is fed to fasting subjects is located in the cholesteryl ester fraction. H. G. R.

Physiology of blood-glycogen. I. G. GOLANDAS. II. H. STAUB and G. GOLANDAS (*Pflüger's Archiv*, 1935, 236, 230—238, 355—360).—I. The mean val. for fasting blood-glycogen (I) in the dog is slightly $>$ that in man or rabbits. Plasma- and serum-glycogen are the same for all three; the greater part of (I) is contained in the corpuscles. (I) does not vary in the same subject; it diminishes in sterile blood stored at 37°, is scarcely altered at —8°, and is increased in unsterilised blood at 37° by bacterial action.

II. (I) rises in dogs and rabbits after fasting for 144—170 hr. Overcharging with carbohydrate generally increases (I) in man (mainly in the corpuscles) and rabbits. R. N. C.

Mechanism of the origin of alimentary hyperglycaemia. Y. HUKUI (*J. Biochem. Japan*, 1935, 22, 447—496).—Direct application of glucose (I) to the duodenum of rabbits produces no significant hyperglycaemia. Direct administration of (I), galactose, or fructose to the stomach or duodenum does not change the sugar content curves of blood from the portal, hepatic, or ear veins. Splanchnicotomy and/or vagotomy lower the alimentary hyperglycaemic curve. Administration of ergotamine or atropine also lowers the curve. Oral administration of fructose produces a hyperglycaemia due to blood-(I) and reduced by splanchnicotomy. The data support the absorption rather than the reflex-mechanism theory. F. O. H.

True blood-sugar level in insulin shock and convulsions. L. B. DOTTE and M. C. HRUBETZ (*J. Biol. Chem.*, 1936, 113, 141—143; cf. A., 1934, 565).—In rats, the true blood-sugar level falls during the course of insulin shock, and at the onset of convulsions is zero. F. A. A.

Variations of blood-sugar in rabbits following subcutaneous injections of phenylhydrazine hydrochloride. P. DERVILLÉE, L. LANSAC-FATTE, and R. CASTAGNOU (*Compt. rend. Soc. Biol.*, 1936, 121, 549—552).—Hyperglycaemia occurs in varying degree, but no hypoglycaemia. R. N. C.

Lactacidæmia in fowls with avitaminosis-B. I. I. NITZESCU and I. GONTZEA (*Compt. rend. Soc. Biol.*, 1936, 121, 562—563). R. N. C.

Influence of preliminary training on the lactic acid content of blood after intense work. A. V. PALLADIN and B. M. KOLDAEV (*Ukrain Biochem. J.*, 1934, 7, No. 1, 30—39).—Intense work causes accumulation of lactic acid in blood. Preliminary training lowers the rate of accumulation. CH. ABS. (p)

Mendel and Goldscheider's method for determining lactic acid in blood. R. MILTON (*Analyst*,

1936, 61, 91—96; cf. A., 1926, 212).—The effect of temp., time of heating, and concn. of H_2SO_4 and veratrole on the intensity of the colour produced is investigated and modifications are suggested. The results obtained are slightly lower, but more consistent, than those given by Friedemann and Kendall's method (A., 1929, 677).
E. C. S.

Determination of sodium formaldehyde-sulphoxylate in blood-plasma. E. HUG (Compt. rend. Soc. Biol., 1936, 121, 577—579).—Plasma is deproteinised with $\text{UO}_2(\text{OAc})_2$, and $\text{NaHSO}_2\cdot\text{CH}_2\text{O}$ determined with I.
R. N. C.

Partition of calcium and inorganic phosphorus in equine serum. P. B. PEARSON and H. R. CATCHPOLE (Proc. Amer. Soc. Animal Prod., 1935, Jan., 84—86).—Average vals. for total Ca and P in horses on a diet with adequate Ca and P were 13.13 ± 1.03 and 3.37 ± 0.29 mg. per 100 ml., respectively, and on a low-P diet vals. were 13.60 ± 0.70 and 2.61 ± 0.21 mg. The vals. for diffusible Ca and P were 7.15 ± 0.87 and 3.02 ± 0.32 mg. for the former and 8.09 ± 0.84 and 2.47 ± 0.29 mg. for the latter.
NUTR. ABS. (m)

Composition of the blood of dairy cattle. I. Effect of age and phosphorus intake on calcium and inorganic phosphorus content of whole blood of dairy heifers. A. H. VAN LANDINGHAM, H. O. HENDERSON, and G. A. BOWLING (J. Dairy Sci., 1935, 18, 557—572).—Feeding of P-deficient rations lowers the blood-inorg. P to extents approx. \propto the deficiency. The P requirement of growing animals is not \propto the increase in body-wt. but depends on skeletal development as measured by the height of the withers. The requirement in proportion to body-wt. decreases as the animal approaches maturity. Age and level of P intake were without effect on blood-Ca.
A. G. P.

Blood-calcium in newborn infants. N. P. COSTA, F. ESCARDO, and S. SCHERE (Rev. Soc. Argentina biol., 1934, 10, 273—279).—In newborn infants blood-Ca was slightly $<$ that of the mother.
CH. ABS. (p)

Blood-magnesium in pregnant women. N. ZAHARESCO-KARAMAN, M. ALEXIU, and I. URSU (Compt. rend. Soc. Biol., 1936, 121, 559—561).—Blood-Mg rises steadily to a max. in the 5th month, falls sharply in the 6th, rises again to the approx. val. of the first max. in the 7th, and then falls slightly until the end of pregnancy.
R. N. C.

Iodometric determination of iron in blood. LASAUSSE and L. FROCRAIN (J. Pharm. Chim., 1936, [viii], 23, 82—84).—Aq. NH_3 and milk of MgO are added and, after evaporating to dryness, incinerating at low temp., and igniting, the residue is freed from HNO_3 by HCl , dissolved in HCl , and mixed with aq. KI . After 3 min. 3 drops of amidone solution are added and liberated I is titrated with 0.005N- $\text{Na}_2\text{S}_2\text{O}_3$.
W. McC.

Effect of adrenalectomy on blood-chloride and -sodium. C. I. URECHIA, G. BENETATO, and RETEZEANU (Bull. Acad. Méd. Roumanie, 1936, 1, 141—144).—Adrenalectomy in cats produces

a rise or fall in blood-Cl, but generally a fall in -Na.
F. O. H.

Blood-bromine. C. I. URECHIA and RETEZEANU (Presse méd., 1935, 43, 701—703).—Low blood-Br was found only in manic-depressive psychoses. Injection of drugs and therapeutic preps. did not reduce it.
NUTR. ABS. (m)

Blood-iodine. V. Blood-iodine after total thyroidectomy in man. G. M. CURTIS, L. E. BARRON, and F. J. PHILLIPS (J. Lab. Clin. Med., 1935, 20, 813—816; cf. A., 1934, 1024).—Thyroidectomy is followed by a rapid transient increase and a subsequent decline in blood-I to $<$ normal. I then present in blood is probably absorbed from the alimentary tract.
CH. ABS. (p)

Polysaccharide hydrogen sulphates with heparin-like action.—See this vol., 453.

Effects of sodium citrate on the alkaline reserve and coagulability of the blood. D. DE SOUZA and F. D. M. HOCKING (J. Physiol., 1935, 85, 168—172).—Alkaline reserve is increased; coagulability is increased with small, and reduced by larger, doses.
R. N. C.

Changes in the coagulability of the blood produced by citric acid and some of its decomposition products. D. DE SOUZA and F. D. M. HOCKING (J. Physiol., 1935, 85, 173—178).—Citric acid or NH_4 citrate (intramuscular) increases alkaline reserve and coagulability of cats' blood. Acetonedicarboxylic and aconitic acids may increase or diminish coagulability without affecting alkaline reserve, but their Na salts increase both; COMe_2 affects neither.
R. N. C.

Blood coagulation. H. DYCKERHOFF and H. F. KÜRZEN (Biochem. Z., 1936, 284, 111—132).—Thrombin (I) contains a very small amount of firmly bound Ca. The Ca-free material has no coagulating power, but very rapidly unites with Ca to produce active (I). Circulating blood contains $>$ sufficient Ca to meet the requirements of (I). Under normal conditions Ca^{++} has no effect on coagulation. Pre-formed (I) probably occurs in circulating blood. Thrombokinase (II) activates (I) by removing inhibitors, in the absence of which (I) causes coagulation when Ca^{++} and (II) are not present.
W. McC.

Influence of novocaine anaesthesia on the fibrinogen content of the plasma and its coagulation. W. L. DULIÈRE, A. HUSTIN, and P. BOSSAERT (Bull. Soc. Chim. biol., 1936, 18, 234—236).—Lumbar injection of novocaine causes a decrease in hæmatocrit, time of coagulation, and concn. of fibrinogen, followed by gradual return to normal.
A. L.

Technique for determination of fibrinogen in human blood: rate of coagulation of plasma. W. L. DULIÈRE (Bull. Soc. Chim. biol., 1936, 18, 231—233)

Test for coprosterol in plasma.—See this vol., 467.

Effect of spleen extract on the time of coagulation, thrombocytes, and erythrocytes of the

blood. E. HAENLEIN and E. SCHLIEPHAKE (Klin. Woch., 1935, 14, 79—83). R. N. C.

Preparation of cobra-toxin for clinical purposes, particularly for alleviation of cancer pain. L. W. VAN ESVELD (Biochem. Z., 1936, 283, 343—357).—A method is described for separating from cobra-toxin the hæmolysin, hæmorrhagin, and non-toxic albumin contents without any considerable loss of the sp. neurotoxin. The purified prep., kept in the dark at p_H 5.2, remained completely active for months while in clinical use. P. W. C.

Chemistry of immunity reactions. IV. Distribution of chemically distinguished antigens in the organism of normal and sensitised animals. F. HAUROWITZ and F. KRAUS (Z. physiol. Chem., 1936, 239, 76—82; cf. A., 1932, 542; 1933, 411).—Injection of arsanilazoprotein (I) into normal guinea-pigs is followed by accumulation of As in the organs of the reticulo-endothelial system, particularly in the liver. Similar results are obtained after injection of a suitable antiserum (*loc. cit.*). The gradual degradation of (I) in the organism has been studied. After injection of iodoglobulin the main portion of the antigen is found in the liver. H. W.

Recovery and stabilisation of the antibacterial agglutinin and anti-sheep hæmolysin of serum. H. GOLDIE (Compt. rend. Soc. Biol., 1936, 121, 761—764).—The agglutinin of *B. coli* and anti-sheep hæmolysin are recovered from their respective complexes by stabilisation with CH_2O and pptn. with 1:4:6:8- $NH_2 \cdot C_{10}H_4(SO_3Na)_3$ and citric acid. Both show the variation of p_H and isoelectric point and increase of thermostability on storage, exhibited by antitoxin recovered by flocculation with the toxin, and are not affected by heating to 85°, which denatures the associated globulins and reduces their anaphylactic activity. R. N. C.

Favourable effect of some lipins on the immunising action of antigens. G. RAMON (Compt. rend., 1935, 201, 687—689).—Tetanus toxin in oil containing cholesterol (I) when injected subcutaneously into horses is at least 7500 times as active in producing antibodies as when (I) is omitted. J. L. D.

Specific antigen and antibody in the urine of pregnant women. L. GRIMARD (Compt. rend. Soc. Biol., 1936, 121, 743—746). R. N. C.

Keten, a new reagent for detoxification of vaccine. J. T. TAMURA and M. J. BOYD (Science, 1936, 83, 61—62).—Acetylation of *B. dysenteriae*, Shiga, with keten for 30 min. detoxifies the antigen. L. S. T.

Characters of antitoxins purified by flocculation, stabilised by formaldehyde, and recovered with sodium naphthylaminetrisulphonate. H. GOLDIE (Compt. rend. Soc. Biol., 1936, 121, 649—652).—The recovered antitoxins become progressively acid during the first 2—3 months of storage, the isoelectric point is shifted, and the thermo-resistance increases. The antigenic power is not affected, but the anaphylactic action is reduced by heating to 80—85° to denature the attacked globulins; the antitoxin is unaffected by such heating. R. N. C.

Chemical specificity of heart muscle. B. KISCH (Klin. Woch., 1935, 14, 145—146).—A review. R. N. C.

Specific gravity and water content of the brains of vertebrate animals. I. Birds. L. P. KING and M. C. HSUNG (Bull. Nat. Acad. Peiping, 1935, 6, No. 1, 1—47). CH. ABS. (p)

Embryochemistry of *Hynobius*. M. TAKAMATSU (J. Biochem. Japan, 1935, 22, 203—211).—Data are given for the ash constituents and N distribution of the components of the eggs of *H. nebulosus* incubated for varying periods. The principal enzymes present are esterase, nucleinase, glycogenase, and glycerophosphatase. F. O. H.

Chemistry of blow-fly larvæ. M. TOMITA and T. KUMON (Z. physiol. Chem., 1936, 238, 101—104).—The amounts of various inorg. ions (mostly Na and PO_4) and the nature of the proteins and enzymes in the larvæ are recorded. R. S. C.

Distribution of lead in human bones. S. L. TOMPSETT (Biochem. J., 1936, 30, 345—346; cf. A., 1935, 1160).—In bones from persons having had no special exposure to Pb the amounts of Pb per kg. of fresh material were: rib 4.0—17.5, vertebra 3.4—16.5, femur 18.2—108.3, and tibia 15.3—96.5 mg. W. McC.

Organic constituents of bone. T. INOUE (Tohoku J. Exp. Med., 1935, 26, 433—440).—Total C of the substantia compacta of the shaft of the rabbit femur, excluding preformed CO_2 , ranged from 8910.5 to 11596.6 mg. (average 9744.6) and total N from 3119.6 to 3387.8 mg. (average 3269.4) per 100 g. of dry substance. The ratio total C: total N suggests that ossein forms the principal part of the org. ground substance. Residual C was 333.1—568.3 mg. (average 443.2) and the residual N 94.9—171.1 mg. (average 132.1). There was no definite sex difference. Calc. on org. ground substance, bones are richer in residual C and N than is blood. The results indicate that carbohydrates and fats are the most important substances metabolised in bone. NUTR. ABS. (m)

Copper content of some human and animal tissues. P. F. HAHN and E. FAIRMAN (J. Biol. Chem., 1936, 113, 161—165).—In the liver and spleen of dogs suffering from experimental anæmia, Cu tends to rise to high levels as Fe falls towards zero. In man, no marked change in Cu is found in various pathological conditions. Fœtal and infant livers are comparatively rich in Cu, so are the livers of patients with Mediterranean anæmia, although Fe (hæmosiderin) is high. F. A. A.

Phosphorus compounds in the nymph and butterfly of *Deilephilia euphorbiae*. J. HELLER (Compt. rend. Soc. Biol., 1936, 121, 414—416).—Analytical vals. for the butterflies and for the whole nymph and its organs are given. HCl-hydrolysable P (adenosinetriphosphoric acid) is high in the butterflies, especially in the male, but very low in the nymph. Intestinal P in the nymph is entirely inorg.; total P in the adipose tissue is as high as in the hæmolymph, muscles, and intestine. R. N. C.

Calcium and magnesium content of the flesh of various animals. M. TAKAMATSU (*Z. physiol. Chem.*, 1936, 238, 99—100).—Ca and Mg were determined in the muscle of 20 animals. Unusually high vals. are: adder, Ca 1.2524, Mg 2.5268; snail, Ca 1.3202, Mg 2.7673; clam, Ca 0.7819; crab, Ca 0.8424% (as oxides) of the dried muscle. R. S. C.

Sodium content of mammalian muscle. F. PODOLSKY and G. MALORNY (*Pflüger's Archiv*, 1935, 236, 339—347).—Na of the ash of mammalian muscle is slightly > that of the equiv. Cl, the excess representing Na of the fibres. The excess is of the same order of magnitude as in muscle of cold-blooded animals. Red and white muscles exhibit no important differences in Na content, but in heart-Na is slightly > that in skeletal muscle, particularly in pigs, rabbits, and man. R. N. C.

am-Glucose in the animal organism. H. K. BARRENSCHEEN and H. FANTA (*Biochem. Z.*, 1936, 283, 382—389).—When O₂ is bubbled through warm dil. glucose solutions, no oxidation occurs. On adding these solutions to blood, liver, or muscle the filtrates obtained by pptn. with EtOH-COMe₂ and treatment with colloidal Fe(OH)₃ show a decrease in total reducing power of 20—50%, according to the duration of the experiment and the organ used. This decrease is not due to oxidation, but concerns the fermentable portion of the sugar, 60—78% of which is now oxidisable with animal C. This oxidisable portion may be am-glucose. P. W. C.

Comparative determination of hepatic glycogen by the cupric and iodometric methods. H. BERRY, B. GOUZON, and C. MAGNAN (*Compt. rend. Soc. Biol.*, 1936, 121, 616—619).—The Cu method gives identical results whether or not the glycogen has previously been pptd. with EtOH; the results are also identical with those by the I method. The Cu-reducing power after Hg deproteinisation is due solely to an aldose. R. N. C.

Micro-determination of liver-glycogen. H. BERRY, B. GOUZON, and C. MAGNAN (*Compt. rend. Soc. Biol.*, 1936, 121, 614—616).—The liver is autoclaved with 30% KOH, and again after acidification with HCl. After deproteinising with Hg(NO₃)₂, and removing excess of Hg, the liberated glucose is determined by the micro-modification of Bertrand's method. R. N. C.

Mixed glycerides of salicylic acid, and fatty acids.—See this vol., 453.

Fatty acids of phrenosin and kersin.—See this vol., 454.

Halibut-liver oils. Vitamin-A content of pilchard oil.—See B., 1936, 242.

Polyethenoid acids of the n-octadecane (C₁₈) series in aquatic animal oils.—See B., 1936, 204.

Lipochromes of the frog (*Rana esculenta*). L. ZECHMEISTER and P. TUZSON (*Z. physiol. Chem.*, 1936, 238, 197—203; cf. this vol., 97).—The liver contains carotene (I) (α - and β -) (25% of total pigment), lutein (II), zeaxanthin (III), free and esterified xanthophyll (IV), and small amounts of other lipochromes; the skin and fat glands, chiefly esterified (IV) with

(I), (II), and (III); and the ovaries, (I), (II), and (III). W. McC.

Colorimetric determination of cholesterol in liver oil. K. HOTTA and M. KAWAJI (*Nagoya J. Med. Sci.*, 1935, 9, 23—24).—Volatile acids are removed by heating the oil with 0.9% aq. NaCl in a stream of air; after saponification with 25% aq. KOH at 150° for 30 min. cholesterol (0.34—0.54%) is determined by the Embden-Miyamori method.

NUTR. ABS. (m)

Fate of carotene in the animal organism. O. BAILLY (*Bull. Acad. méd.*, 1932, 108, 932—935).—The adrenal glands are by far the richest organs of the body in carotene (I), which is localised in the cortex in concns. of the same order as that in carrots. The (I) of bovine adrenals is β -carotene, similar to that found in the ovary. R. N. C.

Carotenoid pigments in fishes. II. Effects of coloured backgrounds and of ingested carotenoids on the xanthophyll content of *Girella nigricans*. F. B. SUMNER and D. L. FOX (*J. Exp. Zool.*, 1935, 71, 101—123). NUTR. ABS. (m)

Anti-anæmic principle of liver. J. F. WILKINSON (*Lancet*, 1936, 230, 354—356).—The claim (A., 1935, 885) that Reinecke acid can be used further to purify and increase the potency of the anti-anæmic principle has been confirmed. L. S. T.

Alleged occurrence of "Krampfstoffe" in acetone extracts of the mammalian brain. E. HOLMES (*J. Physiol.*, 1935, 85, 400—408).—COMe₂ extracts of the brain contain no substances affecting the central nervous system, but a cardiac depressor. R. N. C.

Nitrogenous constituents of the stomach wall of dogs. K. IKEYAMA (*J. Biochem. Japan*, 1935, 22, 397—407).—Total N and constituent NH₂-acids (most of which were isolated) were determined in the mucosa and muscle layers of the fundus, cardiac, and pyloric regions. F. O. H.

Significance of carnitine in muscle. E. STRACK, P. WÖRDEHOFF, and H. SCHWANEBERG (*Z. physiol. Chem.*, 1936, 238, 183—196).—A simple process for isolating carnitine (I) (1.8% calc. as betaine) from meat extract is described. (I) and acetyl-carnitine (II) have little biological activity, but (I) is accompanied by very small amounts of a substance which persistently adheres to the Au salt of (I) and yields an active Ac derivative. Atropine counteracts the activity of this substance and phytostygmine increases it. (II) yields a sparingly sol. compound with AuCl₃. W. McC.

Part played by carnosine in muscles. E. SAVRON (*Ukrain. Biochem. J.*, 1934, 7, No. 1, 53—61).—The carnosine content of muscle varies in different animals. Vals. for white are > those for red muscle. None occurs in pigeons, rats, guinea-pigs, or dogs. CH. ABS. (p)

Micro-determination of creatine in muscle. A. V. PALLADIN (*Ukrain. Biochem. J.*, 1934, 7, No. 1, 163—171).—Muscle is mixed with sand and boiled with aq. NaCl and AcOH. The filtered residue is re-extracted 8—10 times with H₂O. The combined

extract is boiled with picric acid and the creatinine produced is determined colorimetrically.

CH. ABS. (p)

Relation between functional requirements, acetylcholine reaction, and glutathione content of bird muscles. L. CASSEL (Pflüger's Archiv, 1935, 236, 30—35).—The glutathione content of the wing muscles of flying birds is highest in birds that make long flights. Male birds contain > females. Ascorbic acid in the breast muscles is the same in good and bad flyers.

R. N. C.

Muscle extractives of hibernating giant salamander (*Megalobatrachus japonicus*). T. IWA-SAKI (J. Biochem. Japan, 1935, 22, 233—242).—From aq. extracts of the muscles were isolated creatine, creatinine, adenine, xanthine, hypoxanthine, histidine, methylguanidine, lysine, choline, and *D*-lactic acid.

F. O. H.

Acetylcholine and choline in organ extracts. F. PLATTNER and H. TSUDZIMURA (Pflüger's Archiv, 1935, 236, 175—180).—There is no evidence of a correlation between acetylcholine, choline, and esterase in the organs of the cat. Acetylcholine-like substances are not affected by thyroidectomy or adrenalectomy.

R. N. C.

Composition of the protamines of sturgeon. M. A. LISSITZIN and N. S. ALEXANDROVSKAJA (Z. physiol. Chem., 1936, 238, 54—58).—The protamines of the milt of *Acipenser huso*, *guldensstädtii*, and *stellatus* are probably identical, the sulphate being $C_{35}H_{74}O_7N_{18} \cdot 3H_2SO_4$ (amount of H_2SO_4 varies with method of prep.), $[\alpha]$ about -55° in H_2O , and NH_2 -, arginine-, histidine-, and lysine-N being about 8, 72, 10.5, and 6% of the total N, respectively.

R. S. C.

Preparation of *b*-thymonucleic acid by nucleogelase. F. FEULGEN (Z. physiol. Chem., 1936, 238, 105—110).—*b*-Thymonucleic acid (free from *a*-isomeride) is prepared (a) from cell nuclei (e.g., heads of herring sperm) by digestion with slightly alkaline (Na_2CO_3) 0.5% pancreatin solution, pptn. from alkaline (NaOH) solution by EtOH, acidification with AcOH, dehydration with EtOH, and desiccation, or (b) from natural organs (e.g., thymus glands) by liquefaction with about 5.5% NaOH (15 min. at 65°), addition of NH_4Cl , pptn. with EtOH, and enzymic degradation of the ppt. as in (a) (cf. A., 1914, i, 888).

R. S. C.

Form of proteins in blood-plasma and bone-marrow in the normal organism. H. KEILHACK (Arch. exp. Path. Pharm., 1936, 180, 440—457).—Data are given for the contents of the various proteins in rabbit's plasma [7.0% total protein; approx. 0.30% fibrinogen (I)] and bone-marrow [average 3.2% total protein; 1.095% (I)]. The relation between the high (I) content of bone-marrow and the blood constituents is discussed.

F. O. H.

Chemical constitution of liver-proteins. F. F. URBAN (Biochem. Z., 1936, 283, 435—453).—The protein of cat's liver washed free from blood is investigated. About half of the protein is extractable by salt solutions, the globulin (I) : albumin (II) ratio in the extract being 7:3. The (II) fraction is P-free. The (I) fraction after repeated pptn. with

$(NH_4)_2SO_4$ contained 0.7% P. After pptn. also with urea, the P content fell to 0.3% and the purine-N to zero. The differences in total N, tyrosine, tryptophan, histidine, phenylalanine, cystine, arginine, lysine, etc. contents of the (I) and (II) fractions are small and considerably < the differences with serum-proteins.

P. W. C.

Thiol and disulphide groups of proteins. II, III. Reducing groups of proteins.—See this vol., 352.

Ultrafiltration of proteins through graded collodion membranes. II. Haemocyanin (*Helix*), edestin, and ovalbumin. W. J. ELFORD and J. D. FERRY (Biochem. J., 1936, 30, 84—91).—The influence of medium, of p_H , and of concn. of neutral salts on the filterability of the above proteins is investigated, the best results being obtained in Hartley's broth at p_H 7—8. The filtration end-points for haemocyanin (*Helix*) of 55 m μ and for edestin of 18 m μ are established, indicating particle sizes of 18—28 m μ and 6—9 m μ , respectively. The results confirm the val. of the factor employed for deducing particle size from porosity of the membrane which just completely retains the disperse phase.

P. W. C.

Action of radioactive substances on proteins.—See this vol., 301.

Electrical orientation of wool cells.—See this vol., 414.

Proteins of body-fluids. I. Quantitative and qualitative aspects. II. Application of physical data. C. ACHARD (Bull. Acad. Méd. Roumanie, 1936, 1, 15—25, 26—30).—I. The nature and content of proteins in body-fluids in health and disease are discussed.

II. The Tyndall effect, σ , adsorption on C, fluorescence, and effect of dilution and flocculation with $Fe(OH)_3$ of normal and pathological body-fluids are discussed.

F. O. H.

Influence of high environmental temperature on the secretion and composition of milk. S. BARTLETT (J. Dairy Res., 1935, 6, 283—288).—High temp. caused a lowering of the % of fat and solids-not-fat in milk. The depression in total yield was small.

A. G. P.

Factors affecting milk and butter-fat secretion.

I. Variations in fat weight, fat percentage, and the amount of fat in milk required to make a given weight of butter. II. Colour of the butter-fat. E. O. WHETHAM and J. HAMMOND (J. Dairy Res., 1935, 6, 320—339, 340—352).—I. The size of the fat globule is probably controlled by the rate of formation of fat in the cell and the rate of milk secretion. The influence of age, stage of lactation, and breed are examined. The ratio of the wt. of fat in milk required to make 1 lb. of butter is a measure of variations in the size of the fat globules.

II. Effects of genetic and dietary factors are examined.

A. G. P.

Daily variations in butter-fat content of milk. Z. CZUKÁS (Mezőg. kutat., 1935, 8, 270—278).—The daily average butter-fat % of cows' milk varied greatly,

(2.4–5.5). Morning milk contained 40% < evening milk and 30% < noon milk. These differences could not be eliminated by regulating the milking periods. NUTR. ABS. (m)

Component fatty acids of goat milk fat. R. W. RIEMENSCHNEIDER and N. R. ELLIS (J. Biol. Chem., 1936, 113, 219–233).—The fat of the milk of goats fed on a regulated diet contained undecic, pentadecic, palmitoleic, oleic, hexoic, octoic, decic, myristic, palmitic, stearic, and arachidonic acid, and a mixture of saturated acids containing tetracosanoic and cerotic acids. H. D.

Effect of type of feed on the solids-not-fat content of milk. L. L. ROUX, G. N. MURRAY, and D. J. SCHUTTE (Onderstepoort J. Vet. Sci., 1935, 4, 167–197).—Rations containing identical amounts of protein and total digestible nutrients were fed to 3 groups of cows; group (1) received a high concentrate ration, group (2) high dry roughage, and group (3) high succulent rations. In group (1) solids-not-fat rose normally with advance of lactation, whilst groups (2) and (3) showed a fall. The milk production of group (1) did not decrease as rapidly as that of groups (2) and (3). NUTR. ABS. (m)

Yield and composition of ewe's milk. W. GODDEN and C. A. PUDDY (J. Dairy Res., 1935, 6, 307–312).—Analytical data are recorded. No appreciable difference in milk composition resulted from wide variations of Ca in the ration. A. G. P.

Milk of a typical herd of Shorthorn cows. III. Nitrogen distribution, chloride, lactose, copper, and iron contents over a period of two years. W. L. DAVIES (J. Dairy Res., 1935, 6, 362–368).—Analyses are recorded and discussed. A. G. P.

Free lactic acid in fresh milk. B. GROSS and C. OLIVEIRA (Rev. Quim. Farm., 1935, 1, 117–120).—Fresh milk, or its serum, had p_H 6.65–6.85, whereas the val. calc. on the assumption that its acidity is due to lactic acid is about 2.8. Experiments described indicate that no free lactic acid or lactates are present. L. A. O'N.

So-called normal lead of human milk. M. KASAHARA and S. I. NOSU (Jahrb. Kinderheilk., 1935, 145, 78–80).—52 out of 87 samples of milk from women living in an area having a service H_2O supply contained Pb (trace to 0.18 mg. per litre). Out of 15 samples from women in rural districts only 3 contained Pb (0.04–0.11 mg. per litre). NUTR. ABS. (m)

Excretion of drugs in milk. N. T. KWIT and R. A. HATCHER (Amer. J. Dis. Children, 1935, 49, 900–904).—Morphine, codeine, and phenolphthalein are not secreted in human milk. Salicylic acid, I', and Br' appear in milk after administration. CH. ABS. (p)

Plasma-protein determinations in lactating women. S. C. PEACOCK and W. F. HINMAN (Amer. J. Physiol., 1935, 113, 235–237).—The excretion of caseinogen in the milk has no recognisable effect on the blood-proteins. R. N. C.

Crystallisation of [sodium] chloride in presence of cerebrospinal fluid. P. TOMESCO,

I. COSMULESCO, and F. SERBAN (Bull. Acad. Méd. Roumanie, 1936, 1, 133–140).—NaCl in presence of cerebrospinal fluid crystallises in various abnormal forms dependent on the composition of the fluid; the phenomenon is probably of diagnostic val. F. O. H.

Lymph-sugar. J. W. HEIM, R. S. THOMSON, and F. C. BARTTER (Amer. J. Physiol., 1935, 113, 548–554).—Lymph- and plasma-sugar in the dog are almost identical under certain conditions; the glucose-tolerance curves are similar. Sugar administered *per os* or intravenously enters the lymphatic system readily, and is removed at about the same rate as from blood. R. N. C.

Salivary secretion. W. FELDBERG and J. A. GUIMARAIS (J. Physiol., 1935, 85, 15–36). R. N. C.

p_H of normal resting saliva. I. Variations with age and sex. R. E. BRAWLEY (J. Dent. Res., 1935, 15, 55–77).—The average p_H was 6.75, there being no significant difference between the two sexes. NUTR. ABS. (m)

Bile pigment metabolism. I. Breakdown of blood pigments to protoporphyrin by the liver and other organs. Demonstration of a fermenting action. H. T. SCHREUS and C. CARRIÉ (Klin. Woch., 1934, 13, 1670–1673).—The liver is able to form protoporphyrin from hæmoglobin or hæmatin; the process is not associated with life or survival of the cells, but probably with the action of a hæmase. Within certain limits the amounts of fermented substances and of the products of reaction are proportional. Optimum conditions are 37–60° and p_H 3–5; the action of the enzyme is restrained by EtOH, Et₂O, CHCl₃, CMe₂, and glycerol, inhibited by cooling to 0°, and destroyed by boiling. R. N. C.

Determination of bile salts in human bile. R. GOIFFON, F. NEPVEUX, and CHALEIL (Compt. rend. Soc. Biol., 1936, 121, 425–427).—Proteins are pptd. from bile with the Folin-Wu reagent, and pigments with FeCl₃ and NH₃. The bile salts are dissolved in aq. EtOH, evaporated alone and with AcOH, extracted with C₆H₆ to remove fats, dissolved in 0.1N-NaOH, and pptd. with 0.1N-HCl saturated with (NH₄)₂SO₄, the homogeneous suspension being examined photometrically. R. N. C.

Determination of free and combined cholesterol in bile. C. RIEGEL and H. J. ROSE (J. Biol. Chem., 1936, 113, 117–124).—A modification of the Schoenheimer-Sperry (A., 1934, 1240) procedure for the determination of cholesterol in blood is used. F. A. A.

Rabbits bile. I.—See this vol., 469.

Toad bile. III, IV.—See this vol., 469.

Bilifuscin. E. WEINBERGER (Z. physiol. Chem., 1936, 238, 124–128).—Bilifuscin is C₁₂H₁₈O₃N. It is isolated impure from human biliary calculi (cf. A., 1901, i, 283). R. S. C.

Effect of peptones and certain extracts of small intestine on the secretion of succus entericus. E. S. NASSET and H. B. PIERCE (Amer. J. Physiol., 1935, 113, 568–577).—Witte's peptone contains a secretagogue which stimulates the jejunal glands when

administered *per os* or intravenously. It is extracted, free from depressor, by 70% EtOH, and is thermostable, but destroyed by erepsin or trypsin. It is not present in other peptones. Another secretagogue, which resists the digestive enzymes, but is destroyed by boiling in alkali, is extracted from the small intestines of pigs or dogs by acidified 70% EtOH.

R. N. C.

Acidity of gastric juice and the diluting secretion of the stomach. T. ENGSTRÖM (Acta med. scand., 1935, Suppl. 66, 73 pp.).—Gastric secretion in cats following administration of histamine (I) or EtOH is used to study regulation of gastric acidity. Intraglandular regulation by a diluting, HCl-free secretion is of primary importance. True hyperacidity, \approx about 170 millimol., exists. There was no parallel between blood-(I) and intensity of secretion. With continuous intravenous injection of (I), intensity of secretion increased steadily and appeared to tend towards a max. NUTR. ABS. (m)

Histamine-like substance in the gastric juice. C. L. BROWN and R. G. SMITH (Amer. J. Physiol., 1935, 113, 455—463).

R. N. C.

Some physiological and physical aspects of the surface tension of urine. P. W. PERRYMAN and C. F. SELOUS (J. Physiol., 1935, 85, 128—144).—A modification of the max. bubble pressure apparatus for determination of σ is described; it can be used to follow changes of σ with temp. and with time up to 2 hr. The σ -time curves for urine are logarithmic, in both normal and pathological urines; the changes are not due to proteins or absorption of CO₂, but probably to slow adsorption of capillary-active substances. The σ -temp. curve is linear up to 54°, after which the decrease becomes more rapid. Variations of σ are not related to ingestion of food or liquid, but in females σ shows a cyclical variation corresponding with the menstrual cycle. σ is not related to *d*, or the presence of pathological constituents in the urine, and is not correlated with any sp. disease or group of diseases.

R. N. C.

Chemical basis of the Ehrlich diazo-reaction with urine. I. P. SACHS. II. P. SACHS and H. KLOSS (Z. klin. Med., 119, 381—402, 551—563; Chem. Zentr., 1935, i, 3019—3020).—I. A cryst. dichloroazobenzene dye, C₃₁H₂₄O₇N₆Cl₄ (Bz₆ and Bz₇ derivatives), is isolated.

II. By-products of high mol. wt. are formed in the reaction, the pathological significance of which is discussed.

H. N. R.

Detection of histidine in urine as a reaction for pregnancy. N. C. LOUROS (Klin. Woch., 1934, 13, 1156; Chem. Zentr., 1935, i, 3961).—The Kapeller-Adler reaction (A., 1933, 1094) is unsuitable, both for detecting histidine and as a reaction for pregnancy.

H. N. R.

Elimination of xylose, creatinine, and urea by the perfused mammalian kidney. A. HEMINGWAY (J. Physiol., 1935, 84, 458—468).—The average creatinine (I)/xylose (II) and urea/(II) clearance ratios in the isolated perfused kidney are 1.72 and 0.85, respectively, and are within the range of the vals. obtained from normal animals. Plasma concn.

decreases (I) elimination without affecting (II) and urea; (II) elimination \propto the glomerular filtration rate.

R. N. C.

Excretion of inulin, creatinine, xylose, and urea in the normal rabbit. B. I. KAPLAN and H. W. SMITH (Amer. J. Physiol., 1935, 113, 354—360).—Excretion of inulin (I), creatinine (II), xylose (III), and urea increases with urine flow. Simultaneous excretions of (I) and (II) are equal, regardless of urine flow or plasma-(II) level, and are $>$ those of (III) and urea.

R. N. C.

Excretion of kynurenic acid by the mammalian organism. Identification of small amounts of kynurenic acid. W. G. GORDON, R. E. KAUFMAN, and R. W. JACKSON (J. Biol. Chem., 1936, 113, 125—134).—50—100 mg. of kynurenic acid (I) may be identified and determined as the Me ester. The rat, guinea-pig, and Dalmatian dog excrete (I) after administration of tryptophan. The cat does not excrete (I) under these conditions, but ingested (I) is excreted unchanged.

F. A. A.

Properties of reducing material in certain fractions of normal urines. I. Nature of the free fermentable sugars and the fermentable sugars produced on hydrolysis in fasting urines. V. J. HARDING, T. F. NICHOLSON, and R. M. ARCHIBALD. II. Effect of diet on hydrolysable sugar in urine. Nature of this sugar. V. J. HARDING, T. F. NICHOLSON, and S. H. JACKSON (Biochem. J., 1936, 30, 326—334, 335—341).—I. Conc. solutions of carbohydrate are obtained from human urine by successive treatment with basic Pb acetate (I), HgSO₄-BaCO₃, and CuSO₄-Ca(OH)₂. Differential fermentation of the solutions (e.g., with *Saccharomyces Marxianus*) shows the presence, before and after dil. acid hydrolysis, of glucose (II) and galactose (III) and, in some cases, of very small amounts of fructose and mannose. Probably most, if not all, of the fermentable sugar produced on hydrolysis is derived from the non-fermentable reducing fraction, not from a non-reducing precursor. Almost all the sugar of urine is N-free.

II (cf. A., 1931, 1443). Meals consisting chiefly of fat, fruit, and starch, respectively (but not those consisting chiefly of protein), cause increase in the amounts of substances giving rise to fermentable sugar on hydrolysis, excreted in the urine during 4 subsequent hr., the increase being almost entirely due to (II)-producing substances. A small amount of (II)-producing material, pptd. by (I) and HgSO₄-BaCO₃ but not by Lloyd's reagent, occurs in fasting and non-fasting urines, but not after fat and fruit meals. About 33% of the hydrolysable material has reducing power, the reducing group being in the (II) mol. All (III) produced on hydrolysis exists combined through its reducing group, possibly as lactose.

W. McC.

Reducing power of urine. II. H. K. BARRENSCHEEN and H. PRINZ (Biochem. Z., 1936, 284, 99—107; cf. A., 1930, 806).—The reducing material is separated (60%) by adsorption on Al₂O₃ (optimal at *p*_H 7.73) and kaolin (optimal at *p*_H 1.17). The part of the material which loses its reducing power on treatment with CH₂O is preferentially adsorbed (max.

at p_H 6.24 and 7.73) on kaolin, and is not removed by successive elution with aq. NH_3 and dil. $AcOH$, which removes the other part. This part appears to consist of substances related to homogentisic acid.

W. McC.

Isolation and identification of combined oestriol in human pregnancy urine. S. L. COHEN and G. F. MARRIAN (Biochem. J., 1936, 30, 57—65).—A method is described for isolation from human pregnancy urine of a H_2O -sol., Et_2O -insol., non-cryst. substance, m.p. 193—197° (decomp.), containing approx. 50 wt.-% of oestriol. The composition and the Ba content of the Ba salt agree with those required for an oestriolglycuronic acid, $C_{24}H_{32}O_9$. The substance gives strong naphthoresorcinol and Millon tests, but does not reduce Benedict's solution until after hydrolysis.

P. W. C.

Excretion of oestrin by the kidneys of the pregnant mare. S. KOBER (Acta Brev. neerl. Physiol., 1935, 5, 34—35; Chem. Zentr., 1935, ii, 238).—The folliculin content of mare's urine rises suddenly during the 5th and 6th months of pregnancy, and falls again during the last two months.

G. H. F.

Bence-Jones protein. H. TSUTSUI (J. Biochem. Japan, 1935, 22, 343—350).—Reactions for urine containing the protein (I) are given. The N distribution of isolated (I) $\{[\alpha]_D -95.78^\circ$ (1.305% solution in 0.1N-NaOH), isoelectric point p_H 4.72} is tabulated. (I) is hydrolysed by gastric juice or trypsin. Its pathogenesis is discussed.

F. O. H.

Colorimetric determination of urinary protein, plasma-protein, urinary and plasma-albumin. Salting out of these proteins. H. BERGLUND and W. DE M. SCRIVER (Acta med. scand., 1935, 86, 82—87).—Methods with an accuracy of 3—5% are described. Na_2SO_4 , essentially in the concns. used by Howe, is used for fractionation. N is determined by nesslerisation. The acid digestion of protein requires more heat than is required for determination of non-protein-N of blood.

NUTR. ABS. (m)

Determination of sulphate in urine.—See this vol., 442.

Determination in series of the oxalic acid content of urine. K. KOCH (Biochem. Z., 1936, 283, 422—432).—A method which requires 40 c.c. of urine and determines 0.04—0.1 mg. of $H_2C_2O_4$ is described. 15—30 double determinations can be carried out per day.

P. W. C.

Spectrographic determination of phenol added to urine. G. BARAC (Compt. rend., 1935, 201, 1433).—The urine is treated successively with basic Pb acetate, Na_2HPO_4 , and HCl, extracted with Et_2O , and the extract is examined (this vol., 126).

F. O. H.

Determination of *p*-bromophenylmercapturic acid in the urine of the dog. J. A. STEKOL (J. Biol. Chem., 1936, 113, 279—288).—A gravimetric (using the $HgCl_2$ complex) and an iodometric titration method are described.

H. G. R.

Strychnine and barbituric acids. M. E. KERCONOU (Bull. Trav. Soc. Pharm. Bordeaux, 1935, 73, 53—61; Chem. Zentr., 1935, i, 3822).—Extraction

methods for the determination of these substances in urine are described.

H. N. R.

Spectrochemical study of aplysiopurpurin. M. FONTAINE and A. RAFFY (Compt. rend. Soc. Biol., 1936, 121, 735—736).—Aplysiopurpurin in acid $Zn(OAc)_2$ solution (cf. A., 1931, 1443) shows absorption bands at 501, 552, and 601 $m\mu$ and fluorescence bands at 518, 568, 617, and 644 $m\mu$. When obtained in the solid state by pptn. with $(NH_4)_2SO_4$, it does not fluoresce; it is therefore related to mesobiliviolin, and is probably a breakdown product of chlorophyll and phycocchromoproteins absorbed by *Aplysia*.

R. N. C.

Uroporphyrin in acute hæmatoporphyrinuria. E. MERTENS (Z. physiol. Chem., 1936, 238, I—II).—The urine contained, in addition to a little coproporphyrin, a uroporphyrin (I) [Me_8 ester (II), m.p. 258° (Cu compound, m.p. 304°)]. Decarboxylation of (I) with HCl under pressure gives coproporphyrin III and hence (I) is uroporphyrin III. The mother-liquor from (II) contained a $MeOH$ -sol. ester, m.p. 240°.

W. McC.

Urinary porphyrins in disease. K. DOBRINER (J. Biol. Chem., 1936, 113, 1—10).—A method for separating and identifying porphyrins in urine is described. An increased excretion of coproporphyrin I is characteristic of most diseases, but pigment cirrhosis and liver tumour lead to excretion of coproporphyrin III. In two cases uroporphyrin I was isolated, and an unknown porphyrin (Me ester, m.p. 222°) was obtained. The formation of these porphyrins is discussed.

J. N. A.

Acriflavine as a urinary antiseptic. E. W. ASSINDER (Lancet, 1936, 230, 304—305).—Acriflavine is strongly antiseptic towards the gonococcus.

L. S. T.

Phosphatase of the plasma and its variations in disease. C. JIMÉNEZ DÍAZ, E. BASSADONE, and S. CLARIANA (Rev. españ. Enferm. Aparat. digest. Nutric., 1935, 1, 5—20).—Average vals. found were 0.142 Kay unit in adults and 0.26 in children. Increases in rickets, osteomalacia, bone diseases, degenerative rheumatism, and liver disease are noted.

NUTR. ABS. (m)

Scurvy in Addison's disease and the value of the catalase index in adrenal insufficiency. L. NORRHO (Deut. Arch. klin. Med., 1935, 177, 499—508; Chem. Zentr., 1935, ii, 245).—The blood-catalase index has no diagnostic significance in Addison's disease.

G. H. F.

Adrenal disease in relation to hypoglycæmia and death. J. C. NORRIS (Amer. J. Clin. Path., 1935, 5, 120—130).—Hypoglycæmia under these conditions indicates a relationship between liver and adrenals in glucose metabolism.

CH. ABS. (p)

Correlation of hypertrophy of the adrenal cortex with bodily work and the vitamin-B content of the diet. A. VON BEZNÁK and J. PERJES (Pflüger's Archiv, 1935, 236, 181—189).

R. N. C.

Amidopyrine and granulopænia. Reappearance of granulocytosis in a case of recurring agranulocytosis after large doses of amido-

pyrine. L. R. LIMARZI and I. G. MURPHY (J. Lab. Clin. Med., 1935, 20, 616—622). CH. ABS. (p)

Goat's milk anæmia. G. O. KOHLER, C. A. ELVEHJEM, and E. B. HART (Amer. J. Physiol., 1935, 113, 279—284). R. N. C.

Comparison of the anæmia produced by feeding young rats on human, cow's, and goat's milk. H. H. BEARD and T. S. BOGGESS (Amer. J. Physiol., 1935, 113, 642—646). R. N. C.

Blood regeneration in severe anæmia: fractions of kidney, spleen, and heart compared with standard fractions. F. S. ROBSCHT-ROBBINS, G. B. WALDEN, and G. H. WHIPPLE (Amer. J. Physiol., 1935, 113, 467—475). R. N. C.

Chlorophyll and regeneration of blood. Administration of chlorophyll derivatives in chronic hypochromic anæmia. A. J. PATEK, jun. (Arch. Int. Med., 1936, 57, 73—84).—Chlorophyll products when administered either parenterally or orally with comparable amounts of Fe produce blood regeneration. H. G. R.

Liver principle active in pernicious anæmia. C. C. UNGLEY (Nature, 1936, 137, 210—213).—A review. L. S. T.

Treatment of pernicious anæmia with Dakin and West's liver fraction (anahæmin). C. C. UNGLEY, L. S. P. DAVIDSON, and E. J. WAYNE (Lancet, 1936, 230, 349—354).—The prep. is highly active for blood regeneration in pernicious anæmia. L. S. T.

Pathological calcium deposits. D. R. MEEKER and H. D. KESTEN (J. Biol. Chem., 1936, 113, 289—296).—The average composition of calcified deposits in arterial sclerosis is: CaO 49.5, P₂O₅ 36.1, MgO 0.90%. Calcification of implanted colloid material is increased by toxic doses of vitamin-D preps. and the deposit has the average composition: CaO 46.8, P₂O₅ 32.7%. H. G. R.

Urinary sulphur in non-specific arthritis. B. D. SENTURIA (J. Lab. Clin. Med., 1935, 20, 855—861).—The total S excreted and the S partition in urine of affected patients are approx. normal. The N/S ratio is lowered in only a few cases. CH. ABS. (p)

Blood-urea in botulism of cattle. P. ROSSI (Compt. rend. Soc. Biol., 1936, 121, 526—527).—Botulism is accompanied by a rise of blood-urea and a fall in renal excretion of urea, both returning to normal on recovery. R. N. C.

Blood-urea and *Brucella* infection in horses. P. ROSSI (Compt. rend. Soc. Biol., 1936, 121, 611—612).—Blood-urea is not appreciably affected. R. N. C.

Carcinogenic chemical compounds. H. A. WEIDLICH (Chem.-Ztg., 1936, 60, 185—187).—A review.

Carcinogenic action of thorium dioxide in the white rat. G. ROUSSY, C. OBERLING, and M. GUÉRIN (Bull. Acad. méd., 1934, 112, 809—816). R. N. C.

Experimental production by œstrin of pituitary tumours with hypopituitarism and of mammary

cancer. W. CRAMER and E. S. HORNING (Lancet, 1936, 230, 247—249). L. S. T.

Cholesterol as a constituent of malignant cells. I. A. BRONSTEIN and D. V. WOLKENSOHN (Acta Cancerologica, 1935, 1, 205—214).—The cholesterol (I) content of the necrotic centre of the Jensen rat sarcoma is 2—2.5 times that of the developing periphery. X-Irradiation *in vivo* does not alter the (I) of the periphery. The (I) of culture media is not changed by growth of sarcoma cells. CH. ABS. (p)

Action of pituitary secretion on tumours. H. DRUCKREY (Arch. exp. Path. Pharm., 1936, 180, 367—380).—Following castration in female rats, the gonadotropic hormone (I) content of the pituitary increases 15—20-fold and, after approx. 7 months, decreases; the thyrotropic hormone content is unchanged. During the period of increased level of (I), development and growth of tumour implants are inhibited, the initially increased respiration decreasing to zero vals.; such non-respiring tumours are not re-implantable. Relations between hormonal influence and tumour growth are discussed. F. O. H.

Effect of cystine disulphoxide on spontaneous tumours of the mouse. F.S.H. FOR THE STAFF OF THE RESEARCH INSTITUTE OF THE LANKENAU HOSPITAL, PHILADELPHIA (Science, 1936, 83, 108—109).—Tumour growth and cell proliferation are retarded. L. S. T.

Variations of polypeptidæmia in cancerous patients treated by intravenous injections of complex salts derived from vitamin-C (ferri-scorbones). F. ARLOING, A. MOREL, A. JOSSERAND, M. CHAMBON, and S. CELLIÈRE (Compt. rend. Soc. Biol., 1936, 121, 683—685).—Polypeptides are increased. R. N. C.

Effect of hæmatoxylin on respiration and glycolysis of cancerous tissue and spleen of cancerous rats. R. IWATSURU and M. KAWAGUCHI (Biochem. Z., 1936, 284, 163—168).—The R.Q. is increased, in presence or absence of glucose, by addition of hæmatoxylin whereas that of spleen and liver of healthy rats is unchanged or slightly diminished; glycolysis in the diseased tissue and spleen is practically unchanged. W. McC.

Genetics, thiol, and cancer. F. S. HAMMETT (Science, 1936, 83, 57).—A discussion. L. S. T.

Cerebroside-containing cerebral cyst. C. TROPP and B. ECKARDT (Z. physiol. Chem., 1936, 238, 31—34).—The liquid from a cerebral cyst contained no inorg. Fe, cholesterol, or P, very little fat and hæmoglobin products, but mainly cerebrin and kerasin and some albumin. A small amount of solid deposit contained Fe and fat. R. S. C.

Gastric secretion in cœliac disease. J. W. OGILVIE (Arch. Dis. Childhood, 1935, 10, 93—98).—The disease is accompanied by lowered [HCl] in gastric juice without true achlorhydria. The increase in total Cl⁻ probably results from the higher [Cl⁻] in blood. CH. ABS. (p)

Sulphur metabolism in cystinuria. J. C. ANDREWS and A. RANDALL (Amer. J. Med. Sci., 1935, 189, 301—302).—In a case described, the out-

put of cystine (I) was unaffected by doses of NaHCO_3 and Na citrate sufficient to maintain urinary p_H at 7.0–7.5 and to keep (I) in solution, by equimol. proportions of glycine and glutamic acid, or by a high-egg diet. Orally administered (I) is completely oxidised to SO_4^{--} . 60–80% of *dl*-methionine is oxidised to SO_4^{--} , the remainder being excreted as unoxidised S without change in urinary (I). Cysteine (II) is excreted unoxidised. The (II) content of cystinuric urine increases 25–50% on keeping 24 hr.

CH. ABS. (p)

Sugar and glutathione contents of blood and skin in dermatitis produced by croton oil and by sunburn. C. MONCORPS, R. M. BOHNSTEDT, and R. SCHMID (Arch. Dermatol. Syphilis, 1933, 169, 67–75).—The changes are functions of the intensity of skin inflammation and time.

CH. ABS. (p)

"Soya water-bread" and the use of soya meal in the treatment of diabetes and corpulence. F. SCHELONG (Klin. Woch., 1935, 14, 487–490).—The composition of a comparatively carbohydrate-free "water-bread" prep. from oil-free soya-meal is given, and its therapeutic use is indicated. R. N. C.

Neuropathy in diabetes. Lipin constituents of the nerves correlated with the clinical data. W. R. JORDAN and L. O. RANDALL (Arch. Int. Med., 1936, 57, 414–421).—The phospholipins, cholesterol, and cerebroside of the nerves are reduced in diabetes, the greatest effect occurring in those from the lower part of the leg.

H. G. R.

Inorganic phosphorus in diphtheria. I. NATIN and C. DA RIN (Semana méd., 1935, I, 1148–1149).—Blood-inorg. P is not appreciably abnormal.

CH. ABS. (p)

Hyperglycæmia in diphtheria, carbohydrate metabolism, and treatment with glucose and insulin. I. NATIN and C. DA RIN (Semana méd., 1935, I, 1055–1058).—In diphtheria, deviation of glycæmia is small, but glucose tolerance is frequently disturbed by factors of hepatic origin.

CH. ABS. (p)

Experimental epilepsy. III. Alteration in the protective quality of serum in epileptiform convulsions produced by camphor. V. NEKLUDOV (Kolloid-Z., 1936, 74, 218–221).—During and between the convulsions produced in cats and dogs by injection of camphorated oil, the quantity of blood-serum needed to stabilise a sol of Congo-rubin is increased in severe attacks which end fatally, but is diminished in less severe, non-fatal attacks.

F. L. U.

Lipin diseases. IV. Lipin content of tissues in status epilepticus, toxic encephalopathy, and chronic leptomeningitis. D. M. COWIE and M. C. MAGEE (Amer. J. Dis. Children, 1935, 49, 884–893).—The ratio of phospholipins to cholesterol in liver, spleen, and skeletal muscle in status epilepticus is > in other diseases examined (cf. A., 1934, 550).

CH. ABS. (p)

Rôle of uric acid in gout. H. LUCKE (Deut. med. Woch., 1934, 60, 1783–1786).

R. N. C.

Serum-calcium, -inorganic phosphorus, and -phosphatase activity in hyperparathyroidism,

Paget's disease, multiple myeloma, and neoplastic disease of the bones. A. B. GUTMAN, T. L. TYSON, and E. B. GUTMAN (Arch. Int. Med., 1936, 57, 379–413).—Serum-phosphatase is augmented in the diseases studied. In hyperparathyroidism, multiple myeloma, and neoplastic disease of the bones hypercalcæmia is observed, inorg. P being low in hyperparathyroidism, but normal in other cases. In Paget's disease both serum-Ca and -inorg. P are normal.

H. G. R.

Blood-cholesterol in hypothyroidism. LESNÉ, BRISKAS, and LARDÉ (Bull. Soc. Pédiat. Paris, 1935, 33, 60–62).—The finding of high blood-cholesterol in hypothyroidism is confirmed. In infants, the val. is 2–4 and in children above 15 years 1.3–1.6 g. per litre.

NUTR. ABS. (m)

Blood-cholesterol in arterial hypertension. A. H. ELLIOT and F. R. NUZUM (Arch. Int. Med., 1936, 57, 63–72).—Hypercholesterolaemia was not observed in uncomplicated hypertension or in hypertension associated with vascular degeneration or renal impairment or a low metabolic rate unaccompanied by hypothyroidism. High vals. were generally associated with subnormal body-wt.

H. G. R.

Treatment of hyperinsulinism with insulin. H. J. JOHN (Endocrinol., 1935, 19, 689–694).

R. N. C.

Hypoglycæmic headache. P. A. GRAY and H. I. BURTNESS (Endocrinol., 1935, 19, 549–560).—Migraine and other headache conditions are often associated with low blood-sugar (I). The glucose tolerance curve is of the flat type. Reactivity to insulin (II) is measured by the (II) tolerance test; the fall of (I) below fasting level \propto the height above the fasting level before injection of (II).

R. N. C.

Van der Bergh reaction (ring test technique) and hæmoglobin-bilirubin interrelation in icterus neonatorum. N. W. ELTON (J. Lab. Clin. Med., 1935, 20, 817–826).—No relationship was apparent between the bilirubin content and changes in hæmoglobin content and no. of erythrocytes.

CH. ABS. (p)

Variations of oxalæmia in liver diseases. A. RODRIGUEZ-OLLEROS (Rev. españ. Enferm. Aparat. digest. Nutric., 1935, 1, 323–332).—Blood- $\text{H}_2\text{C}_2\text{O}_4$ in hepatic disease is > normal. No correlation was found between extent of bilirubinæmia and oxalæmia. Ingestion of 1 g. of $\text{H}_2\text{C}_2\text{O}_4$ produces in liver patients in 2 hr. a 10–30% increase in oxalæmia, whereas there is no increase in non-hepatic patients. Diets poor or rich in $\text{H}_2\text{C}_2\text{O}_4$ produce no const. variation in oxalæmia on the day following the diet.

NUTR. ABS. (m)

Carbohydrate exchange after carbohydrate charging and its disturbance in liver diseases. I. Insulin-glucose-water charging. R. MEIER and E. SCHMIEDT (Z. ges. exp. Med., 1935, 95, 277–287; Chem. Zentr., 1935, i, 3950–3951).—Injection of excess of insulin followed by ingestion of excess of glucose and H_2O by healthy man does not generally result in increased carbohydrate combustion, the R.Q. and O_2 consumption showing little change. In cirrhosis of the liver, combustion is retarded and

continues longer than normally. Lactic acid formation is increased in jaundice. In normal rabbits glycogen is first synthesised, but is later oxidised; it disappears from the liver 3 hr. after ingestion, and is not deposited in the muscles. R. N. C.

Glucose exchange in liver diseases. II. E. SCHMIEDT (Z. ges. exp. Med., 1935, 95, 288—294; Chem. Zentr., 1935, i, 3951).—Charging with glucose is not suitable for the diagnosis of liver functional disturbance in man. O_2 consumption shows no characteristic change, but R.Q. exhibits a late rise in cirrhotics. R. N. C.

Biochemistry of blood of normal and malaria-infected monkeys. R. C. WATS and B. M. DAS GUPTA (Indian J. Med. Res., 1934, 21, 475—481).—Blood-sugar, -non-protein-N, and -Ca were unchanged by infection, whilst the plasma-cholesterol decreased. Treatment with atebirin, quinine, etc. caused an unexplained increase in inorg. PO_4''' . CH. ABS. (p)

Bromide content of blood determined by the method of Leipert and Watzlawek, in mental disease. M. NAGY and J. STRAUB (Orvosi Hetilap., 1935, 79, 895—897).—In 70% of cases of recurrent psychosis blood-Br' was subnormal (normal 0.9—1.4 mg. per 100 ml.). In the remaining cases and in other mental diseases it was normal or high. NUTR. ABS. (m)

Mineral metabolism in osteogenesis imperfecta. W. W. SWANSON and L. V. IOB (Amer. J. Dis. Children, 1935, 49, 958—963).—In affected cases, retention of Na differs more from normal than that of other minerals. Vals. for Ca and P are < normal, and those for S, K, Cl, and N are in the normal range. The Ca and P of bones increase. Viosterol improves retention of Ca and P without affecting that of other minerals. CH. ABS. (p)

Diagnostic value of pigmentation in paludism. Concentration [of pigment] in blood and urine. M. CANCEULESCO and R. HIRSCH (Bull. Acad. Méd. Roumanie, 1936, 1, 31—34). F. O. H.

Poikiloderma atrophicans vasculare (Jacobi). A. MARCHIONINI and F. BÖHNING (Arch. Dermatol. Syphilis, 1934, 170, 112—122).—Changes in blood-sugar, serum-protein, -alkali reserve, -lactic acid, -cholesterol, -K, and -Ca during a sweat bath with a normal patient and with one almost devoid of sweat glands are examined. CH. ABS. (p)

Rapid flocculation method for diagnosis of syphilis. P. RYTZ (Amer. J. Clin. Path., 1935, 5, 159—161).—The reaction is made more rapid by coagulation of blood by heating for 2—3 min. at 60°, sensitisation of serum by $(NH_4)_2SO_4$, and use of a stable stock antigen. CH. ABS. (p)

Calcium therapy in "staggers" in the bullock. (A) J. R. SHEEHY. (B) J. R. GREIG (Vet. Rec., 1936, 16, 147—148; 202). R. N. C.

Fistulous withers and poll-evil: calcium therapy. W. W. LANG (Vet. Rec., 1936, 16, 238). R. N. C.

Tetany in calves. B. SJOLLEMA (Vet. J., 1935, 91, 133—137).—In tetany the mineral and, probably, the carbohydrate metabolism are disturbed. Blood-

Ca and -Mg vary irregularly. Tetany is not due to Mg deficiency but probably results from overfeeding with protein. CH. ABS. (p)

Concentrated diet in childhood tuberculosis and malnutrition. G. E. PRATT (Arch. Pediatr., 1934, 51, 529—533).—Supplementary milk feeding to increase the calorific val. of the diet and the intake of fat, protein, carbohydrate, Ca, P, vitamin-A and -B₂ increased the gain in wt. and general condition of tuberculous children. CH. ABS. (p)

Effect of irradiated ergosterol on the phospholipins of the blood in pulmonary tuberculosis. J. H. REICHART (Diss., Amsterdam, 1935, 64 pp.).—A photo-electric method of determining lipid P was found most accurate. The lipid P content of the blood in 34 normal subjects varied as much as 12% in 6—7 days. The vals. in tuberculous patients, treated with irradiated ergosterol or untreated, were not significantly different from one another or from normal vals. NUTR. ABS. (m)

Blood-calcium in tuberculosis. F. MEERSSE-MANN and H. SÉGUIN (Rev. Tuberc. Paris, 1935, [v], 1, 514—528).—Blood-C tends to be low. NUTR. ABS. (m)

Variations in living matter controlled by chemical laws. O. RAHN (Biochem. Z., 1936, 284, 40—62).—Vital processes (e.g., heat-inactivation of enzymes, fission processes in the cell, velocity of cell division, biological variation, death of cells) are considered from certain mathematical aspects. F. O. H.

Basal heat production of the rhesus monkey (*Macaca mulatta*). N. RAKIETEN (J. Nutrition, 1935, 10, 357—362).—The average basal heat production, 608 kg.-cal. per sq. m. per 24 hr., is the same for both sexes and is not affected by administration of Na amytal. A. G. P.

Basal metabolism and iodine excretion during pregnancy. L. ENRIGHT, V. V. COLE, and F. A. HITCHCOCK (Amer. J. Physiol., 1935, 113, 221—228).—Growth of the foetus and supplementary tissues is largely responsible for the increased metabolism accompanying pregnancy, but in adolescent girls there is another stimulatory factor absent in mature women. The increase is smaller if iodised salt is used during pregnancy. I excretion increases 3 weeks before birth, suggesting a possible change in thyroid function. R. N. C.

Basal metabolism and urinary nitrogen excretion of Oriental women. A. H. TURNER and F. G. BENEDICT (Amer. J. Physiol., 1935, 113, 291—295).—Basal metabolism is < the prediction standard and that of American women in the same environment. The urinary N excretion shows that proteins in the diet are not abnormally low, and that the fall of basal metabolism is not due to decreased protein metabolism. R. N. C.

Interpretation of lowered basal metabolic level. D. L. SEXTON (Endocrinol., 1935, 19, 579—586). R. N. C.

Heat production in man. II. Output of carbon dioxide as a measure of heat production in basal metabolism. T. W. ADAMS and E. P.

POULTON (Guy's Hosp. Rep., 1935, 85, 56—75).—Calculations and deductions support the view that, under basal conditions, carbohydrate and fat are burnt in a fixed ratio. CO_2 production is a direct measure of the amount of combustion.

NUTR. ABS. (m)

Increase of the contents of reducing substances (glutathione and ascorbic acid) in the organs in training. K. WACHHOLDER and K. UHLENBROCK (Pflüger's Archiv, 1935, 236, 20—29).—I-reducing substances (I) are increased in the skeletal, heart, and stomach muscles, liver, lungs, and brain of the dog and the rabbit by regulated exercise, the increases being due to glutathione in the first instance, but in many cases to ascorbic acid as well. (I) are decreased in many organs in over-exerted rabbits. In a well-trained dog (I) are decreased in the thyroid and adrenals.

R. N. C.

Effect of muscular exercise on biological processes. E. TAKEDA (Japan. J. Exp. Med., 1935, 13, 471—509, 511—520, 521—527, 529—534, 535—541).—The following changes were observed in dogs as the result of work for 1 hr. on the treadmill: increases in no. of leucocytes and lymphocytes, blood-fat, and residual N, decreases in blood-sugar, no. of erythrocytes, haemoglobin content of the blood, CO_2 -combining capacity of the plasma, and total urinary N. In dogs fed from infancy on meat diets all these changes were > in dogs fed on vegetable diets.

NUTR. ABS. (m)

Changes of volume of muscle as an expression of chemical processes. O. MEYERHOF and W. MOHLE (Biochem. Z., 1936, 284, 1—11).—The changes in vol. which occur in normal and poisoned [with $\text{CH}_3\text{I}\cdot\text{CO}_2\text{H}$ (I)] muscle on stimulation and in muscle with heat- or (I)-rigor are accompanied by an unexplained contraction, in Ringer's solution somewhat > that in paraffin oil, and especially pronounced during production of lactic acid (II). The dilations are only 40% (Ringer) and 50% (paraffin) of those observed during enzymic (II) production, and the contraction of muscle poisoned with (I) is > the expected val. When valeric acid penetrates muscle, slight contraction occurs.

W. McC.

Is the work of the kidney (due to excretion of urea) a factor in specific dynamic action? A. G. EATON, S. C. CORDILL, and J. L. GOUAUX [with V. CLAY] (J. Nutrition, 1935, 10, 429—436).—The work done by kidneys in the concn. of urine during rapid excretion of urea is not a material factor in the sp. dynamic action of proteins.

A. G. P.

Coefficient *K* of Nicloux in the gudgeon (A) living 24 hours in glucose solutions of increasing concentrations, (B) living in glucose solutions as a function of time. G. FONTÈS, J. BRUNER, and A. LINDENBERG (Compt. rend. Soc. Biol., 1936, 121, 452—455, 456—458).—(A) *K* diminishes as the concn. of glucose increases, the curve being linear. *K* becomes zero when the osmotic pressure becomes double the isotonic val.

(B) *K* shows little variation in a 1.25% solution of glucose, and becomes normal in 5 days. It falls rapidly in 5% solution, rises in 3 days, and then falls again.

R. N. C.

Behaviour of heavy water towards light water in the organism. F. BREUSCH and E. HOFER (Klin. Woch., 1934, 13, 1815—1816; Chem. Zentr., 1935, i, 3882—3883).—From determinations of *d* to $\pm 5 \times 10^{-7}$ for H_2O mechanically and chemically held in various organs, no fractionation of H_2O and D_2O in the organism could be detected in normal cases, in sarcoma of the lung, in cirrhosis of the liver, or in blood from tuberculous or cancerous cases.

J. S. A.

Effect of ingestion of saline waters on the p_{H} of the intestinal tract, the nitrogen balance, and the coefficient of digestibility. V. G. HELLER, J. R. OWEN, and L. PORTWOOD (J. Nutrition, 1935, 10, 645—651).—Assimilation and digestibility of foods, if affected at all, are improved by dissolved salts provided serious disturbance of growth or reproduction does not occur. The p_{H} of the intestinal tract is not appreciably altered, but that of the stomach is somewhat affected.

A. G. P.

Respective variations of weight, water, and the constituents of the dry weight in the gudgeon as functions of the external glucose concentration. G. FONTÈS, J. BRUNER, and A. LINDENBERG (Compt. rend. Soc. Biol., 1936, 121, 459—462).— H_2O and " H_2O impermeable to EtOH" decrease, and non-protein substances increase, as the glucose (I) concn. increases. The dry wt. decreases, the curve being linear. In a 1.25% (I) solution conditions tend to return to normal after 5 days.

R. N. C.

Immediate effects of reduced cooling powers on the water balance and related effects in the human subject. D. H. K. LEE and A. G. MULDER (J. Physiol., 1935, 84, 410—432).

R. N. C.

Permeability and ion concentration in muscle excitation. V. S. ILJIN (Pflüger's Archiv, 1935, 236, 148).—A reply to Ernst and Fricker (cf. A., 1935, 239).

R. N. C.

Absorption of water from common salt and sugar solutions. E. J. McDOUGALL and F. VERZAR (Pflüger's Archiv, 1935, 236, 321—338).— H_2O and hypotonic NaCl solutions are rapidly absorbed in the rat and cat; isotonic NaCl is absorbed well in the rat, but in the cat an increase in vol. of the solution sometimes occurs, as in the case of isotonic xylose (I) solutions in both species. The increase in vol. is not accompanied by a change of osmotic pressure, so that blood-crystalloids (II) diffuse into the intestine. Glucose (III) is absorbed from isotonic solution by the rat intestine after 15 min.; the absorption depends on the amount of (II) diffusing in, and is generally so intensive that the solution becomes hypotonic and H_2O is absorbed. Absorption is slower in the cat, no H_2O being resorbed from 5.4% (III). If (III) absorption in the rat is depressed by $\text{CH}_3\text{I}\cdot\text{CO}_2\text{H}$, H_2O behaves as in the case of (I), and the solution becomes hypertonic through diffusion of (II) into the intestine. Increase of the hydrostatic pressure of the small intestine causes an increase in rate of absorption of isotonic NaCl \propto the increase in pressure.

R. N. C.

Relative significance of electrolyte concentration and tissue reaction in water meta-

bolism. H. A. DAVIS and L. R. DRAGSTEDT (Amer. J. Physiol., 1935, 113, 193—199).—Dogs dehydrated by simple H₂O deprivation retain 0.9% NaCl and 5% glucose better than do normal dogs. Animals with gastric fistulae and consequent alkalosis retain H₂O slightly better than those with pancreatic fistulae; the latter are extensively depleted of base, chiefly Na, through loss of pancreatic juice, but still cannot retain NaCl. R. N. C.

Changes in the laid egg. P. ULRIK and D. DAVIDSEN (Proc. 5th World's Poultry Congr. Rome, 1933, 2, 462—474).—The p_H of the egg increases from 8.2 when new laid to 9.2 after 12 hr., and to 9.8 in 9 days. Subsequent changes are insignificant. Titration with CH₂O serves as an approx. index of egg age. CH. ABS. (p)

Relation between metabolic processes and the ventricular electrogram. A. S. DALE (J. Physiol., 1935, 84, 433—453). R. N. C.

Mechanism of intracellular respiration. D. KEILIN (Bull. Soc. Chim. biol., 1936, 18, 96—130).—A lecture.

Accuracy of the Barcroft differential manometer in respiration studies. A. S. CORBET and W. R. WOOLDRIDGE (Biochem. J., 1936, 30, 132—140).—The standard error in the determination of O₂ by the Barcroft technique depends on the duration and replication of the experiments. A statistical method for determining the significance of the difference between means is recommended. H. D.

Effect of viosterol on oxygen consumption of frog's muscle. S. GELFAN (Amer. J. Physiol., 1935, 113, 464—466).—O₂ consumption in isolated frog muscle is increased by daily injections of viosterol. R. N. C.

Effect of thyroxine on tissue oxidation. G. N. MARKOFF (Beitr. path. Anat., 1935, 94, 377—388; Chem. Zentr., 1935, i, 3561).—Thyroxine (I) augments tissue oxidation in the liver of the rat, but not in the spleen or brain. The increase does not occur until the regular effects of (I) are established. The increase in O₂ consumption in the liver is noticeable 3 days after the last injection of (I), whilst the increase of cellular oxidases is evident immediately after the last injection. R. N. C.

Effect of liver feeding in relation to oxygen want. H. B. PARRY (J. Physiol., 1935, 84, 454—457).—Exposure of rabbits to low O₂ tensions does not cause formation in the liver of any factor hæmopoietic to rats. R. N. C.

Choline and liver respiration. O. A. TROWELL (J. Physiol., 1935, 85, 356—374).—Choline (I) in concns. > 0.12% increases O₂ consumption by rat's liver- or kidney-tissue, decreases that of cardiac muscle and spleen, and does not affect that of brain. Added fatty acid or glucose does not affect the action of (I). Washed liver-pulp oxidises (I) with uptake of 1 atom of O per mol. (I) does not affect O₂ consumption by aq. liver extract, but in concns. > 0.01% it inhibits CH₃Ac-CO₂H production to a degree \propto the concn., inhibition being complete at 1%; fatty acid increases the inhibition. The effect of (I) on O₂ consumption by liver-tissue is probably the algebraic

sum of (I) oxidation by the liver and inhibition of normal fat oxidation; the increase in O₂ consumption due to the first process is > the decrease due to the second, at all (I) concns. R. N. C.

Embryochemistry of amphibia. VIII. Oxidative processes in giant salamander's eggs. F. YAMASAKI. IX. Urea and uric acid in incubated eggs of giant salamander. M. TAKAMATSU and T. KAMACHI (J. Biochem. Japan, 1935, 22, 181—184, 185—187).—VIII. Development of the eggs produces an increase in -SH and in indophenol-oxidase.

IX. The incubated eggs contain 0.0030—0.0047% of urea, but only traces of uric acid. F. O. H.

Effect of frequency of contraction of the isolated mammalian heart on the consumption of oxygen. A. E. COHN and J. M. STEELE (Amer. J. Physiol., 1935, 113, 654—658). R. N. C.

Influence of muscular work on oxidative processes in the animal organism. L. PAL-LADINA (Ukrain. Biochem. J., 1934, 7, No. 1, 23—30).—The oxidation of PhOH, injected into rabbits, diminishes after muscular work. CH. ABS. (p)

Comparison of the rates of metabolic activity in the solitary and migratory phases of *Locusta migratoria*. C. G. BUTLER and J. M. INNES (Proc. Roy. Soc., 1936, B, 119, 296—304).—*L. migratoria* may, according to the conditions, assume either a migratory or a solitary phase. The rate of O₂ uptake per unit area of body surface is higher for locusts in the migratory phase, in all instars after the first. The rate is higher for males than for females in all instars and both phases. The rate diminishes from the first to the third instars, and increases again from the fourth instar to the adult stage. F. A. A.

Mechanical activity of gut muscle under anaërobic conditions. B. N. PRASAD (J. Physiol., 1935, 85, 249—266).—The mechanical activity of gut muscle is arrested by asphyxia through exhaustion of its labile carbohydrates. Max. activity is maintained when both glucose and O₂ are supplied to the muscle. CH₂I-CO₂H limits considerably the anaërobic activity of the muscle, suggesting a low phosphagen content. R. N. C.

Relation of rate of growth to diet. III. Comparison of stock rations. L. B. MENDEL and R. B. HUBBELL [with F. FRANCIS] (J. Nutrition, 1935, 10, 557—563). A. G. P.

Effect of cereal diets on the composition of body-fat of rats. H. S. OLCOTT, W. E. ANDERSON, and L. B. MENDEL (J. Nutrition, 1935, 10, 517—523).—The I val. of the body-fat varied with the cereal food given. A. G. P.

Alimentary value of (A) old, (B) new, maize. G. NICHITA, N. TUSCHAK, and G. IFTIMESCO (Compt. rend. Soc. Biol., 1936, 121, 563—566, 567—570). R. N. C.

Effect of differently de-fatted soya-bean meals on the blood picture of domestic animals. I. ENVER (Diss., Tierärztl. Hochsch., Berlin, 1933; Bied. Zentr., 1935, 6, A, 1).—Effects of extraction with C₂HCl₃ and with CCl₄ are compared by means

of rabbits and guinea-pigs. The blood picture is not appreciably altered by the use of these solvents.

A. G. P.

Are potato- and maize-starch nutritionally equivalent? F. FISCHLER (Münch. med. Woch., 1935, 82, 57—58; Chem. Zentr., 1935, ii, 243).—Equivalence is established.

G. H. F.

Comparative rachitogenic property of oats and maize. L. L. LACHAT and L. S. PALMER (J. Nutrition, 1935, 10, 565—577).—HCl extracts of oats when purified and freed from excess of NaCl showed rachitogenic properties when fed to rats receiving a mildly rachitogenic diet. With a severely rachitogenic diet the extracts produced no additional effect. Rolled oats and yellow maize are rachitogenic to rats and especially to chickens.

A. G. P.

Influence of diet on the glucose tolerance of the dog. E. M. GREISHEIMER and F. W. HOFFBAUER (J. Nutrition, 1935, 10, 525—534).—With low-carbohydrate diets an increase in the proportion of fat or protein lowers the glucose tolerance. Effects of other dietary variations are recorded.

A. G. P.

Effect of 1% of cod-liver oil on the rat with particular reference to the thyroid gland. C. B. FREUDENBERGER and F. W. CLAUSEN (J. Nutrition, 1935, 10, 549—555).

A. G. P.

Effect of choline on the weight of young rats. E. W. MCHENRY (J. Physiol., 1935, 85, 343—349).—Choline (I) and vitamin- B_1 exhibit a complementary effect on the gain in wt. of young rats. Rats not receiving (I) exhibit symptoms resembling those of vitamin- B_1 deficiency.

R. N. C.

Effect of deficient diets on the total ash, calcium, and phosphorus contents of bones. R. YEAGER and J. C. WINTERS (J. Nutrition, 1935, 10, 389—397).—In animals stunted (to maintain the same body-wt.) by calorie, protein, and lysine deficiency, the ash, Ca, and P of bones were > those of normal animals of the same wt. but < those of normal animals of the same age. Stunting by means of a low-salt diet caused very much lower bone vals. than in normal animals of the same wt. or age.

A. G. P.

Rats' milk and stomach contents of suckling rats. D. T. MAYER (J. Nutrition, 1935, 10, 343—350).—Recorded data indicate that suckling rats require a high-fat, low-carbohydrate diet. Although a large proportion of the calorific val. of rats' milk is derived from the fat, such a diet is not extremely ketogenic.

A. G. P.

Biological value of fresh milk and milk heated for short periods, in experiments on rat-feeding. H. HERTEL (Z. Immunitäts., 1935, 84, 321—327).—Milk heated for short periods is scarcely altered in its nutritional val. and vitamin content, whilst pasteurised milk differs considerably in biochemical composition. The short-period heated milk does not assure optimal or max. growth.

R. N. C.

Nutritive value of proteins for maintenance. S. MORRIS and N. C. WRIGHT (J. Dairy Res., 1935, 6, 289—302).—With maintenance rations containing min. proportions of protein a deficiency in lysine causes a decrease in urinary N characterised by an

MM

increase in NH_3 and a decline in urea. Catabolism of body-tissue is high probably through excessive deamination with mild acidosis. Cystine deficiency has no effect.

A. G. P.

Utilisation of energy-producing nutriment and protein as affected by individual nutrient deficiencies. III. Effects of the plane of protein intake. E. B. FORBES, R. W. SWIFT, A. BLACK, and O. J. KAHLENBURG (J. Nutrition, 1935, 10, 461—479).

A. G. P.

Effect of different percentages of protein in the diet on virgin rats. J. R. SLONAKER (Amer. J. Physiol., 1935, 113, 159—165).

R. N. C.

Replacement of protein [in cattle rations] by ammonium salts. S. V. FOMIN and V. I. DEMIN (Ukrain. Biochem. J., 1934, 7, No. 1, 133—143).—Replacement of proteins in the ration by urea and NH_4 salts lowered the rate of growth.

CH. ABS. (p)

Proteins of foodstuffs. V. Contents of cystine and tryptophan. T. TOMIYAMA (J. Biochem. Japan, 1935, 22, 341—342).—The respective cystine, methionine (cf. A., 1934, 572), and tryptophan contents of the proteins from silk-worm pupæ (a), sardines (b), and soya beans (c) are: (a) 0.86, 2.97, 1.50; (b) 0.76, 3.14, 1.40; (c) 1.05, 1.96, 1.35%.

F. O. H.

Formation of histidine from arginine in incubating hens' eggs. T. KAMACHI (J. Biochem. Japan, 1935, 22, 199—202).—Injection of arginine (I) into incubating eggs is followed by an increase in the free histidine (II), whilst injection of (II) does not increase the level of (I).

F. O. H.

Origin of creatine from proteins and amino-acids. H. H. BEARD and T. S. BOGGESS (Amer. J. Physiol., 1935, 113, 647—653).—Creatine (I) in the muscles of rats fed on diets containing only 4% of protein is increased by re-feeding on a diet containing 25% of protein or 21% of glycine or glutamic acid. Total N, fat, and total solid in the muscles are scarcely changed. (I) is thus an exogenous catabolic product of proteins of NH_2 -acids.

R. N. C.

Methionine content of food proteins. A. E. SCHARPENACK and G. P. JERJOMIN (Problems of Nutrition, Moscow, 1935, 4, No. 4, 11—16).—Casein has a very high methionine (I) but low cystine (II) content. Legume protein contains little (I), but some (II). Egg-yolk protein contains relatively large quantities of (I) and (II). Proteins of equal S content differ sharply in the character of their S compounds.

NUTR. ABS. (m)

Does bis- β -aminoethyl disulphide (cystamine) promote growth in the rat limited to an inadequate intake of cystine and methionine? R. W. JACKSON and R. J. BLOCK (J. Biol. Chem., 1936, 113, 135—139; cf. A., 1933, 89; Mitchell, this vol., 102).—Cystamine does not promote growth of white rats maintained on a diet low in cystine and methionine.

F. A. A.

Availability of *dl*-amino-*N*-methylhistidine for growth. J. B. FISHMAN and A. WHITE (J. Biol. Chem., 1936, 113, 175—179).—*dl*- α -Chloro- β -glyoxal-

inylpropionic acid was ineffective, and *dl*-amino-*N*-methylhistidine was effective, in producing a growth response in histidine-deficient rats. H. D.

Influence of denervation on the carnosine content of muscles. B. KOLDAEV and P. BUTKOV (Ukrain. Biochem. J., 1934, 7, No. 1, 63—67).—Section of the ischiatic nerve in one pad of a rabbit does not affect the carnosine (I) content of the gastrocnemius muscle. After rigor (I) probably decreases somewhat. CH. ABS. (p)

Influence of fatigue on the glutathione content of muscle. A. V. PALLADIN, S. BORSHKOVSKI, and L. PALLADINA (Ukrain. Biochem. J., 1934, 7, No. 1, 7—22).—Fatigued muscle shows an increase in oxidised glutathione (I). This is attributed to changed conditions of oxidation which lower the capacity of (I) to act as H acceptor. CH. ABS. (p)

Aminohydroxy-acids and their degradation in the animal body.—See this vol., 468.

Formation of carbohydrate and fat from protein. F. HÖLZL (Diss., München, 1933: Bied. Zentr., 1935, 6, A, 2).—A discussion. A. G. P.

Effect of ingestion of cottonseed oil before and after hydrogenation on the composition of the body-fat of the rat. J. M. SPADOLA and N. R. ELLIS (J. Biol. Chem., 1936, 113, 205—218).—The normal acids of rat adipose tissue were myristic, palmitic, stearic (I), palmitoleic (II), and oleic (III). Rats fed with a low-fat basal diet+cottonseed oil deposited more (I) and (II) than those receiving partly hydrogenated oil or the basal diet alone. The deposition of linoleic acid \propto the amount fed and replaced (II) and (III). Small amounts of arachidonic acid were found in the fat after feeding with the oil. H. D.

Digestion of fats from crude plant tissues: digestion of closed plant cells and their importance for physiology and pathology of digestion in man. H. WEISS (Arch. Verdauungskr., 1935, 57, 42—45; Chem. Zentr., 1935, i, 3565).—The fat of the uninjured cells is digested by the intestinal lipases in the mouse. R. N. C.

Carotenoids and oxidation of lipins. J. VERNE (Compt. rend. Soc. Biol., 1936, 121, 609—610).—Only those lipins of skin or adrenal sections that do not give a positive Feulgen-Verne reaction can be stained with carotenoids (I); autoxidation renders the reaction positive, but prevents staining. (I) protect the lipins against autoxidation. R. N. C.

Can intact monoglycerides be resorbed? G. ROSENTHAL and H. TRAUTWEIN (Ber. Verh. sächs. Akad. Wiss., math.-phys. Kl., 1934, 86, 325—338).—The depancratised dog resorbs monoglycerides (I) better than triglycerides, probably because the (I) are absorbed without previous cleavage on account of their small solubility in H₂O or of their capacity to form emulsions; both these properties facilitate cleavage by intestinal lipases. Hydrolysis is further favoured by the surface activity of the (I), through which they are more readily adsorbed on the lipases and more quickly saponified. R. N. C.

Fat metabolism. XVI. Biological degradation of fatty acids, esters, and fats to dicarboxylic acids. B. FLASCHENTRÄGER and K. BERN-

HARD (Z. physiol. Chem., 1936, 238, 221—232; cf. A., 1935, 1151).—Coconut oil and cooking fat (20% butter), if given in sufficient amount, are degraded in the dog, yielding small amounts of sebacic (I) and suberic acid. The Me and Et esters of the C₉—C₁₂ monocarboxylic acids, given with fat, yield the corresponding dicarboxylic acids. Of the Na salts of the C₆—C₁₂ and C₁₄, C₁₆, and C₁₈ monocarboxylic acids only octoic, nonoic, and decoic acids yield dicarboxylic acids. The behaviour of the Me and Et esters of these monocarboxylic acids is analogous. (I), even when given in very small amounts, passes chiefly unchanged (partly β -oxidised) into the urine. The degradation of monocarboxylic acids probably proceeds more rapidly than does that of the dicarboxylic acids and consequently β - rather than ω -oxidation predominates in the organism. W. McC.

Fat metabolism in fowls: practical significance. E. T. HALNAN and E. M. CRUICKSHANK (Proc. 5th World's Poultry Congr. Rome, 1933, 2, 612—619).—Pullets at 15 weeks of age commence to store more fat than cockerels, the difference increasing with advancing maturity. The Et₂O-sol. matter in the blood of laying hens is > that in the blood of cockerels. The I val. of depôt fat reflects that of food fat. Ingestion of unsaturated acids, e.g., hemp oil, causes an increase in unsaturated acids on egg-yolk fat. CH. ABS. (p)

Deuterium as an indicator in fat metabolism. B. CAVANAGH and H. S. RAPER (Nature, 1936, 137, 233—234).—By the use of linseed oil containing D for investigating the absorption of fatty acids in the rat, it is shown that lipins of the liver and kidney take up the D-containing fatty acids. L. S. T.

Effect of liver feeding on the "fat" content of the liver. A. W. BEESTON and H. WILKINSON. (Biochem. J., 1936, 30, 121—126).—Rats fed on a diet containing chiefly dried liver developed fatty livers (A., 1934, 104); cholesteryl esters (I) rose to 1.8% and glycerides (II) to 2%. 214 mg. of extra choline (III) added to the diet daily had no influence on the % of (I) but lowered that of (II). Using EtOH-extracted livers with added beef dripping gave vals. for (I) and (II) of 0.45 and 1.67%, respectively; addition of the extracted cholesterol (IV) to the diet raised the vals. to 3.62 and 3.19% so that the fatty liver production is due to (IV) in the diet. H₂O-extracted liver gave the same results as unextracted liver. Inclusion of extra (IV) in the diet produced increased fat deposition, whilst replacing the dried by raw liver or adding (III) had little effect. H. D.

Dietary prevention of fatty livers. Triethyl- β -hydroxyethylammonium hydroxide. H. J. CHANNON and J. A. B. SMITH (Biochem. J., 1936, 30, 115—120).—Triethyl- β -hydroxyethylammonium hydroxide (I) (aurichloride, m.p. 225°), prepared from NEt₃ and CH₂Cl-CH₂-OH, when fed to rats on a fatty liver-producing diet caused an inhibition of fat accumulation rather < that of choline. Large individual variations in fat accumulation occurred which were not associated with food intake; the inhibitory action of (I) on does was > on bucks. H. D.

Carbohydrate and fat metabolism during development of *Hynobius* eggs. M. TAKAMATSU (Z. physiol. Chem., 1936, 238, 96—98).—The glycogen, fat, and cholesterol contents of the embryos of *H. nebulosus* eggs decrease with development. The fat is almost entirely sol. in both EtOH and Et₂O.

R. S. C.

Utilisation of inulin for growth by the young white rat. A. BENDAÑA and H. B. LEWIS (J. Nutrition, 1935, 10, 507—515, 578).—With rats receiving a calorie-deficient diet utilisation of inulin was < that of sucrose or fructose. Inulin cannot serve as the sole source of carbohydrates for rats.

A. G. P.

Do the phosphorus and glycogen contents of frog muscle run parallel? A. MOSCHINI (Bull. Soc. Chim. biol., 1936, 18, 160—164).—The changes in the P and glycogen content of frog muscle caused by injection of glucose into normal animals and those with muscles atrophied by fasting, by section of the sciatic nerve, and by pancreatectomy do not run parallel. A lowering of the P content is always associated with functional disturbance.

A. L.

Absorption and utilisation of carbohydrates [by animals]. H. B. PIERCE (J. Nutrition, 1935, 10, 689—716).—A review.

A. G. P.

Fœtal carbohydrate metabolism following adrenalectomy, insulin, and glucose experiments on the mother. E. L. COREY (Amer. J. Physiol., 1935, 113, 450—454).—Adrenalectomy and administration of insulin in the pregnant rat cause a fall of liver-glycogen in both mother and fœtus, whilst glucose (I) increases it. Cortical hormone is without effect. Placental and fœtal muscle-glycogen are relatively unaffected; the latter shows a slight rise with (I).

R. N. C.

Carbohydrate metabolism of gut muscle. B. N. PRASAD (J. Physiol., 1935, 85, 239—248).—The isolated muscle contains only about 0.25% of carbohydrate available for glycolysis; it oxidises about 1 mg. of carbohydrate per g. per hr. in presence of O₂. In presence of glucose (I) it produces lactic acid under aerobic or anaërobic conditions; even in oxygenated Ringer's solution the deeper portions of the muscle probably receive an inadequate O₂ supply. Glycolysis under anaërobic conditions takes place at about 2 mg. of (I) per g. per hr.; it is inhibited by CH₃I·CO₂Na and increased by electric stimulation.

R. N. C.

Utilisation of sugars and polyhydric alcohols by the adult blowfly. G. FRAENKEL (Nature, 1936, 137, 237—238).—The utilisation by *Calliphora erythrocephala* of numerous carbohydrates and polyhydric alcohols is summarised. The results indicate the presence of several enzymes (enumerated) in the gut of the fly.

L. S. T.

Animal calorimetry. XI. Specific dynamic action of carbohydrate. Z. ASZÓDI and J. PÉLYI (Biochem. Z., 1936, 283, 393—414).—The sp. dynamic action of carbohydrate on administration of large amounts of sugar is > that of fat but with small amounts is not related quantitatively to the amount of sugar used. In presence of carbohydrate

reserves, these small amounts are not therefore immediately burnt. The elimination of heat on feeding carbohydrate does not synchronise with the O utilisation.

P. W. C.

Acidosis, alkalosis, and carbohydrate metabolism. Influence of acid- and base-producing diets. C. MORI (J. Biochem. Japan, 1935, 22, 437—446).—The assimilation of sugar by rabbits (as indicated by the change in blood-sugar after ingestion of glucose) on a diet producing acidosis is > that with a diet producing alkalosis.

F. O. H.

Influence of calcium on intestinal absorption. E. J. McDougall (J. Physiol., 1935, 85, 109—116).—Absorption of isotonic glucose, xylose, and sorbose solutions injected into the small intestine in rats is not affected by a diet producing low serum-Ca.

R. N. C.

Mechanism of the suppression of ammonio-genesis in muscle by pyruvic acid. J. K. PARNAS, B. SOBCEK, and W. MEJBAUM (Compt. rend. Soc. Biol., 1936, 121, 701—704).—NH₃ production is suppressed by AcCO₂H (I) more rapidly in presence of hexose diphosphate, which accelerates NH₃ production *per se*. (I) probably reduces phosphoglyceraldehyde to phosphoglyceric acid, which is then transformed into phosphopyruvic acid. The latter reacts with NH₃ and adenylic acid to form adenosinetriphosphoric acid.

R. N. C.

Transformation of adenosinetriphosphoric acid in muscle. II. Relation between dephosphorylation of the acid, production of ammonia, and degradation of creatinephosphoric acid during muscular activity. D. FERDMANN and O. FEINSCHMIDT (Biochem. Z., 1936, 284, 63—71; cf. A., 1935, 778).—In the frog, muscular activity results in degradation of adenosinetriphosphoric (I) and creatinephosphoric acid (II) with production of H₄P₂O₇ and H₃PO₄, respectively. During recovery of fatigued muscle, (I) and (II) are resynthesised with disappearance of H₄P₂O₇ and H₃PO₄, the extent of resynthesis depending on the length of the period of recovery and being almost complete in 15 min. The adenylic acid produced by dephosphorylation of (I) is deaminated during activity and reaminated during recovery.

W. McC.

Effects of cod-liver oil and wheat germ on the retention of iron, nitrogen, phosphorus, calcium, and magnesium during human pregnancy. C. M. COONS and R. R. COONS (J. Nutrition, 1935, 10, 289—310).—Addition of wheat germ to a basal diet improved the retention of Fe and N, the effect being due to the mineral rather than to the org. contents. Cod-liver oil enhanced the action of wheat germ. Increased retention of Ca, Mg, and P due to feeding cod-liver oil is small and irregular.

A. G. P.

Spectrum analysis of hen-eggs and chick-tissues. W. F. DREA (J. Nutrition, 1935, 10, 351—355).—Al, Ba, Ca, Cu, Fe, Mg, P, K, Rb (?), Si, Na, Sr, Ti, and V pass from food or H₂O into the egg and thence into blood and tissues of the chick. Mn and Zn are absent from chicks' blood. Al, Ba, Cu, Si, Sr, Ti, and Zn are uniformly distributed among the tissues. Ba, Fe, Sr, and V are more conc. in hens'

blood and/or egg than in the food. B, F, and Ag are unnecessary or harmful to chicks. Cr, Pb, and Mo occur in hens' blood in amounts corresponding to those in the food but are not regularly present in eggs. When present in chicks, Mo accumulates in the liver, Pb in lungs, and Cr in brain and eye. Mn occurs in yolks but not in whites or shells, and in chicks accumulates in the liver. A. G. P.

Chemistry of cephalopod embryos. T. KAMACHI (Z. physiol. Chem., 1936, 238, 91—95).—The Ca, Mg, SO_4 , NH_2 , and enzyme contents of the embryo increase at the expense of the residue during development of the eggs of *Loligo bleekeri*, Kefirstein, but the PO_4 and Cu contents remain unchanged; the enzymes present resemble qualitatively those of other eggs. R. S. C.

Toxicity and rate of disappearance of intracisternally injected calcium salts in the dog. M. F. MASON, and H. RESNIK (J. Pharm. Exp. Ther., 1936, 56, 53—59).—Aq. CaCl_2 , Ca gluconate and lactate containing 0.25 mg. of Ca per kg. body-wt. are injected into dogs without producing toxic action. Larger doses cause respiratory depression, 0.4 mg. of Ca per kg. being the lethal dose. Simultaneous injection of Mg does not increase the Ca tolerance. A. L.

Influence of nutrition on metabolism during work. IV. Calcium. F. BRUMAN and F. JENNY (Deut. Arch. klin. Med., 1935, 177, 527—543; Chem. Zentr., 1935, ii, 243).—The effects of Ca and K on metabolism were antagonistic. G. H. F.

Calcium as a factor in the nutritional improvement of health. H. C. SHERMAN (Proc. Nat. Acad. Sci., 1936, 22, 24—26).—A discussion of recent work. A. G. P.

Effects of increasing the calcium content of a diet in which calcium is one of the limiting factors. H. C. SHERMAN and H. L. CAMPBELL (J. Nutrition, 1935, 10, 363—371).—Addition of Ca to the diet improved food utilisation and the general development of rats. A. G. P.

Calcium and phosphorus needs of pre-school children. A. L. DANIELS, M. K. HUTTON, E. M. KNOTT, O. E. WRIGHT, and M. FORMAN (J. Nutrition, 1935, 10, 373—388).—The requirements are 45—50 mg. of Ca (with adequate vitamin-D) and 60—70 mg. of P per kg. A. G. P.

Calcium and phosphorus metabolism in chick embryos. T. KAMACHI (J. Biochem. Japan, 1935, 22, 189—197).—Injection of CaCl_2 , Na_2HPO_4 , or org. Ca- PO_4 preps. (I) into incubating eggs diminishes the Ca content of the embryo but not that of the allantoic fluid; the effect is probably due to inhibition of Ca mobilisation from the shell. (I), but not Na_2HPO_4 , increases the P content of the embryo. F. O. H.

Calcium and phosphorus requirements of growing turkeys. F. E. MUSSEHL and C. W. ACKERSON (Proc. 5th World's Poultry Congr. Rome, 1933, 2, 664—667).—A factor other than the Ca:P ratio of the diet influences Ca and P assimilation. The acid:base ratio of the entire ration probably has an important effect. In the absence of vitamin-D

and ultra-violet energy, poultts receiving the higher levels of Ca (CaCO_3) were better able to adjust themselves to vitamin limitation. The Ca and P requirements vary with the growth rate, which is influenced by the quality and quantity of protein and the supply of vitamins other than -D.

CH. ABS. (p)

Changes in lime content between various parts of the hen's egg during incubation. A. CAZANIGA (Proc. 5th World's Poultry Congr. Rome, 1933, 2, 444—449).—The shell-Ca diminished rapidly from the 13th day of incubation. In the egg contents vals. increased subsequently. CH. ABS. (p)

Experimental sodium chloride deficiency in man. R. A. McCANCE (Proc. Roy. Soc., 1936, B, 119, 245—268).—In man, a severely limited intake of NaCl (about 40 mg. of Na, 200 mg. of Cl, daily), accompanied by sweating, but without limitation of H_2O intake, causes a loss of at least 25—30% of the extra-cellular Na and Cl. The N balance becomes negative, and the blood-urea rises. The body appears to react partly by allowing the total vol. of body fluids to fall, partly by allowing their osmotic pressure to fall. F. A. A.

Acidosis as a factor of fatigue in dogs. F. W. SCHLUTZ, M. MORSE, and A. B. HASTINGS (Amer. J. Physiol., 1935, 113, 595—601).—Alkalosis from NaHCO_3 reduces, whilst acidosis from NH_4Cl favours, the capacity of dogs for exercise; NaHCO_3 promotes lactic acid formation, whilst NH_4Cl depresses it. Acidosis accompanying exercise is not a causal factor of fatigue. R. N. C.

Effect of sodium fluoride on the basal metabolism of the rat under several experimental conditions. P. H. PHILLIPS, H. E. ENGLISH, and E. B. HART (Amer. J. Physiol., 1935, 113, 441—449).—Normal basal metabolism in rats is not affected by feeding with NaF, but when previously raised by thyroid it exhibits a sharp and rapid rise. KI alone causes a temporary reduction, which is unaffected by simultaneous administration of NaF. R. N. C.

Metabolism in the rat of the naturally-occurring arsenic of the shrimp as compared with arsenic trioxide. E. J. COULSON and R. E. REMINGTON and K. M. LYNCH (J. Nutrition, 1935, 10, 255—270).—In the shrimp As occurs in complex combination from which it cannot be liberated in the animal organism. Following the digestive process in rats shrimp-As appears in a sol. form and is eliminated through the kidneys; it is retained only to a very small extent. No evidence of toxicity was obtained. A. G. P.

Physiological and clinical rôle of bromine metabolism. L. A. JACOBSEN (Presse méd., 1935, 43, 452—454; Chem. Zentr., 1935, i, 3565).—A review. R. N. C.

Human iodine balance. V. V. COLE and G. M. CURTIS (J. Nutrition, 1935, 10, 493—506).—The combined urine- and stool-I may account for < 50% of the I intake in some cases. The output of I was fairly uniform for an individual on a monotonous diet. Increased faecal I occurred in cases of hyperthyroidism. A. G. P.

Iron metabolism. E. NOLTE (Arch. Pharm., 1936, 274, 107—110).—The liver, lung, and kidney of a goat kept during 5 months on a diet containing a liver-Fe-protein adsorbate (ferripan) (≈ 0.26 g. Fe per diem) contain considerably more Fe than the same organs of a goat maintained on an Fe-free diet. The Fe content of the blood and milk is the same in both cases. H. B.

Iron metabolism of pre-school children. L. ASCHAM (J. Nutrition, 1935, 10, 337—342).—Retention of Fe by children of 4—6 years averaged 0.07 mg. with an intake of 0.59 mg. A. G. P.

Iron requirements of normal adults. G. E. FARRAR, jun., and S. M. GOLDBAMER (J. Nutrition, 1935, 10, 241—254).—The Fe requirement is normally > 5 mg. daily. Normal urine contains 0.02 mg. of Fe per 100 c.c. A. G. P.

Nitrogen metabolism in soya bean-feeding of horses. U. I. LISTOVNISCHA and M. F. GULUHI (Ukrain. Biochem. J., 1934, 7, No. 1, 153—161).—Feeding of soya beans increases N metabolism. Urinary N (daily excretion) increases and the urea: total N ratio declines through increase in other N constituents, especially NH_3 . There is increased excretion of creatinine owing to higher endogenous protein metabolism. CH. ABS. (p)

Metabolism of women during the reproductive cycle. VI. Continuous nitrogen utilisation of a multipara during pregnancy, parturition, puerperium and lactation. H. A. HUNSCHER, F. C. HUMMELL, B. N. ERICKSON, and I. G. MACY (J. Nutrition, 1935, 10, 579—597).—N balances over a period of 8 months are recorded and discussed (cf. A., 1933, 304). A. G. P.

Nitrogen and sulphur metabolism in supra-renalectomised rats. M. SANDBERG and D. PERLA (J. Biol. Chem., 1936, 113, 35—41).—There was no change in the excretion of uric acid, faecal N and S, and in Cu and Fe metabolism. There was marked creatinuria and an increase in urea, urinary N and S, and neutral S. The % of SO_4^{--} decreased slightly. J. N. A.

Effect of sulphur in the diet on the growth and wool production of sheep. Nutritive value of some vegetable oils in N. China.—See B., 1936, 218.

Food value of ethyl alcohol. H. H. MITCHELL (J. Nutrition, 1935, 10, 311—335, 460).—The energy of ingested EtOH is largely available for physiological purposes. Added to a milk diet EtOH induces more rapid growth, a greater retention of N and fat, and improved digestibility of the basal diet. Sucrose (I) has a relatively greater growth-promoting action, more available energy, and no effect on the digestibility of the basal diet. (I) increases the faecal excretion of metabolic products, but EtOH has no action. A. G. P.

(A) Clearance, extraction percentage, and estimated filtration of sodium ferrocyanide in the mammalian kidney: comparison with inulin, creatinine, and urea. (B) Distribution of ferrocyanide, inulin, creatinine, and urea in

blood: effect on significance of their extraction percentages. D. D. VAN SLYKE, A. HILLER, and B. F. MILLER (Amer. J. Physiol., 1935, 113, 611—628, 629—641).—(A) The plasma clearances and extraction % of $\text{Na}_4\text{Fe}(\text{CN})_6$ (I), inulin (II), and creatinine (III) in the dog are approx. equal; they are independent of plasma concn. The clearance of urea is about 57% of those of the above substances, and is also independent of plasma concn.

(B) (I) and (II) injected intravenously in the dog are not absorbed into the erythrocytes, but remain in the plasma. (III) enters the corpuscles very slowly, so that it is not withdrawn from them as the blood passes through the kidneys, whilst urea diffuses very readily into the cells, and is therefore withdrawn from them in the kidneys. R. N. C.

Excretion of phenol-red by the dog. J. A. SHANNON (Amer. J. Physiol., 1935, 113, 602—610).—Phenol-red (I) excretion is $>$ insulin (II) excretion at low plasma-(I) levels, but the (I)/(II) excretion ratio falls as the level increases. The depression of (I) clearance as the level is raised is reversible. The ratio is unaffected by phloridzin. R. N. C.

Metabolism of orally administered citric acid. C. C. SHERMAN, L. B. MENDEL, and A. H. SMITH [with M. C. TOOTHILL] (J. Biol. Chem., 1936, 113, 265—271).—Only 0.7% of orally administered citric acid appeared in the urine of the dog, none appeared in the faeces, whilst the increased blood-content was maintained for 3—7 hr. The renal threshold was 2.2—6.0 mg. per 100 c.c. H. D.

Citric acid formed in animal metabolism. C. C. SHERMAN, L. B. MENDEL, and A. H. SMITH [with M. C. TOOTHILL] (J. Biol. Chem., 1936, 113, 247—263).—The quantity of citrate (I) excreted by men \propto urinary p_{H} ; addition of NaHCO_3 to a low-citrate diet increases the excretion of (I); in dogs the increase is favoured by replacement of the dietary caseinogen by sucrose. Ingestion of the diet produced an increased excretion of (I) which was not due solely to a raised blood-(I) or diuresis. H. D.

Curves of sodium formaldehydesulphoxylate in the blood after intravenous or intragastric administration. E. HUG (Compt. rend. Soc. Biol., 1936, 121, 579—581).—The compound disappears rapidly from the plasma of the dog after intravenous injection, a large part being excreted by the kidneys. The relatively low plasma concn. after intragastric administration \propto the quantity given. The curve reaches its max. in 2—8 hr. R. N. C.

Elimination of sodium formaldehydesulphoxylate by the digestive secretions. T. C. MINNHAAR (Compt. rend. Soc. Biol., 1936, 121, 581—582).—In the dog the compound is eliminated in very small quantities in the saliva, bile, and pancreatic and intestinal juices. R. N. C.

Degradation of mescaline and similar substances in the body. K. H. SLOTTA and J. MÜLLER (Z. physiol. Chem., 1936, 238, 14—22).—Mescaline (I), given orally, is excreted mainly as $(\text{OMe})_3\text{C}_6\text{H}_2\cdot\text{CH}_2\cdot\text{CO}_2\text{H}$ (II) in the urine of rabbits and dogs. Instead of (II), human urine gives a OMe-rich oil, a mixture of probably two substances,

which on hydrogenation (PtO_2) absorbs 3H_2 and gives a substance, $\text{C}_9\text{H}_{14}\text{O}_2\text{N}\cdot\text{OMe}$, cryst. (no picrate, auri- or platini-chloride). (II) is recovered in good yield unchanged from the urine of dogs or rabbits to which it is fed, and has no physiological effect on these animals or man. $3:4:5\text{-(OMe)}_3\text{C}_6\text{H}_2\cdot\text{CHO}$ is recovered from urine as the acid, but $\beta\text{-}3:4:5\text{-trimethoxyphenylethyl alcohol}$ (III) yields a N-containing degradation product. (I) has very little effect on schizophrenic patients, who are, however, profoundly affected by $2:3:4\text{-(OMe)}_3\text{C}_6\text{H}_2\cdot[\text{CH}_2]_2\cdot\text{NH}_2$, which is innocuous to healthy men. $3:4:5\text{-(OMe)}_3\text{C}_6\text{H}_2\cdot\text{COCl}$ and CH_2N_2 give $3:4:5\text{-trimethoxy-}\omega\text{-diazoacetophenone}$, m.p. 103° (and some Cl-ketone), which yields $3:4:5\text{-trimethoxyphenylacetamide}$, m.p. 125° , hydrolysed by hot $\text{KOH}\cdot\text{MeOH}$ to (I), m.p. 121° . (I) and HNO_2 afford (III), b.p. $95\text{--}135^\circ/0\cdot01\text{ mm.}$ (*p*-nitrobenzoate, m.p. 100°). R. S. C.

Degradation of dimethylaniline and its oxide in the animal body. F. HORN (Z. physiol. Chem., 1936, 238, 84—90).— NPhMe_2 is not converted by dogs into NPhMe_2O . Both compounds are converted, at least partly, into $o\text{-OH}\cdot\text{C}_6\text{H}_4\cdot\text{NH}_2$. The toxic symptoms of NPhMe_2 include methæmoglobin formation. R. S. C.

Tissue cultures exposed to the influence of a magnetic field. R. PAYNE-SCOTT and W. H. LOVE (Nature, 1936, 137, 277).—Exposure to magnetic fields of 5000 gauss produced no observable change in the growth of cells from the heart of chick embryos cultivated *in vitro*. A slight tendency to protoplasmic disintegration in some of the resting cells was observed in certain exposed cultures. L. S. T.

Changes in the blood-fluid of *Scyllium canicula* exposed to continuous current, when the branchial region is close to the anode. E. A. PORÅ (Compt. rend. Soc. Biol., 1936, 121, 503—504).—The increases of blood-osmotic pressure and $\text{-Ca} \propto I$, but are $<$ those obtained when the branchial region adjoins the cathode, as are also the variations of blood- and serum-Cl and -Na , whilst the increases of proteins and corpuscular Cl and the fall of the alkaline reserve are higher. The fall of κ is the same in both cases. The increases of inorg. salts and org. substances are $>$ the corresponding losses in the muscles. R. N. C.

Changes in the blood-fluid of the male *Scyllium canicula* produced by continuous electric current. E. A. PORÅ (Compt. rend. Soc. Biol., 1936, 121, 507—508).—Passage of current for 12 hr. increases muscle- H_2O at the expense of the blood. Inorg. salts in the muscles increase considerably, possibly through penetration of salts from the external medium, whilst org. substances fall in the muscles and rise in the serum. The alkaline reserve increases, whilst blood-Cl falls. R. N. C.

Changes in the blood-fluid of the male *Scyllium canicula*, produced by an opposing continuous electric current in the external medium. E. A. PORÅ (Compt. rend. Soc. Biol., 1936, 121, 660—662; cf. preceding abstract).—The blood loses H_2O without a corresponding gain in the muscles. Inorg. salts increase in both blood and muscles, but org.

substances pass from the muscles to the blood. Blood-, serum-, and corpuscular-Cl, -Na , -proteins , the alkaline reserve, and κ are all increased, whilst -Ca falls. R. N. C.

Effect of ultra-violet radiation on lens protein in the presence of salts and the relation of radiation to industrial and senile cataract. J. H. CLARK (Amer. J. Physiol., 1935, 113, 538—547).—Ultra-violet irradiation of solutions of lens proteins in aq. NaCl, KCl, and CaCl_2 at p_{H} 6·0—7·2 and 4° denatures the proteins but produces no increase of opacity except when CaCl_2 is present. No increase is found at p_{H} 7·8, whilst the increase is general at p_{H} 5·4. Opacity is not increased by heating to 40° at p_{H} 7·2 without irradiation, but after irradiation it is increased considerably in all solutions containing Ca; Na, but not K, exerts a restraining action. Light-coagulation probably consists of denaturation of the proteins followed by pptn. through Ca; senile cataract may be due to accumulation of denatured protein in the lens together with increased blood-Ca, whilst exposure to intense radiant heat is responsible for cataract in metal and glass workers. R. N. C.

Factors concerned in the arrest of contraction in an ischemic myocardial area. R. TENNANT (Amer. J. Physiol., 1935, 113, 677—682).—NaCN and KCl, but not $\text{CH}_3\text{I}\cdot\text{CO}_2\text{Na}$, arrest contraction, which is also arrested by perfusion of a ventricular zone in the normal heart with Na lactate in buffered blood-Locke's solution. R. N. C.

Adrenaline glycæmia in the dog submitted to slow continuous intravenous injections of alkaline mineral water. E. CHABROL and J. SALLET (Compt. rend. Soc. Biol., 1936, 121, 733—735).—Large quantities of 0·7% aq. NaHCO_3 reduce considerably the blood-sugar and its response to subsequent injection of adrenaline. R. N. C.

Effect of buffered phosphate solutions on a thin layer of living vascular tissue, in moist chambers introduced into the rabbit's ear. R. G. ABELL (Anat. Rec., 1935, 64, 51—73). R. N. C.

Reversible loss of the all-or-none response in cold-blooded hearts treated with excess potassium. G. H. ZWIKSTER and T. E. BOYD (Amer. J. Physiol., 1935, 113, 560—567). R. N. C.

Deposition of strontium salts in hypertrophic cartilage *in vitro*. R. ROBISON, K. A. O. LAW, and A. H. ROSENHEIM (Biochem. J., 1936, 30, 66—68).—The deposition *in vitro* of Sr salts in hypertrophic cartilage (dissected away from all calcified tissue) by immersion in solutions containing Sr^{++} (spectroscopically pure), PO_4^{---} , and CO_3^{--} is confirmed, the deposits being shown by spectrum analysis to consist largely of a Sr phosphate or carbonatophosphate. P. W. C.

Function of fluorine in the human organism. L. MICHAELIS (Klin. Woch., 1935, 14, 94—95).—Theoretical. R. N. C.

Iodine injuries with particular reference to "complete salts" injuries. I. MÜHE (Deut. Arch. klin. Med., 1935, 177, 345—367; Chem. Zentr., 1935, i, 3949). R. N. C.

Action of iodine on basal exchange in intestinal closure. J. GLATZEL (Wien. med. Woch., 1935, 85, 397—400; Chem. Zentr., 1935, i, 3565).—The high basal exchange in rectal cancer and artificial intestinal closure is reduced to normal in 7 days by Lugol's I solution. R. N. C.

Selenium in [animal] nutrition. H. A. SCHNEIDER (Science, 1936, 83, 32—34).—Growth effects are described for rats receiving up to 70 p.p.m. of Se as Na_2SeO_3 with a normal diet. L. S. T.

Effect of sulphur on the weight and adrenaline content of the adrenal capsule and on the vasoconstrictor action of blood-serum. M. MITANI (Folia Endocrinol. Japon., 1933, 8, 104).—Intramuscular injection of large doses of S lowered the wt. and adrenaline content of the adrenals. Continuous small dosage of S produced a similar effect, but the wt. of the capsules increased.

CH. ABS. (*p*)

Sulphur-mercury compounds and their action on the blood. L. LIACI (Arch. Farm. speriment., 1933, 56, 372—381; Chem. Zentr., 1935, i, 3952).—Injection of a S-Hg compound in rabbits causes slight modifications of blood-sugar, increases of erythrocytes and leucocytes, and decrease of resistance of erythrocytes to hypotonic NaCl solutions. Blood-Ca and hæmoglobin are unaffected. R. N. C.

Chemotherapeutic activity of compounds of arsenic with albumin breakdown products rich in sulphur. W. A. COLLIER and M. KRAUSE (Z. Hyg., 1935, 117, 190—195). R. N. C.

Physiological action of zinc in animals. G. BERTRAND (Bull. Soc. Chim. biol., 1936, 18, 213—224).—A review. A. L.

Pharmacology of ethyl alcohol. I. Comparison of grain and synthetic alcohols. II. Correlation of the local irritant, anæsthetic, and toxic effects of three potable whiskies with their alcohol content. O. W. BARLOW [with A. J. BEAMS and H. GOLDBLATT] (J. Pharm. Exp. Ther., 1936, 56, 117—146).—The toxic and physiological effects of synthetic and grain EtOH are indistinguishable. The irritant and toxic effects of whisky are > those due to its EtOH content. Administration of synthetic or grain EtOH or whisky to rats in concns. equiv. to 7.5% of EtOH as the sole source of fluid had no effect on growth, but at concns. of 15% growth was retarded. Certain differences are observed in their actions on the stomach and intestine as between synthetic or grain EtOH and whisky. W. O. K.

[Action of] carbonyl chloride [on the blood].—See this vol., 301.

[Physiological] effect of acetic and substituted acetic esters of borneol. H. TSUJI (Tôhoku J. Exp. Med., 1934, 24, 374—379). CH. ABS. (*p*)

Action of benzene in pregnancy. G. BARZILAI (Boll. Soc. ital. Biol. speriment., 1933, 8, 1388—1392).—Pregnant female mice are less resistant to narcosis from C_6H_6 in the inspired air. The effect is most noticeable at a concn. of 35.43 mg. of C_6H_6 per litre of air; with < 26 mg. per litre acute narcosis does not occur. R. N. C.

Anthelmintic studies on hydroxyalkylbenzenes. VI. Alkyl polycyclic phenols. VII. Halogenated phenols. VIII. Phenolic ketones, ethers, and esters, and organic acids. P. D. LAMSON, R. W. STOUGHTON, and A. D. BASS (J. Pharm. Exp. Ther., 1936, 56, 50—52, 60—62, 63—68).—VI. The *in-vitro* ascaricidal properties of various polycyclic phenols are not significantly increased by introduction of alkyl groups.

VII. High activity is shown by *p*-chlorocarvacrol, 4-chloro-2-hexyl-phenol and -2-heptyl-phenol. 2:4:6-Tribromo-phenol and -resorcinol are, however, inactive.

VIII. Of > 100 phenolic ketones, ethers, esters, and acids, none shows marked *in vitro* ascaricidal activity. Some monoethers of dihydric phenols are active, but too toxic for use. A. L.

Acid-base changes in the serum of the dog associated with the hyperthermia of dinitrophenol administration. E. MUNTWYLER, V. C. MYERS, W. H. DANIELSON, and C. ZORN (Amer. J. Physiol., 1935, 113, 186—192).—Oral administration of sublethal doses of 2:4-dinitrophenol (I) frequently increases serum-Cl and decreases HCO_3^- . Total bases (II) are somewhat variable, depending on the quantity of (I) given; p_{H} remains within normal limits, but tends to fall slightly from the control level with large doses of (I). Subcutaneous injection of (I) lowers Cl and HCO_3^- ; (II) are decreased by sublethal and increased by lethal doses, the undetermined acid concn. being increased in both cases: the p_{H} remains fairly const. R. N. C.

Mechanism of the stimulating action on metabolism of dinitro-compounds. Acetaldehyde, dihydroxyacetone, and glutathione as antidotes. H. HANDOVSKY, H. CASIER, and C. SCHEPENS (Arch. int. Pharmacodyn., 1935, 50, 397—446).—Dinitrocyclopentylphenol (I) ("pentyl") is the most stimulating and least toxic of all the nitro-derivatives. An activator for dinitro-derivatives which varies in its ease of extractability exists in muscle. The stimulation of metabolism *in vitro* is attributed to a respiratory enzyme differing from the normal cellular respiratory enzymes in being cryolabile. (I) added to muscle diminishes its glutathione (II) content, and, in living pigeons, intravenously (II) prevents the hyperthermia which follows (I) injection. A similar inhibition is shown by dihydroxyacetone and MeCHO. *In vitro*, the destruction of MeCHO by muscular tissue is increased by addition of (I); hence MeCHO takes part in the oxido-reduction processes affected. NUTR. ABS. (*m*)

Comparative actions of cardiazole and coramine on the respiratory centre of man. I. Subcutaneous injection. H. STEININGER and E. GAUBATZ (Klin. Woch., 1935, 14, 159—160).—Cardiazole is the more active compound. R. N. C.

Action of large quantities of glucose in prolonged intravenous infusion. E. BAUER and H. KNÜPPER (Ber. Verh. sächs. Akad. Wiss. math.-phys. Kl., 1934, 86, 339—350).—The max. intravenous tolerance for glucose in the dog is normally about 1.4 g. per kg. per hr. Blood-lactic acid rises

some time before death, and the alkaline reserve falls. The abnormal glycogen content of the liver is not the cause of death. The relations between liver-glycogen and N, and the liver and body wts. are studied. R. N. C.

Effect of camphor on the adrenaline reaction. I. Blood pressure. J. SZELÖCZEY. II. Dilatation of pupil and increase of blood pressure. J. SZELÖCZEY. III. Permeability and adsorption. J. SZELÖCZEY and B. KOLONITS (Magyar orvosi Arch., 1935, 36, 37—50, 51—55, 56—62; Chem. Zentr., 1935, ii, 241). G. H. F.

Spectrographic and biological study of phloridzin derivatives. I. Phloridzin heptaacetate. A. LAMBRECHTS (Bull. Soc. Chim. biol., 1936, 18, 237—238).—Phloridzin heptaacetate (I) shows an absorption band with a max. at 275 m μ and an extinction coeff. of 675. Injection of a solution of 10 mg. of (I) in EtOH produces a glycosuria of 17%, but this may be due to the hydrolysis of (I) by the blood. A. L.

Nutrition of the euglenia, *Astasia chattoni*. A. LWOFF and H. DUSI (Compt. rend., 1936, 202, 248—250).—Addition of fatty acid to the media considerably increases the reproduction. H. G. R.

Point of attack of acetylcholine in the heart. Does nicotine inhibit the cardiac action of acetylcholine? F. PLATTNER (Pflüger's Archiv, 1935, 236, 226—229). R. N. C.

Acetylcholine and the normal striped muscle of mammals. A. SIMONART and E. F. SIMONART (Arch. int. Pharmacodyn., 1935, 49, 302—328; Chem. Zentr., 1935, i, 3003). G. H. F.

Influence of thyroparathyroidectomy and of bile acids on bile secretion. S. TUZIOKA (J. Biochem. Japan, 1935, 22, 367—374).—The vol. of bile and the total bile acids of dogs (with biliary fistulæ) are diminished and the bile- p_H is increased. Administration of Na taurocholate produces a return to normal vals. F. O. H.

Influence of bile acids on calcium metabolism. XII. Tetany and blood-calcium in thyroparathyroidectomised dogs. T. HOSHIZIMA (J. Biochem. Japan, 1935, 22, 375—383). F. O. H.

Influence of changes induced by cholesterol on the calcification *in vitro* of rabbit aorta. K. A. O. LAW and R. ROBISON (Biochem. J., 1936, 30, 69—75).—The development of typical cholesterol (I) arteriosclerosis by feeding rabbits on a diet rich in (I) is not associated with any increased proneness to calcification of the aorta *in vitro*, nor did the deposits so obtained specially favour those portions of the vessel in which the (I) lesions occurred. P. W. C.

Cholesterol as a growth factor for flagellates. R. CAILLEAU (Compt. rend. Soc. Biol., 1936, 121, 424—425). R. N. C.

Action of muscle-adenylic acid and related substances on the blood-supply of the skeletal muscle. W. SCHOEDEL (Pflüger's Archiv, 1935, 236, 93—101).—Adenylic acid (I) from muscle increases the blood-supply to skeletal muscle by 100—

170%, as do acetylcholine, adenosine, and adenosine triphosphate. The effect of yeast-(I) is < than that of muscle-(I). Inosic acid (except in large quantities), adenine, hypoxanthine, and carnine are without effect. The NH₂-compounds and carbohydrate of muscle-(I) are responsible for the action. R. N. C.

Influence of administration of tonsil extracts on sugar excretion in rabbits. C. TATEISHI (J. Biochem. Japan, 1935, 22, 251—261).—The sugar excretion threshold is lowered by administration of small, and increased by large, amounts of extracts of pig's tonsil; the diminished level returns to normal on administration of cholic acid. F. O. H.

Action of the oxidase of *Cynara scolimus* in decreasing the blood-sugar. A. RISI (Rass. ter. Pat. clin., 1933, 5, 297—298; Bied Zentr., 1935, 6, A, 7).—Injection of the artichoke oxidase modifies the carbohydrate metabolism and induces a marked hypoglycemia in rabbits. A. G. P.

Effect of yeast and yeast extracts on intestinal motion. H. WASTL (Biochem. Z., 1936, 284, 24—39). W. McC.

Ether anæsthesia. Changes in serum-potassium during and following anæsthesia. B. H. ROBBINS and H. A. PRATT (J. Pharm. Exp. Ther., 1936, 56, 205—208).—The normal serum-K is for dogs 20 mg. and for guinea-pigs 34 mg. per 100 c.c. During Et₂O anæsthesia, serum-K falls in both animals, and returns to normal within 5 hr. W. O. K.

Chemical constitution and local anæsthetic action of alkamine esters of *p*-alkoxybenzoic acids.—See this vol., 468.

Adrenaline secretion and blood-sugar content in dogs anæsthetised with avertin. H. SATO, Y. SATOW, and T. DEGUCHI (Tohoku J. Exp. Med., 1934, 24, 485—494).—Anæsthesia did not affect adrenaline output but slightly decreased the blood-sugar. CH. ABS. (p)

Muscle contractions without production of lactic acid. E. MARTINI (Arch. ital. Biol., 1935, 88, 82—90; Chem. Zentr., 1935, ii, 248). G. H. F.

Emetine sulphocamphorate. I. IMAZ and M. F. PASTOR (Rev. Assoc. med. Argentina, 1935, 49, 99—104).—Effects of the sulphocamphorate are similar to those of the hydrochloride, but its toxicity is lower. CH. ABS. (p)

Effect of ergotamine on glycosuria and hyperglycemia produced by stimulation of the superior cervical sympathetic ganglion. D. A. CLEVELAND (Amer. J. Physiol., 1935, 113, 592—594).—Ergotamine inhibits the above effects. R. N. C.

Heart activity and vegetative poisons. I. Effect of intravenous injections of atropine on the heart action. G. W. PARADE and J. G. JÄGER. II. Effect of intravenous injections of adrenaline and pilocarpine on the heart action. G. W. PARADE and H. R. FOERSTER (Klin. Woch., 1934, 13, 1684—1686, 1709—1711). R. N. C.

Respiratory effects of morphine, codeine and related substances. V. Effect of α -, β -, and

γ -isomorphines and their dihydro-derivatives on the respiration of the rabbit. C. I. WRIGHT and F. A. BARBOUR (J. Pharm. Exp. Ther., 1936, 56, 39—49).—The min. subcutaneous doses of α -, β -, and γ -isomorphine and dihydro- α -, β -, and γ -isomorphine required to depress the respiratory mechanism of the rabbit are 0.55, 8.0, 8.0, 0.4, 0.55, and 5.3 mg. per kg., respectively. A. L.

Effect of morphine on the human ureter. N. F. OCKERBLAD, H. E. CARLSON, and J. F. SIMON (J. Urol., 1935, 33, 356—362). CH. ABS. (p)

Effect of quinine on tissue respiration: relation between quinine and various hormones in this respect. I. Insulin or adrenaline. II. Genital glands. K. MIZUTANI (Folia Endocrinol. Japon., 1933, 8, 97—98, 98—99).—I. Injection of quinine (I) lowered the O_2 consumption of liver, kidney, thyroid, spleen, and heart muscle to a small extent, and that of skeletal muscle markedly. Administration of insulin increased this effect on liver and thyroid and decreased it in all other organs. Adrenaline in all cases retarded the action of (I).

II. Feeding of dried testicle to male rats decreased these effects of (I) in all organs, especially thyroid. Interstitial tissue of the ovary had a similar, and corpus luteum a reverse, action in the case of female rats.

CH. ABS. (p)

Site and mode of action [of therapeutic substances] and intermediary metabolism. H. FREUND (Arch. exp. Path. Pharm., 1936, 180, 416—436).—Intermediary metabolism is dependent on the condition of the organ. The site and mode of action of a therapeutic substance are changed by changes in tissue metabolism. The relations between variation in metabolic processes and the action of drugs etc. are exemplified.

F. O. H.

Relation between the toxicities and the b.p. of related substances. J. FERGUSON (Nature, 1936, 137, 361—362).—An exact linear relationship exists between the b.p./1 atm. of a series of related compounds and the log of the molar lethal doses to insects for the most diverse cases. Data for the action of chlorinated ethylenes on *Sitophilus granarius* are given. In a homologous series or a series of substituted derivatives the effect of the substituent is probably purely physical, increasing the availability of the toxic grouping of the parent substance.

L. S. T.

Relation between toxicity, resistance, and time of survival. L. REINER (J. Gen. Physiol., 1936, 19, 419—422; cf. A., 1934, 323, 551).—Theoretical. A more general form of the equations is given, consistent with a limiting toxicity with increasing concn. of drug.

F. A. A.

Treatment of military gas poisoning. E. GILLERT (Therap. d. Gegenwart, 1934, 75, 529—537; Chem. Zentr., 1935, i, 3814).

H. N. R.

Chronic carbon monoxide poisoning. H. BURESCH (Z. Hyg., 1935, 117, 153—160).

R. N. C.

Action of alcohol and some other poisons on heart inhibition in the frog. C. G. SANTESSON (Skand. Arch. Physiol., 1934, 69, 255—292).

R. N. C.

Relative toxicity of acetone, methyl alcohol, and their mixtures. I. R. M. SKLIANSKAYA, F. E. URIEVA, and L. M. MASHBITZ. II. Action on white mice. L. M. MASHBITZ, R. M. SKLIANSKAYA, and F. E. URIEVA (J. Ind. Hyg., 1936, 18, 106—116, 117—122).—I. $COMe_2$ depresses the activity of the isolated frog's heart more powerfully than MeOH, but recovery occurs more readily after $COMe_2$. Mixtures of $COMe_2$ and MeOH show the predominant effect of $COMe_2$.

II. Measured by commencement of narcosis, the toxicity of $COMe_2$ is $>$ that of MeOH, but according to mortality, MeOH is more toxic than $COMe_2$ or their mixtures. With mixtures of 40, 50, and 60% of $COMe_2$, the toxicity is $<$ that of the separate compounds.

J. N. A.

Toxicity and potential dangers of ethylene glycol. F. H. WILEY, W. C. HUEPER, and W. F. VON OETTINGEN (J. Ind. Hyg., 1936, 18, 123—126).—A concn. of 300 mg. of $(CH_2OH)_2$ per 1000 litres of air has no toxic effects on mice or rats, and probably none on man, even with continued exposure of 8 hr. per day for $3\frac{1}{2}$ months.

J. N. A.

Simultaneous poisoning of frog's muscle with veratrine and iodoacetic acid. J. MÄRTENSSON (Skand. Arch. Physiol., 1935, 71, 229—237; Chem. Zentr., 1935, i, 3004).

G. H. F.

Antiseptic properties of wine. E. CERIOTTO (Semana méd., 1935, 42, 529—532; Chem. Zentr., 1935, ii, 290).—The antiseptic activity of wine *in vivo*, not *in vitro*, is ascribed to the presence of colloidal metals.

H. N. R.

Toxicity of potassium perrhenate. L. C. HURD, J. K. COLEHOOR, and P. P. COHEN (Proc. Soc. Exp. Biol. Med., 1933, 30, 926—928).—In contradistinction to $KMnO_4$, $KReO_4$ had low toxicity when injected intraperitoneally into rats or mice. In rabbits Re was conc. mainly in the urine with some distribution in the organs, but not in the brain.

CH. ABS. (p)

Relative toxicity of thiocyanate ions. P. BRUN (Compt. rend. Soc. Biol., 1936, 121, 543—546).—CNS' is equally toxic to germinating seeds, infusoria, and fish, but the toxicity is very feeble compared with that of CN' .

R. N. C.

Muscle metabolism in arsenic-treated rabbits. W. NONNENBRUCH, Z. STARY, A. BAREUTHER, and H. THELEN (Arch. exp. Path. Pharm., 1936, 180, 437—439).—The hexosemono- and adenylypyro-phosphoric acid contents of the muscle are diminished, due to a decrease in phosphorylation processes (cf. A., 1934, 1250).

F. O. H.

Halide distribution in body fluids in chronic bromide intoxication. M. F. MASON (J. Biol. Chem. 1936, 113, 61—74).—The distribution of Br' and Cl' in simultaneously taken samples of blood, spinal fluid, urine, gastric juice, and saliva from dogs and patients with chronic bromism has been determined. The distribution ratio for Br' between cells and serum is slightly $>$ for Cl' , whilst that between serum and spinal fluid is much $>$ for Cl' . The replacement of Cl' by Br' in urine is $<$ in serum. In gastric juice the replacement is sometimes $>$ and

sometimes < in serum. In dog's parotid saliva the replacement is approx. the same as in serum, whilst in human mixed saliva it is much greater.

J. N. A.

Augmentation of the toxicity of fluorosis in the chick by feeding desiccated thyroid. P. H. PHILLIPS, H. ENGLISH, and E. B. HART (J. Nutrition, 1935, 10, 399—407).

A. G. P.

Experimental salt poisoning in ducks. J. P. TORREY and R. GRAHAM (Cornell Vegetarian, 1935, 25, 50—53).

CH. ABS. (p)

Pharmacology of the nitrite effect of bismuth subnitrate. E. J. STIEGLITZ and A. E. PALMER (J. Pharm. Exp. Ther., 1936, 56, 216—222).— $\text{Bi}(\text{OH})_2\text{NO}_3$ or NaNO_3 , added to cultures of *B. coli*, is partly reduced to nitrite (I). After oral administration of $\text{Bi}(\text{OH})_2\text{NO}_3$ in therapeutic doses, the blood-(I) (normal, $0.5\text{--}1.5 \times 10^{-6}$ g. per 100 c.c.) usually rises significantly, whilst the arterial blood pressure falls.

W. O. K.

Lead in drinking-water. F. WEYRAUCH and H. MÜLLER (Z. Hyg., 1935, 117, 196—201).—Traces of Pb in the drinking-water of German towns are probably responsible for the Pb present in human bones.

R. N. C.

Treatment of plumbism. I. GRAY (J. Amer. Med. Assoc., 1935, 104, 200—205).—A low-Ca, high-P (ratio 1:3—4) diet together with administration of NH_4Cl and H_3PO_4 increased the elimination of Pb.

CH. ABS. (p)

Biochemical behaviour of lead in the body. J. C. AUB (J. Amer. Med. Assoc., 1935, 104, 87—90).—A review.

CH. ABS. (p)

Acute poisoning from mercuric chloride. T. SOLLMANN and N. E. SCHREIBER (Arch. Int. Med., 1936, 57, 46—62).—The average [Hg] in the organs of fatal cases of HgCl_2 poisoning was: kidneys 3.8, liver 2.05, spleen 0.55, intestines 0.43, heart, skeletal muscle, and lungs 0.20—0.30, brain 0.14, blood 0.015—0.12 mg. per 100 g.

H. G. R.

Selenium in proteins from toxic foodstuffs. IV. Effect of feeding toxic proteins or toxic protein hydrolysates with and without removal of selenium. K. W. FRANKE and E. P. PAINTER (J. Nutrition, 1935, 10, 599—611).—Hydrolysates (H_2SO_4) of toxic proteins retain the toxic factor, but become innocuous after pptn. of Se compounds by HgCl_2 .

A. G. P.

Toxicant occurring naturally in certain samples of plant foodstuffs. XI. Effect of feeding toxic and control foodstuffs alternately. K. W. FRANKE (J. Nutrition, 1935, 10, 233; cf. this vol., 105).—Further data relating to the effects of "toxic" maize are given.

A. G. P.

Acridine compounds.—See this vol., 484.

Succession of enzymic processes in muscular tissue. J. K. PARNAS (Bull. Soc. Chim. biol., 1936, 18, 53—85).—A lecture.

Mode of combination of an enzyme with an adsorbent and with a substrate. K. G. STERN (Science, 1936, 83, 190—191).

L. S. T.

Rôle of the concentration (A) of the co-enzyme, (B) of the substrate, in the rate of fermentation reactions. L. AMBARD and S. TRAUTMANN (Compt. rend. Soc. Biol., 1936, 121, 470—472, 472—473).—(A) The variations in the fixation of the co-enzyme with univalent anionic concn. at const. p_{H} and in the concn. of the co-enzyme with $[\text{H}^+]$ at const. univalent anionic concn. are confirmed.

(B) The rate of formation of the substrate-enzyme-co-enzyme complex in the inversion of sucrose (I) by invertase is inversely \propto the concn. of (I), but the rate of hydrolysis of the complex is independent of (I) concn.

R. N. C.

How can water intervene in the calculation of enzymic reactions? L. THIVOLLE (Compt. rend. Soc. Biol., 1936, 121, 476—477).—Theoretical.

R. N. C.

Effect of ultra-violet light on enzymic reactions. II. Pepsin. S. BANERJEE and H. K. SEN (J. Indian Chem. Soc., 1935, 12, 740—746; cf. A., 1935, 1415).—Ultra-violet light does not affect the action of pepsin on caseinogen at p_{H} 1.8, when the peptic val. is a max. The influence of various org. and inorg. additions on the peptic val. is also investigated and the mechanism of the action is discussed.

R. S.

Similarity between the mechanism of the rennin and pectase (pectin-methoxylase) reactions. A. C. DAHLBERG and Z. I. KERTESZ (Science, 1936, 83, 56).

L. S. T.

Lysozyme. K. MEYER, R. THOMPSON, J. W. PALMER, and D. KHORAZO (J. Biol. Chem., 1936, 113, 303—309).—The method of prep. has been modified to include separation as the flavianate. Lysozyme is a basic polypeptide (15.3% N) active only in the reduced state.

H. G. R.

Activation of villikin. E. VON KOKAS and G. von LUDÁNY (Pflüger's Archiv, 1935, 236, 166—174).—Villikin is activated only by the HCl of the gastric juice; it is also activated by other acids, the activating powers of which vary, but not by NaOH, NaCl, H_2O , EtOH, COMe_2 , urea, glycerol, or sucrose. When activated, it is sol. in H_2O , neutral salts, dil. alkali, and EtOH. It exists in the intestinal mucosa as an inactive heat-resistant precursor (provillikin).

R. N. C.

Anhydrase activity in invertebrates. M. FLORKIN (Arch. Int. Physiol., 1935, 40, 283—290; Chem. Zentr., 1935, i, 2997).—The occurrence of carbonic anhydrase of Meldrum and Roughton (A., 1933, 844) in many invertebrates is proved.

G. H. F.

Influence of different diets on enzymes of the organism. I. The problem. II. Starvation and blood enzymes. III. Insufficient consumption of proteins and the blood-enzymes. B. GOLDSTEIN (Ukrain. Biochem. J., 1934, 7, No. 1, 79—94, 95—107, 109—123).—I. A discussion.

II. Starvation caused no typical changes in blood-catalase (I), a slight initial increase followed by a decrease in -amylase (II), and a progressive and marked decline in -lipase (III). The (III) content

and the decomp. of albumin in the organism were unrelated.

III. Insufficient consumption of protein (such as to cause death in 30—40 days) effected no change in (I) or (II) but an increase in (III) which is paralleled by the decrease in wt. of the animal. Elimination of NH_2 -acids (tryptophan, cystine, tyrosine) is of no importance in the formation of (III), which may serve as an index of protein sufficiency. CH. ABS. (p)

Components of dehydrogenase systems. IX. Cozymase and "codehydrogenase II." H. VON EULER and E. ADLER. **X.** Lactic acid dehydrogenase and malic acid dehydrogenase from heart muscle. E. ADLER and M. MICHAELIS. **XI.** Glucose dehydrogenase from liver. N. DAS (Z. physiol. Chem., 1936, 238, 233—260, 261—268, 269—274; cf. A., 1935, 1276).—IX. In addition to cozymase (I) yeast contains codehydrogenase II (II), (probably identical with the co-enzyme of red blood-cells), which is separated from (I) by chromatographic adsorption on Al_2O_3 and is a necessary component of the dehydrogenase system of Robison's ester; (I) is a necessary component of the alcohol dehydrogenase system of yeast, (II) being inactive in the second system and (I) in the first. Both (I) and (II) act as H carriers.

X. The dehydrogenation of lactic acid (III) by the enzyme of heart muscle is activated by flavin enzyme (a necessary constituent), which is partly separated from (III) dehydrogenase by chromatographic adsorption on Al_2O_3 . In the (III) and malic acid dehydrogenase systems (I) is the activating co-enzyme, (II) from yeast and red blood-cells having no effect.

XI. Both (I) and (II) activate the glucose dehydrogenase system of liver and (II) occurs in liver.

W. McC.

Inhibiting action of hydrogen cyanide on biological oxidations. E. J. BIGWOOD, J. THOMAS, and H. HERBO (Bull. Soc. Chim. biol., 1936, 18, 176—181).—Determinations of the amount of uric acid formed in the aerobic and anaerobic oxidation of hypoxanthine by xanthine-dehydrogenase from milk indicate that the aerobic oxidation is inhibited by HCN. This suggests that indophenol-oxidase is involved.

A. L.

Histochemical investigation of oxidases by the indophenol-blue reaction. Application to lipins. L. LISON (Bull. Soc. Chim. biol., 1936, 18, 185—189).—The indophenol-blue obtained on treating certain fatty substances with the Nadi reagent is produced by the oxidation of the reagent by the fatty substances and not by the preferential dissolution of the autoxidised reagent or by the presence of an oxidase. This view is supported by the fact that pure unsaturated lipins such as oleic acid, when kept exposed to the air, bring about the oxidation of benzidine by peroxidase.

A. L.

Action of carbon monoxide on the indophenol-oxidase in milk. E. J. BIGWOOD, J. THOMAS, and H. HERBO (Bull. Soc. chim. biol., 1936, 18, 182—184).—CO in the dark is without effect on the aerobic oxidation of hypoxanthine or the Nadi reagent by the xanthine-dehydrogenase from milk. The system

is therefore similar in behaviour to that of succino-dehydrogenase from muscle.

A. L.

Action of neutral salts of the Hofmeister series on diastatic enzymes. W. HAARMANN and O. FOLSCHKE (Biochem. Z., 1936, 283, 312—321).—In isotonic and unbuffered solutions, all neutral salts inhibit the conversion of starch into sugar by diastase (I). Animal (I) is particularly strongly inhibited by OAc' , PO_4''' , and I' whilst SO_4'' , Cl' , and tartrate are only feebly inhibitory. Malt-(I) is strongly inhibited by all the salts, least by I' . In alkaline solution the activity of animal (I) is increased by neutral salts, particularly by Cl' and SO_4'' , and that of malt-(I) is increased by SO_4'' , OAc' , and tartrate but not by Cl' and I' . The increase in alkaline solution does not occur at high concns. of the salts. In acid solution practically no activation occurs.

P. W. C.

Influence of the chlorides of alkalis and of alkaline earths on the saccharification of starch by diastatic enzymes. W. HAARMANN and K. BAERTSCHER (Biochem. Z., 1936, 283, 301—311).—In neutral and acid solution Cl' in low concn. accelerates by 20% and in higher concns. inhibits the activity of malt-diastase (I); NaCl and MgCl_2 inhibit by 70% and other chlorides (except LiCl) by 50%. Animal (I) under the same conditions is not or only slightly affected. In alkaline solution, the activity of animal (I) was considerably increased whereas that of plant (I) was inhibited. With increasing concn. the action of Cl' varies in a characteristic way for each cation, the accelerating action with animal (I) being gradually decreased and the inhibition of plant (I) increased.

P. W. C.

Sisto- and eleuto-amylase. R. DEPLANQUE (Z. Spiritusind., 1936, 59, 60, 62).—A lecture.

Influence of heavy water on activity and stability of pancreatic amylase. M. L. CALDWELL, S. E. DOEBBELING, and S. H. MANIAN (J. Amer. Chem. Soc., 1936, 58, 84—87).—The hydrolysis of starch by pancreatic amylase (I) is not influenced to any marked extent by D_2O (concn. up to 100%), provided deterioration of (I) is avoided. Inactivation of (I) occurs more rapidly and to a greater extent in D_2O than in H_2O at 25° .

H. B.

Taka-amylase. VII. Purification by adsorption. VIII—X. Selectivity of different adsorption materials. T. KITANO (J. Soc. Chem. Ind. Japan, 1936, 39, 22—24B, 24B, 25—26B, 26B; cf. A., 1935, 1535).—Separation of taka-amylase (I) from maltase (II) by adsorption is attempted. Adsorption is rapid, and greater at lower temp. Graphite has no adsorptive action. The relative adsorptive power, for (I) and (II), of various charcoals and earths, of kaolin, and of $\text{Cu}(\text{OH})_2$ and $\text{Fe}(\text{OH})_3$ is examined. By none of these is (I) obtained free from (II). The optimum action on starch and on maltose is at the same p_{H} (4.6). (I) may be a form of Ohlsson's saccharogenamylase (β -amylase).

E. W. W.

Action of some oxidisers on amylolysis and alcoholic fermentation in flour paste. R. GUILLEMET and C. SCHELL (Compt. rend. Soc. Biol., 1936,

121, 463—464).—Amylolysis in paste is increased by $K_2S_2O_8 \propto$ the concn., and by $KBrO_3$ and K_3BO_3 , which show max. effect in min. concn. R. N. C.

Determination of amylolytic activity of pancreatin. A. DE CLERCQ (J. Pharm. Belg., 1935, 17, 95—98; Chem. Zentr., 1935, i, 2997).—The methods of the Belgian, American, French, and Spanish pharmacopœias are compared. The reaction on starch for < 1 hr. at 37° is recommended. G. H. F.

Hydrogen sulphide as a factor in the determination of free and bound amylase in ungerminated cereals. T. CHRZASZCZ and J. JANICKI (Biochem. J., 1936, 30, 342—344; cf. this vol., 245).—More bound amylase is liberated in aq. extracts of barley, rye, and wheat by added H_2S than by added papain. The amount liberated when shaking is intermittent is $>$ when it is continuous.

W. McC.

Enzymic fission of glucosides in heavy water. F. SALZER and K. F. BONHOEFFER (Z. physikal. Chem., 1936, 175, 304—321).—The results of investigations of the fission of β -glucosides by emulsin are examined in relation to the Michaelis-Menten theory of the velocity of enzymic reactions (A., 1913, i, 540). If the enzyme is almost saturated with substrate the rate of fission in D_2O solution is $<$ in H_2O , showing that the hydrolytic decomp. of the enzyme-substrate complex is slower. If only a small part of the enzyme is combined with substrate fission is more rapid in D_2O than in H_2O , showing that the affinity of the enzyme for the substrate in D_2O is $>$ in H_2O . Similar considerations are applicable to hydrolyses catalysed by H^+ . The hydrolysis of salicin is more rapid in D_2O than in H_2O , indicating that the first step of the reaction is the formation of a complex of H^+ and substrate at a speed which is high compared with that of the subsequent decomp. into H^+ and products of hydrolysis. If, however, the first step is the slower, the rate of reaction may be higher in H_2O than in D_2O . The Michaelis consts. of *p*-cresol-glucoside and *n*-butylglucoside are 0.14 and 0.22, respectively, at 30° .

R. C.

Action of emulsin. III. Sources of error in the polarimetric examination of enzymic hydrolysis of β -glucosides. S. VEIBEL and F. ERIKSEN (Biochem. J., 1936, 30, 163—167).—Before the polarimetric determination the enzymic reaction is stopped by adding K_2CO_3 , which raises the p_H of the solution from 4.4 to 10.5—10.6. The difference in rotation at these two p_H vals. is about 3—4%. Glucose solutions are unstable at p_H 10.6; 0.1M solutions decrease in α by 0.0033° per hr. Salicin is used as a standard glucoside; a concn. of 3.972% should be used (cf. Helferich, A., 1931, 873). PhMe should not be used as a bactericide as it accelerates the rate of enzymic hydrolysis by 25—35%.

E. A. H. R.

Kinetics of ester hydrolysis by enzymes. VI. Relative specificity of esterases. E. BAMANN and E. RENDLEN (Z. physiol. Chem., 1936, 238, 133—144; cf. A., 1934, 218).—The varying affinity of pig's liver esterase for Me_1 and Me_2 esters and Me ester amides of dicarboxylic acids (malonic to adipic) and the effects of altering $[H^+]$ and substrate concn. con-

firm the view that the enzyme-binding power of the ester group of the substrate is controlled by the electrochemical nature of the adjacent groups. The predominating effect of the acid group in preventing production of the enzyme additive compound can be counteracted or restricted by increasing the distance between ester and CO_2H group, by esterifying CO_2H or converting it into $CO-NH_2$, and by reducing the degree of dissociation of CO_2H .

W. McC.

Determination of activity of lipase and esterase. H. PÉNAU and J. GUILBERT (J. Pharm. Chim., 1936, [viii], 23, 57—77).—The activity of the lipase (I) and esterase (II) of blood-serum is determined by measuring the extent of hydrolysis (at 40° with shaking) in 2 hr. of tributyrin [for (I)] and Pr^aCO_2Et [for (II)]. After the digestion $NaPO_3$ and 0.1N- H_2SO_4 are added (p_H 3.5), the mixture is centrifuged, and the liquor and washings are extracted 3 times with Et_2O . After addition of $EtOH$ and H_2O the extract is titrated with 0.1N-NaOH (bromothymol-blue). In the dog there is little variation in the activities. Differences in the activities amongst animal species may be due to the presence of activators and inhibitors.

W. McC.

Enzymic hydrolysis of tributyrin by pancreatic lipase. A. I. VIRTANEN and E. LINDEBERG (Suomen Kem., 1936, 9, B, 2).—The hydrolysis proceeds in three stages: tributyrin \rightarrow α -dibutyryl \rightarrow monobutyryl \rightarrow glycerol. Each stage has a different reaction velocity.

J. N. A.

Cathepsin and arginase in a melanoma of the horse. A. PURR (Z. Krebsforsch., 1935, 41, 483—487; Chem. Zentr., 1935, i, 2998).—Melanomas of horse differ in their cathepsin (I) and arginase (II) contents from other malignant tumours; compared with rat sarcoma, the (I) content is much higher and the (II) content very low.

G. H. F.

Determination of amino-acids in crystalline pepsin. H. O. CALVERY, R. M. HERRIOTT and J. H. NORTHROP (J. Biol. Chem., 1936, 113, 11—14).—Cryst. pepsin has been analysed for total N, NH_2-N (before and after acid hydrolysis), humin-N, amide-N, tyrosine, tryptophan, cystine, arginine, histidine, lysine, aspartic and glutamic acid. The low basic N val. and the very high NH_2-N val. after acid hydrolysis are noteworthy. Coagulation by heat at p_H 4 appears to cause partial destruction of the pepsin mol. and marked differences are shown by analyses of the coagulated and non-coagulable material.

H. W.

Determination of peptic activity. H. ESCHENBRENNER (Pharm. Ztg., 1936, 81, 229—231).—A direct measure of peptic activity cannot be obtained by a titration method or by the change in η on digestion. Preliminary observations are reported dealing with the possibility of using the ratio of η to titration vals. as a measure of the activity.

E. A. H. R.

Fission of arginine during proteolytic hydrolysis. S. KAMIYA (J. Biochem. Japan, 1935, 22, 263—277).—Liberation of arginine (I) during proteolytic hydrolysis of edestin, caseinogen, and gelatin was followed by treating aliquots of the hydrolysate at intervals with protease-free arginase preps. (from

pig's liver) and then determining (I) by the urease method; increase in $\cdot\text{CO}_2\text{H}$ was followed by titration with 0.1N-KOH. Pepsin (II) (7—8 days) does not liberate (I) whilst $\cdot\text{CO}_2\text{H}$ is increased by 8.5—27% of the total $\cdot\text{CO}_2\text{H}$ liberation by (II)—trypsin (III)—erepsin (IV). Subsequent digestion by (III) (7—12 days) liberates 26.9—43.5% of the total (I) and increases $\cdot\text{CO}_2\text{H}$ by 43.3—76.6%. Final digestion by (IV) (22 days) liberates 63.4—80.4% of (I). Liberation of (I) by (II)–(IV) hydrolysis is > that by (II)–(III)–(IV) hydrolysis.

F. O. H.

Action of trypsin on substituted protein. A. KIESEL and O. ROGANOVA (Z. physiol. Chem., 1936, 238, 149—159).—Substitution products of edestin (I) are less readily attacked by trypsin than is (I) itself, the effect being moderate or slight in the case of ethylated, sulphonated, and deaminated (I) and very great with benzoyl- (II), benzoylmethyl-, and benzoyl-deamino-destin (III). When the substituents are removed from (II) and (III) the product is nearly as readily attacked as is (I) itself. Probably the NH_2 and OH groups (but not CO_2H) play an important part in the process.

W. McC.

Digestive enzymes in marine invertebrates. I. **Proteolytic enzymes in *Polypus vulgaris* (Lamarck).** E. SAWANO (Sci. Rep. Tokyo Bunrika Daigaku, 1935, 2, B, 101—126).—The acidity of the digestive tract of *P. vulgaris* increases from the pharynx (p_{H} 6.8) to the intestine (p_{H} 5.5). The distribution of proteinase, amino- and carboxy-polypeptidase, and dipeptidase in the digestive tract, anterior and posterior salivary glands, liver, and pancreas is recorded. The p_{H} optima of these four enzymes appear to be unaffected by the nature of the tissues in which they occur. A cathepsin-like proteinase occurs in extracts of liver and pancreas.

E. A. H. R.

Urinary phosphatase. II. Excretion by man. H. WOLBERGS (Z. physiol. Chem., 1936, 238, 23—30; cf. Kutscher, A., 1935, 1279).—Details are given of work already reported (A., 1935, 1268). A difference (due to prostatic secretion) exists between the urines of the two sexes. Injection of insulin has the reverse action to, and inhibits, that of glucose administration.

F. O. H.

Urinary phosphatase. III. W. KUTSCHER and A. WÖRNER (Z. physiol. Chem., 1936, 238, 275—279; cf. Wolbergs, this vol., 111).—When urine is dialysed through parchment the activity of the phosphatase is increased. Subsequent electro dialysis, repeated with the solution obtained by dissolving in H_2O the active material which separates after 12—24 hr. on the first occasion, results in a high degree of purification accompanied by only slight loss of activity.

W. McC.

Specificity of phosphatases. W. SCHUCHARDT (Biochem. Z., 1936, 283, 433—434).—A sample of yeast when tested with dil. AcOH did not attack α - and β -glycerophosphate between p_{H} 6 and 9 and when treated with dil. aq. NH_3 was inactive between p_{H} 3.3 and 5.

P. W. C.

Phosphatase action of emulsin. H. BREDERECK and H. BEUCHELT (Naturwiss., 1936, 24, 107—108).—Active emulsin preps. from almonds bring about a

rapid cleavage of H_2PO_4 from mononucleotides and yeast-nucleic acid. The glycosidic linking in purine nucleotides is not attacked. H_3PO_4 is also liberated, although less rapidly, from glycerophosphoric acid.

E. A. H. R.

Rôle of water in the activation of renal phosphatase. L. THIVOLLE (Compt. rend. Soc. Biol., 1936, 121, 474—476).—The rate of fermentation by renal phosphatase (I) is increased by dilution, there being an optimum dilution depending on the amount of (I) present.

R. N. C.

Chemical difference between protein-linked and free nucleic acid. G. SCHMIDT (Science, 1936, 83, 15).—The observed difference in the rates of dephosphorylation of thymonucleic acid and thymonucleohistone by phosphatase is due to the linking of the nucleic acid component with the protein.

L. S. T.

Anaërobic decomposition of hexosephosphoric acids by animal tissues. III. Hydrolysis by phosphatase. T. TAKAHASHI (J. Biochem. Japan, 1935, 22, 303—321).—Production of hexose monophosphate and free sugar from hexose diphosphate by autolysed tissue is not invariably accompanied by formation of AcCHO .

F. O. H.

Phosphodiesterase and hydrolysis of lecithin. H. UDAGAWA (J. Biochem. Japan, 1935, 22, 323—340).—Diphosphatase preps. (from taka-phosphatase) free from monophosphatase hydrolyse lecithin (optimum p_{H} 4—5) to the corresponding glyceride and cholinephosphoric acid, the latter being further hydrolysed only by monophosphatase.

F. O. H.

Animal lipins. X. Cerebrosidase. Its relation to the splitting of polydiaminophosphatide by polydiaminophosphatase. S. J. THANNHAUSER and M. REICHEL (J. Biol. Chem., 1936, 113, 311—317).—Cerebrosidase is inactive, its activators, which depress polydiaminophosphatase activity, being H_2S , cysteine, reduced glutathione, and *l*-ascorbic acid.

H. G. R.

Hexokinase. O. MEYERHOF (Naturwiss., 1935, 23, 850—851).—If glucose and adenylyl pyrophosphate are incubated with hexokinase (I), adenylic acid and hexose monophosphate are formed. If this mixture is boiled and added to fresh muscle extract lactic acid is rapidly formed. (I) probably acts by causing phosphorylation of sugars.

E. A. H. R.

Fermentative enzymes. V. Phosphorylation systems of alcoholic fermentation. A. SCHÄFFNER and H. BERL (Z. physiol. Chem., 1936, 238, 111—123; cf. A., 1935, 1026; this vol., 246).—Phosphorylation of hexose by macerated yeast is induced equally by hexose diphosphate (I) and adenosine triphosphate (II). Purification of the enzyme system results in induction by (I) [or by dihydroxyacetonephosphoric acid (III)] but not by (II); hence "phosphatase" is not identical with the "heterophosphatase" of Euler and Adler (A., 1935, 1276) and thus at least two phosphorylating systems exist in yeast extracts. A third system, whereby the monoester is converted into the diester, is probably also present, the mechanism being one of oxidation to a phosphohexonic acid and subsequent fission to

AcCO_2H (decarboxylated to MeCHO) and triose-phosphoric acid [2 mols. of which give 1 mol. of (I)]. Pyrophosphatase and Warburg's intermediary enzyme are also concerned in phosphorylation processes. A consideration of the rôle of (III) and of phosphoglyceric acid (IV) and of inhibition by $\text{CH}_2\text{I}\cdot\text{CO}_2\text{H}$ indicates that the reaction $\text{glucose} + \text{phosphate} \rightarrow \text{hexose ester}$ is coupled with the oxidation-reduction process $(\text{III}) + \text{MeCHO} \rightarrow (\text{IV}) + \text{EtOH}$. Intra- and extra-cellular phosphorylation processes are compared.

F. O. H.

Transformation of the pyrophosphate fraction in yeast cells. M. M. LEVITOV (Biochem. Z., 1936, 284, 86—98).—Fresh yeast in aq. suspension loses very little of its pyrophosphate (I) content in 5 hr., but considerable loss of (I) and of orthophosphate (II) occurs when glucose (III) is added. No appreciable change in the (I) and (II) contents of fermenting (glucose) yeast occurs if fermentation is inhibited by $\text{CH}_2\text{Br}\cdot\text{CO}_2\text{H}$ and respiration by KCN but when fermentation is inhibited with NaF the (I) and (II) contents decrease. Addition of (III) checks the degradation of (I) which occurs on autolysis. Phosphoglyceric acid acts more powerfully than does (III), thus causing the diminished (I) content to increase. The (I) compound of yeast seems to act as a phosphate carrier in the same way as does adenosinetriphosphoric acid in animal cells.

W. McC.

Inverse Pasteur reaction. W. A. BELITZER (Biochem. Z., 1936, 283, 339—342).—Working with yeast, the inverse Pasteur reaction is observed only when the respiration system is saturated with a suitable H donor.

P. W. C.

Sporulation of yeast. II. H. STANTIAL (Trans. Roy. Soc. Canada, 1935, [iii], 29, III, 175—188).—Formation of ascospores by *S. cerevisiae* is increased by grapefruit juice, the active constituent of which is a carbohydrate [of 12 investigated, 8 (especially mannose and maltose) were active]. Aq. NaOAc or KOAc in presence of sugar is effective. Data for the influence of temp. and p_{H} on sporulation are given.

F. O. H.

Wildier's bios. W. L. MILLER (Trans. Roy. Soc. Canada, 1935, [iii], 29, III, 163—165).—Amino-hydroxybutyric acid (I) (from crotonic, isocrotonic, and phenoxyethylmalonic acid), aspartic (II) + amino-isobutyric acids, (II) + α -aminobutyric acid or d -glutamic acid + alanine cannot replace the (I) isolated from tomato juice as a source of bios IIA in the growth of yeasts. Of 32 NH_2 -acids only *l*-leucine (III) had a significant effect; (III), however, also enhances the action of bios IIA. Wildier's bios appears to contain four constituents, viz., a (I), inositol, (III), and bios IIB (which is purified by the use of COMe_2 and Cu and Hg acetates). Bios V is necessary for the growth of *S. hanseniospora valbyensis*.

F. O. H.

Influence of inositol and bios IIA and IIB on the reproduction of twelve yeasts. New constituent of bios. L. N. FARRELL (Trans. Roy. Soc. Canada, 1935, [iii], 29, III, 167—173).—*S.* and *Zyg. mandshuricus* are indifferent to inositol whilst *Zyg. mellis* is only slightly influenced. *S. hanseniospora valbyensis* and *S. galactosus* require an additional

factor (I). The remainder resemble Wildier's yeast. (I) (bios V; cf. preceding abstract) occurs in tomato and lemon juice and is not identical with ascorbic acid.

F. O. H.

Balance of alcoholic fermentation by yeasts. R. GUILLEMET (Compt. rend. Soc. Biol., 1936, 121, 465—467).—Anaërobic fermentation of sucrose, glucose, and fructose in aq. solution by yeasts reaches equilibrium in a few hr., with production of equimol. quantities of EtOH and CO_2 . Maltose exhibits anomalies; some disappears without production of EtOH and CO_2 , being probably broken down to intermediate products. Production of CO_2 is independent of that of EtOH.

R. N. C.

Rate of fermentation of sugars by different kinds of yeast. R. GUILLEMET (Compt. rend. Soc. Biol., 1936, 121, 467—469).—The rates of fermentation of sucrose (I) and maltose (II) by "grain" yeasts are the same; yeasts grown on molasses ferment (I) more rapidly than do "grain" yeasts, but attack (II) irregularly and less rapidly than (I). The rate of fermentation of (I) does not vary with the age of the yeast, but that of (II) falls. Bakers' yeasts ferment (I) more rapidly than do brewers' yeasts.

R. N. C.

Kinetics of alcoholic fermentation of sugars by brewer's yeast. IV. Specificity. Rates of fermentation of α - and β -glucose. R. H. HOPKINS and R. H. ROBERTS (Biochem. J., 1936, 30, 76—83).—The initial rates of fermentation attained by α - (I), β - (II), and $\alpha\beta$ -glucose (III) are the same except with initial concns. of < 1%, (I) with concns. of 0.5 and 0.25% attaining a max. rate > (II). K_m vals. for (I) and (II) are respectively 0.0099 and 0.0118. It is suggested that neither (I) nor (II) but an intermediate, probably open-chain, form of glucose is specifically fermented, (I) being converted more rapidly than (II) into this form. Mutarotation of partly fermented (III) may be explained on this hypothesis.

P. W. C.

Alcoholic fermentation in heavy water. O. REITZ (Z. physikal. Chem., 1936, 175, 257—274).—By the fermentation of sucrose (I) in pure D_2O $\text{CH}_2\text{D}\cdot\text{CD}_2\cdot\text{OD}$ is formed. With decrease in the D content of the solvent, α , the proportion of it which is incorporated into the Me group of the alcohol formed, falls. Fermentation of (I) and *d*-glucose in pure D_2O is only half as rapid as in ordinary H_2O (cf. A., 1934, 327). The rate of decrease in the rate of fermentation with increase in α increases with α .

R. C.

Metabolic systems involved in dissimilation of carbohydrate reserves in baker's yeast. T. J. B. STIER and J. N. STANNARD (J. Gen. Physiol., 1936, 19, 479—494).—The endogenous respiration (dissimilation of carbohydrate reserves) of intact yeast cells is a purely respiratory process, fermentation not being involved. Anaërobic CO_2 production and EtOH production are absent; $R:Q=1$, and is unaffected by concs. 10^{-5} to $10^{-1}M$ of $\text{CH}_2\text{I}\cdot\text{CO}_2\text{H}$ or KCN. If the structure of the cells is destroyed, fermentation reactions occur.

F. A. A.

Kinetic analysis of the endogenous metabolism of bakers' yeast. T. J. B. STIER and

J. N. STANNARD (J. Gen. Physiol., 1936, 19, 461—477).—The endogenous metabolism of *Saccharomyces cerevisiae* placed in a non-nutrient medium shows two phases; (a) a const. rate of O_2 consumption and CO_2 production as long as the stored material is ample, (b) a first-order decline in rate, which \propto the concn. of some substrate, probably glycogen. R.Q.=1 in both phases; their relative duration depends on the age of the cultures. F. A. A.

Absorption spectrum of reduced cytochrome from baker's and brewer's yeasts. E. ELION (Bull. Soc. Chim. biol., 1936, 18, 165—172).—The method of Fink (A., 1932, 1167) for distinguishing between brewer's and baker's yeast is based on the finding that the absorption spectrum of the cytochrome of the former has two, that of the latter four, bands. There are exceptions to this, some brewer's yeasts having a four-banded, some baker's yeasts a two-banded, cytochrome spectrum. A. L.

Effect of time and intensity of radium radiation on the inverting capacity of yeast. G. HARKER (Nature, 1936, 137, 190—191).—Exposure of yeast to Ra emanations permanently reduces its sugar-inverting power. The effect reaches a saturation val. depending on the intensity of the radiation, and is due to some action on the living cells rather than on the enzyme itself. L. S. T.

Polyose of yeast membrane. II. L. ZECHMEISTER and G. TÓTH (Biochem. Z., 1936, 284, 133—138; cf. A., 1934, 810; Sevag *et al.*, A., 1935, 1280).—The polyose (I) occurs pre-formed in yeast and is obtained when it is degraded by enzymes. (I) is not attacked by H_2O at 100° but is hydrolysed by dil. acid and alkali. (I) in untreated yeast resists hydrolysis, being protected by impurities. W. McC.

Isolation of adenosinetriphosphoric acid from yeast. T. WAGNER-JAUREGG (Z. physiol. Chem., 1936, 238, 129—130).—100 g. of fresh yeast yield 60 mg. of adenosinetriphosphoric acid, $[\alpha]_D -30.9^\circ$ (as Na salt in H_2O), and some inosinepyrophosphoric acid (?). R. S. C.

Mitogenetic radiations and Liesegang rings.—See this vol., 426.

Action of various growth-substances on the growth of certain fungi. L. RONS DORF (Arch. Mikrobiol., 1935, 6, 309—325).—An apparent selectivity is shown in the response of various fungi to auxin, bios, and to Nielsen's growth-substance-A and -B. Auxin disappears from nutrient solutions whether added before or after sterilisation. Interrelationships between the various growth factors and vitamin-B are discussed. A. G. P.

Auxogenic action of normal and pathological tissues on the growth of *Phycomyces*. W. H. SCHOPFER (Compt. rend., 1936, 202, 236—238).—Rabbit liver contained a thermostable, H_2O - and EtOH-sol. growth-promoting substance, probably vitamin- B_1 , which was also present to a smaller extent in a tumour and the EtOH extract. H. G. R.

Synthesis of vitamin- B_1 by *Phycomyces*. W. H. SCHOPFER and A. JUNG (Arch. Mikrobiol.,

1935, 6, 345—349).—*Phycomyces* grown on a synthetic medium supplemented with vitamin- B_1 does not absorb an appreciable amount of the vitamin. Rat tests afford no evidence of the synthesis of - B_1 by the mould. *Phycomyces* produces a yeast-stimulating substance and an auxogenic factor. The action of - B_1 in stimulating the growth of *Phycomyces* is not a direct one. Its presence is necessary to enable the organism to produce its sp. growth factors. A. G. P.

Growth factors and vitamins in plants. Effect of extracts of *Aspergillus* on the development of *Phycomyces*. W. H. SCHOPFER and A. JUNG (Arch. Mikrobiol., 1935, 6, 334—344).—Extracts of several species of *Aspergillus* activate culture media of *Phycomyces*. The active agent is probably vitamin- B_1 , which is synthesised in very small quantities by the organism. A. G. P.

Rôle of bios in the biology of fungi of the genus *Fusarium*. A. R. WERNER (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 61—64).—The presence of bios in the growth medium is essential for sporulation. Low viability and the physiological need of activators induce the fungus to invade living tissues. A. G. P.

Availability of the nitrogen compounds eliminated by *Aspergillus niger*. A. RIPPEL and G. BEHR (Arch. Mikrobiol., 1935, 6, 359—361).—N compounds appearing in the substrate of cultures of *A. niger* have little nutrient val. for the fungus. The substances are possibly related to the colouring matter and humin formed during autolysis. A. G. P.

Absorption of oxalic acid by *Aspergillus repens*. D. BACH and J. FOURNIER (Compt. rend., 1935, 201, 1416—1417).—In media containing or free from glucose, max. consumption of $H_2C_2O_4$ occurs at p_H approx. 3.5 and is nil at p_H 7, indicating utilisation of HC_2O_4' and not of C_2O_4'' . F. O. H.

Chemical sterilisation of humus for fungus cultures. D. LHNELL (Arch. Mikrobiol., 1935, 6, 326—333).—Use of volatile antiseptics (Schweitzer 1932) gives only partial sterilisation. EtOH is the most effective of the substances examined, killing all fungus spores and reducing bacterial nos. to approx. 2%. A. G. P.

Fungus fluorescence *in vitro*. A. S. VON MALLINCKRODT-HAUPT and C. CARRIE (Arch. Dermatol. Syphilis, 1934, 169, 519—526).—Cultures of pathogenic skin fungi in sucrose-urea-mineral salt media showed fluorescence *in vitro* after 14 days. Colour changes followed variations in the p_H of the medium. Fluorescence nearly disappeared at neutrality. CH. ABS. (p)

Action of micro-organisms on the diastereomeric forms of hexane- γ -diol.—See this vol., 452.

Formation of organo-metalloidal compounds by micro-organisms. IV.—See this vol., 460.

Penicillic acid.—See this vol., 456.

Correlation of qualitative microchemical tests on the protozoan nucleus and the mode of nutrition. M. S. LUCAS and C. A. EVANS (J. Roy. Microscop. Soc., 1935, [iii], 55, 261—264).—Certain

saprozoic protozoa contained no detectable thymonucleic acid or inorg. salts in their nuclei. H. D.

Why have some investigators been unable to grow *Chilomonas paramecium* in inorganic or simple organic solutions? S. O. MAST and D. M. PACE (Science, 1936, 83, 18—19).—Conflicting evidence is discussed (A., 1935, 1027). L. S. T.

Fixation of quinine by *Paramecia* as determined by its fluorescence. G. VALETTE (Compt. rend., 1935, 201, 681—683).—The cytological effect of the drug on *P. caudatum* is similar to that of neutral-red. J. L. D.

Glucose metabolism of trypanosomes (*T. equiperdum* and *T. Lewisi*). L. REINER, C. V. SMYTHE, and J. T. PEDLOW (J. Biol. Chem., 1936, 113, 75—88; cf. A., 1935, 125).—*T. equiperdum* decomposes 1 mol. of glucose anaerobically, forming 1 mol. each of glycerol and AcCO_2H (I). Under aerobic conditions 2 mols. of (I) are formed, together with small amounts of lactic acid and CO_2 . Presence of serum or plasma does not alter the course of reaction, but increases the rate of the anaerobic process. *T. Lewisi* under anaerobic conditions forms succinic acid, AcOH , and EtOH , and in addition HCO_2H and CO_2 under aerobic conditions. There is no evidence that phosphorylation is involved in the metabolism of either species. J. N. A.

Trypanocidal action of azo-dyes. A. ST. G. HUGGETT and S. F. SUFFOLK (J. Pharm. Exp. Ther., 1936, 56, 188—193).—Of the azo-dyes chlorazol-fast-pink B.K.S (I), chlorazol-sky-blue FFS and S.D. 2, all of which have an anticoagulant action, the most highly trypanocidal, as tested by its action on *T. equiperdum* infection in mice, is (I), which is only slightly less active than germanin. Its high toxicity, however, reduces its chemotherapeutic index to 3—7. W. O. K.

Physiology of pigments of purple bacteria. III. Carotenoids. E. SCHNEIDER (Rev. Fac. Sci. Univ. Istanbul, 1936, 1, No. 2, 74—80; cf. A., 1934, 1265).—Two fractions were obtained. One is adsorbed by Al_2O_3 , Ca(OH)_2 , or CaCO_3 , and is probably a lipochrome containing O. The second fraction is adsorbed on Al_2O_3 or Ca(OH)_2 , and is probably related to, but is more autoxidisable than, lycopene. Both fractions are mixtures of very similar compounds, probably isomerides. E. P.

Carotenoids of purple bacteria.—See this vol., 340.

Formation of putrescine from *D*-arginine by bacterial action. K. HIRAI (Biochem. Z., 1936, 283, 390—392).—A strain of *B. coli* was used and the base isolated as aurichloride and platinichloride in good yield (7.5 g. of putrescine hydrochloride from 10 g. of arginine hydrochloride). P. W. C.

Lime-precipitating bacillus and an iron- and silica-accumulating coccus as stone formers. A. BRUSSOFF (Arch. Mikrobiol., 1935, 6, 471—474).—The rust-coloured layer found on the sides of conduits for hot spring H_2O in Aachen is formed by two types of bacteria. One ppts. CaCO_3 and the other

accumulates Fe and SiO_2 , which collect in a gelatinous condition between the calcareous concretions. A. G. P.

Bacterial proteases. III. Acidoproteolyte of Gorini. G. GORBACH and R. ULM (Arch. Mikrobiol., 1935, 6, 362—368).—Milk, and the casein-containing ppt. produced in skim-milk cultures of *Mammococcus Gorini*, contain a protease of the papain type exhibiting max. activity in neutral media. Proteolysis of casein increases and that of gelatin and peptone decreases with the age of the culture. A peptidase is also present (optimum p_{H} 4.8) which tends to become less active with the ageing of the prep. A. G. P.

Reduction of methylene-blue by *B. abort. infectiosi*, Bang, and *B. melitense*. K. H. BAU and K. WANG (Z. Hyg., 1935, 117, 399—402).—The organisms reduce methylene-blue in presence of a no. of alcohols and carbohydrates, and also open-chain NH_2 -acids; the action of *B. melitense* is the stronger. R. N. C.

Influence of dicyanodiamide, guanidine, and guanylurea on bacteria.—See B., 1936, 245.

Effect of metallic salts on lactic acid fermentation. A. ZLATAROV and D. KALTSHEVA (Biochem. Z., 1936, 284, 12—23).—Lactic acid fermentation of milk and whey by *Streptococcus lactis* is restricted by Mn, Co, Ni, Fe^{++} , and Fe^{+++} salts in concns. > approx. 0.01M ($\text{Mn} < \text{Fe} < \text{Ni} < \text{Co}$), the extent of restriction depending on the concn. of salt. Lower concns. have a slight stimulatory effect. W. McC.

Biological activators of *Azotobacter*. A. R. WERNER (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 57—60).—Bios from yeast or from extracts of soil-grown green algae stimulates the fixation of N by *Azotobacter*. A. G. P.

Electrical method for killing bacteria in gaseous suspension. M. PAUTHENIER and H. VOLKRINGER (Compt. rend., 1936, 202, 250—252).—*B. prodigiosus* in air or N_2 is killed by passage through an electric field maintained by an e.m.f. of the order of 3000 volts per cm. H. G. R.

Bactericidal action of ammonium persulphate. H. LEUNIG (Z. Hyg., 1935, 117, 257—262).—The bactericidal action of dil. $(\text{NH}_4)_2\text{S}_2\text{O}_8$ solutions is augmented considerably by small quantities of org. acids. R. N. C.

Chemistry of virulence. L. HALLAY (Wien. med. Woch., 1934, 84, 1254—1256; Chem. Zentr., 1935, i, 3800).—The virulence of pathogenic micro-organisms is generally increased by acidification of the inflamed regions, and reduced by restoration of the original $[\text{H}^+]$ equiv., which can be effected by active hyperemia, sweat-production, antiketogenic diet, and surface inflammation with buffer solutions. R. N. C.

Cultivation of *B. diphtheriae* on telluric media. J. ZOPOTH (Compt. rend. Soc. Biol., 1936, 121, 785—788). R. N. C.

(A) Fibrinolysis by streptococci of human and animal origin. (B) Carbohydrate-fibrinolytic linking in *Streptococcus hemolyticus*. (C) Fibrinolytic streptococci from lower animals.

(D) Susceptibility of "hybrid" fibrins to *Streptococcus* fibrinolysins. R. R. MADISON (Proc. Soc. Exp. Biol. Med., 1934, 31, 1018—1019; 32, 49—50, 444—445, 641—644).—(A) Human plasma clots were liquefied by 94% of cultures of *S. haemolyticus* of internal human origin, by 17% of those from superficial human tissue, and by 7% of those of veterinary origin. Numerous strains of *S. viridans* were non-fibrinolytic.

(B) The Tillet-Garner sp. fibrinolytic titre of strains of *S. haemolyticus* was closely correlated with the Lamefield human-diagnostic "carbohydrate" titre.

(C) Strains of *S. haemolyticus* from horse and hog were sp. lytic for the fibrins of these animals.

(D) Heterogeneous fibrinogen (I)—thrombin (II) complexes vary in susceptibility according to the origin of the (I). Both (I) and (II) from man are carriers of susceptibility to antihuman streptococcus fibrinolysin. Similarly sp. phenomena occur in the horse and hog.

CH. ABS. (*p*)

Production of staphylococcal toxin and anatoxin. G. RAMON (Compt. rend. Soc. Biol., 1936, 121, 375—379).

R. N. C.

Determination of staphylococcal toxin. G. RAMON and R. RICHOU (Compt. rend. Soc. Biol., 1936, 121, 379—382).

R. N. C.

p_H curve of certain smooth strains of tubercle bacilli. R. K. GOYAL (Compt. rend. Soc. Biol., 1936, 121, 390—392).—The curves for seven strains over a period of 10 weeks are described; they are affected by phenolsulphonaphthalein to different extents.

R. N. C.

Chemistry of the tubercle bacillus: lipin compounds. M. FRANCIOSI (R. Ist. lombardo Sci. Lettere, Rend., 1934, 67, No. 2, 737—740; Chem. Zentr., 1935, i, 3943).—Fractional extraction of the living bacilli in the cold yields fat, phosphatides, wax, and C-H-O compounds of high mol. wt. and m.p.

R. N. C.

Nuclear staining of myxobacteria and other species. P. F. MILOVIDOV (Arch. Mikrobiol., 1935, 6, 475—509).—A no. of species show nuclear staining after but not before hydrolysis with HCl. Application of the technique for ascertaining the distribution of nuclear material at various stages of development is described. Thymonucleic acid occurred generally in the organisms.

A. G. P.

Staining and microscopical demonstration of filterable viruses. A. C. COLES (J. Roy. Microscop. Soc., 1935, [iii], 55, 249—255).

H. D.

Isolation of crystalline tobacco mosaic virus protein from diseased tomato plants. W. M. STANLEY and H. S. LORING (Science, 1936, 83, 85).—An active cryst. protein has been obtained from tomato plants infected with tobacco mosaic virus (cf. A., 1935, 1181); it has the same cryst. form and properties as that isolated from tobacco plants.

L. S. T.

Irradiation of plant viruses and micro-organisms with monochromatic light. III. Resistance of the virus of typical tobacco mosaic and *E. coli* to radiations of 3000—3250 Å. A. HOLLAENDER and B. M. DUGGAR (Prac. Nat. Acad. Sci.,

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1936, 22, 19—24).—The amount of energy necessary to destroy 50% of the virus at 2250 Å. is 20% of that required at 2650 Å. To inactivate *E. coli* the energy requirement at 2250 Å. is > that at 2650 Å.

A. G. P.

Effect of food and of exhaustion on the pituitary, thyroid, adrenals, and thymus glands of the rat. D. H. ANDERSON (J. Physiol., 1935, 85, 162—167).

R. N. C.

Epiphysis problem. W. A. DEN H. JAGER and J. F. HEIL (Acta Brev. neerl. Physiol., 1935, 5, 32—34; Chem. Zentr., 1935, ii, 242).—Removal of the epiphysis or injection of epiphyseal extracts had no marked effects.

G. H. F.

Enteral absorption of insulin. F. LASCH and E. SCHÖNBRUNNER (Arch. exp. Path. Pharm., 1936, 180, 469—478).—Insulin (20 units) directly introduced into the small intestine of rats produces a significant hypoglycæmia in approx. 25% of the rats used. The % response is increased by admixture of insulin with glycerol, EtOH, serum, saponin, or Hg₂Cl₂. Acid but not basic dyes completely protect insulin from inactivation *in vitro* by peptic hydrolysis.

F. O. H.

Biological effects of pineal extract (Hanson). L. G. ROWNTREE, J. H. CLARK, A. STEINBERG, and A. M. HANSON (Science, 1936, 83, 164—165).

L. S. T.

Electrodialysis of oxytocin. N. DAS, B. N. GHOSH, and B. C. GUHA (Z. physiol. Chem., 1936, 238, 131—132).—When electrodialysed, oxytocin moves to the cathode at p_H 9.6, but not at p_H 10, and is, therefore, a base or adsorbed on a basic carrier.

R. S. C.

Action of adrenaline on the respiratory quotient. E. M. BRIDGE and H. R. NOLTIE (J. Physiol., 1935, 85, 334—342).—Continuous intravenous injection of adrenaline in unanæsthetised rabbits reduces the R.Q. to the protein-fat level; the low vals. of liver- and muscle-glycogen suggest a purely glycogenolytic action.

R. N. C.

Comparative variations of blood-sugar and bile secretion due to slow and continuous intravenous injection of adrenaline. E. CHABROL and J. SALLET (Compt. rend. Soc. Biol., 1936, 121, 538—540).—Increase of blood-sugar in dogs is accompanied by a fall in rate of bile secretion. Injection of atophan prior to that of adrenaline has no effect.

R. N. C.

Survival and increase of adrenaline in tissue cultures of adrenal glands from chick embryos. M. R. LEWIS and E. M. J. GELING (Amer. J. Physiol., 1935, 113, 529—533).

R. N. C.

Differential depression of vaso-motor mechanisms by adrenaline. L. C. WYMAN and C. TUM SUDEN (Amer. J. Physiol., 1935, 113, 271—278).

R. N. C.

Effect of adrenaline on the blood-sugar, -lactic acid, and -inorganic phosphorus of completely hypophysectomised dogs. I. L. CHAIKOFF, F. L. REICHERT, L. S. READ, and M. E. MATHES (Amer. J. Physiol., 1935, 113, 306—311).—The increases produced by adrenaline in completely hypophysectomised dogs are < those in normal and control animals.

R. N. C.

Comparison of the effects of sympathin and adrenaline on the iris. W. B. CANNON and A. ROSENBLUETH (Amer. J. Physiol., 1935, 113, 251—258). R. N. C.

Reflex liberation of circulating sympathin. A. C. LIU and A. ROSENBLUETH (Amer. J. Physiol., 1935, 113, 555—559). R. N. C.

Exhaustibility of the sympathin stores. J. A. DYE (Amer. J. Physiol., 1935, 113, 265—270).—The sympathin stores are relatively resistant to exhaustion. R. N. C.

Cortin. I.—See this vol., 473.

Sexual hormones. VII, VIII, XI, XII.—See this vol., 467, 472.

Effect of cortin on sensitivity to narcotics. I. SINDRAM (Acta Brev. neerl. Physiol., 1935, 5, 29—30; Chem. Zentr., 1935, ii, 240).—Adrenalectomised animals are very sensitive to narcotics; administration of cortical hormone restores normal sensitivity. G. H. F.

Action of cortical extracts of the adrenals (eucorton) on muscle-phosphagen in normal and adrenalectomised frogs. S. C. A. MOSCHINI (R. Ist. lombardo Sci. Lettere, Rend., 1934, 67, 695—707; Chem. Zentr., 1935, i, 3561).—Eucorton neither prevents the fall of muscle-phosphagen nor maintains life in adrenalectomised animals. R. N. C.

Relation of the adrenal cortical hormone to nitrogen metabolism in experimental hyperthyroidism. G. A. KOELSCH and E. C. KENDALL (Amer. J. Physiol., 1935, 113, 335—349).—The quantity of cortical hormone (I) administered is apparently the only factor that can modify the effect of thyroxine (II) on N metabolism in the dog. A negative N balance does not necessarily occur as a result of complete cortical excision, but may occur in an adrenalectomised dog given a low maintenance dose of (I); it is produced in such cases by (II). The action of (I) against the effect of (II) on N metabolism is a sparing action, and a negative N balance can be made positive by administration of sufficient (I). R. N. C.

Identity of the pigmenting and corticotropic hormones. A. JORES (Klin. Woch., 1935, 14, 132—133).—The pigmenting hormone of the posterior pituitary is not identical with the corticotropic hormone of the anterior pituitary, only the former being adsorbed by animal C. R. N. C.

Action of the melanophoric hormone on the darkness-adaptation of the human eye. W. BUSCHKE (Klin. Woch., 1934, 13, 1785—1786; Chem. Zentr., 1935, i, 3946).—The injected hormone has no action. A. G. P.

Melanophore hormone of the hypophysis cerebri. E. M. K. GEILING and M. R. LEWIS (Amer. J. Physiol., 1935, 113, 534—537).—The hormone is elaborated by the pars intermedia. R. N. C.

Conditions necessary for the continuous growth of hypophysectomised animals. H. M. EVANS, R. I. PENCHARZ, and M. E. SIMPSON (Endocrinol., 1935, 19, 509—514).—Growth of rats is maintained by aq. alkaline extract of pituitary, but not by extract purified with flavianic acid. R. N. C.

Effect of pitocin, pitressin, and antuitrin on fat tolerance tests. H. BLOTNER (Endocrinol., 1935, 19, 587—591).—Pitocin and pitressin (more active), but not antuitrin or antuitrin-S, prevent increases or cause decreases in plasma-cholesterol in patients following ingestion of a fat meal. R. N. C.

Anterior pituitary. IV. Effect of male hormone preparations on the anterior pituitaries of gonadectomised male and female rats. W. O. NELSON and T. F. GALLAGHER (Anat. Rec., 1935, 64, 129—145). R. N. C.

Effect of injection of pituitary extracts on blood-sugar and the residual chromic index of plasma. M. POLONOVSKI, H. WAREMBOURG, and J. DRIESSENS (Compt. rend. Soc. Biol., 1936, 121, 677—679).—Anterior pituitary extract does not appreciably affect the residual chromic index in normal or abnormal conditions. Posterior pituitary extract also has no effect in the normal subject, but raises blood-sugar (I) in diabetes, and both (I) and the residual chromic index in cancer. R. N. C.

Effect of pituitary (posterior lobe) extract on the urinary flow in non-anæsthetised dogs. A. SAMAAAN (J. Physiol., 1935, 85, 37—46). R. N. C.

Action of extracts of posterior lobe of pituitary on the heart of dogs under normal conditions of circulation. W. ANTOPOL and R. RÖSSLER (Z. ges. exp. Med., 1934, 94, 453—470; Chem. Zentr., 1935, i, 2998). G. H. F.

Effect of posterior pituitary preparations on the colloid osmotic pressure of serum-protein, water and mineral metabolism of dogs. K. YANAGI (J. Pharm. Exp. Ther., 1936, 56, 23—38).—Subcutaneous injections of 20—50 international units of pituitrin and pitressin to dogs cause marked hydræmia with a fall in hæmatocrit, and in *d*, *n*, and total protein of the serum, and an increase in plasma vol. During the period of hydræmia serum-K increases. A. L.

Action of parathormone. II. H. K. GOADBY and R. S. STACEY (Biochem. J., 1936, 30, 269—272; cf. A., 1935, 258).—Since in cases of grossly impaired renal function parathormone (I) does not produce the normal increased urinary P excretion, (I) probably acts directly on the kidneys. The effect on blood-Ca is normal. H. D.

Relation of the parathyroid hormone to the state of calcium in the blood. F. C. McLEAN, B. O. BARNES, and A. B. HASTINGS (Amer. J. Physiol., 1935, 113, 141—149).—The average serum-Ca (I) in normal cats is $1.15 (\pm 0.07) \times 10^{-3} M$, and ionisation follows the law of mass action. This relationship also holds over the entire range of (I) vals. from those associated with tetany to the max. (I) produced by parathyroid hormone (II). Plasma-Ca is maintained at normal levels by a regulatory mechanism associated with (II); Ca is reduced by parathyroidectomy and increased by (II). Tetany appears only when (I) falls to $0.65 \times 10^{-3} M$, and cannot be further correlated with (I). Hyperparathyroidism occurs when (I) is $> 1.7 \times 10^{-3} M$, and leads to death at $1.17 \times 10^{-2} M$. Na polyanethanolsulphonate used as

an anti-coagulant does not affect Ca ionisation, and plasma so obtained is not toxic to the frog's heart.

R. N. C.

Effect of extirpation of the parathyroid and thymus of rats on the development of the gnawing teeth: influence of vitamin-D. T. VON SPRETER (Z. ges. exp. Med., 1935, 96, 95—115; Chem. Zentr., 1935, i, 3002).—Thymectomy caused no deficiency symptoms in rats at puberty. Growth and Ca metabolism remained normal. Thymectomy with parathyroidectomy produced no defects in teeth. No antagonism between thymus and parathyroid in this respect is apparent.

A. G. P.

Relationship between the parathyroid glands and sex hormones in tetany. E. P. McCULLAGH and J. E. KEARNS (Endocrinol., 1935, 19, 532—542).

R. N. C.

Effect of di-iodotyrosine on the thyroid of the rat. P. DE FREMERY (Acta Brev. neerl. Physiol., 1935, 5, 35—36; Chem. Zentr., 1935, ii, 241—242).—Normal young rats are unsuitable for testing thyrotropic hormone as their thyroids appear to be exceptionally active. Injection of di-iodotyrosine inhibits this activity and renders the glands suitable for testing.

G. H. F.

Influence of thyroidectomy on the effectiveness of gonad-stimulating hormones. S. L. LEONARD and I. B. HANSEN (Anat. Rec., 1936, 64, 203—209).

R. N. C.

Relationships in the sex hormone groups. L. RUZICKA (Nature, 1936, 137, 260—262).—A summary.

L. S. T.

Sex glands, particularly in connexion with the corpus luteum hormone. K. EHRLHARDT (Münch. med. Woch., 1934, 81, 1838—1840).—A review.

R. N. C.

Effect of sex hormones on the prostate of monkeys. S. ZUCKERMAN and A. S. PARKES (Lancet, 1936, 230, 242—247).—Androsterone and androstanediol (I) produce rapid development of the prostate and seminal vesicles of immature rhesus monkeys. When administered in the ratio 50:1, (I), but not progesterone, suppresses the prostatic effects of œstrone.

L. S. T.

Effect of some gonadotropic hormones on the chick. W. R. BRENNEMAN (Anat. Rec., 1936, 64, 211—220).

R. N. C.

Crystalline male hormone from urine. K. DAVID and J. FREUD (Acta Brev. neerl. Physiol., 1935, 5, 31—32; Chem. Zentr., 1935, ii, 239—240).—Male hormone obtained from urine is probably not identical with that from testes. By reducing the cryst. hormone from urine a substance is formed which is thrice as active on capons as the original crystals.

G. H. F.

Effect of male hormone on the protein and energy metabolism of castrate dogs. C. D. KOCHAKIAN and J. R. MURLIN (J. Nutrition, 1935, 10, 437—459).—Injection of the hormone results in a temporary decrease followed by an increase in the amount of urea excreted. Other urinary N constituents are unaffected. Fat metabolism is increased,

that of protein decreased, and that of carbohydrate unaffected in thin but decreased in fat dogs.

A. G. P.

Effect of the ovarian hormones, œstrin and progesterin, on the menstrual cycle of the monkey. G. W. CORNER (Amer. J. Physiol., 1935, 113, 238—250).

R. N. C.

Estimation of œstrin and of male hormone in oily solution. E. BULBRING and J. H. BURN (J. Physiol., 1935, 85, 320—333).

R. N. C.

Action of the ovarian hormones on the uterine muscle measured *in vivo* and *in vitro*. J. M. ROBSON (J. Physiol., 1935, 85, 145—158).

R. N. C.

Effects of œstrin on the urogenital tract of the male monkey. G. VAN WAGENEN (Anat. Rec., 1935, 63, 387—403).

R. N. C.

Excretion of theelin in the urine of guinea-pigs with irradiated ovaries. I. G. SCHMIDT (Anat. Rec., 1936, 64, 255—266).—Theelin excretion is reduced in irradiated ovaries, which show a normal appearance but have very few follicles. It is excreted from irradiated ovaries in which the œstrous opening is prolonged, in amounts < in normal œstrous urine, but too high to be accounted for by the no. of follicles present; it is probably secreted also by the glandular tissue itself.

R. N. C.

Hormonal control of œstrus, ovulation, and mating in the female rat. E. WITSCHI and C. A. PFEIFFER (Anat. Rec., 1935, 64, 85—105).

R. N. C.

Relation of lipins to œstrin and progesterin in the corpus luteum of the sow. E. M. BOYD and C. A. ELDEN (Endocrinol., 1935, 19, 599—602).—œstrin in the corpus luteum \propto phospholipins, whilst progesterin is inversely \propto free cholesterol; other lipin fractions are not related to the hormone concns.

R. N. C.

Hormones of the corpus luteum. A. BUTEN-ANDT and V. WESTPHAL (Ber., 1936, 69, [B], 443—447).—All the remaining ketone mixtures including those of m.p. > 100° and < 145—155° obtained from swine ovary (A., 1934, 1268) are dissolved in $\text{CHCl}_3\text{-C}_5\text{H}_5\text{N}$ and treated gradually at 0° with a cooled solution of ClSO_3H in CHCl_3 . The alcohols are thereby converted into the H sulphates, which yield sparingly sol. Na salts; these are decomposed by AcOH or $\text{EtOH-H}_2\text{SO}_4$. The material unattacked by ClSO_3H crystallises readily. All the crude crystallisates obtained from ovarian extracts through the semicarbazones are thus shown to be mixtures of *allopregnanolone* (Na sulphate, m.p. about 193°) and α - or β -progesterone in varying proportion. Indications of the presence of other substances are not observed. Progesterone (I) and pregnenolone (II) can be separated similarly. (II), $[\alpha]_D^{20} + 30^\circ$ in EtOH (oxime, m.p. 218—219°) (cf. A., 1934, 1268), is smoothly transformed into (I) by treatment with Br in AcOH at 0° and subsequently with $\text{CrO}_3\text{-AcOH}$ at 20° followed by Zn dust and AcOH at 100°. Treatment of various crystallisates with ClSO_3H shows the presence only of (I) and (II); transformation products are not observed.

H. W.

Substances stimulating the uterus in the blood of pregnant and parturient women. F. CAROCA and O. KOREF (*Endokrinol.*, 1935, 15, 244—250; *Chem. Zentr.*, 1935, ii, 238).—Whole blood or serum from men, or from women in the intermenstrual period, stimulates the contraction of the virgin guinea-pig uterus equally. Serum from pregnant, menstruating, and parturient women is one third as potent owing to counteraction by corpus luteum hormone, but whole blood from parturients is much more potent than its serum. The active substance is adsorbed on the fibrin during clotting. G. H. F.

Action of hormones on the closed vagina. E. DINGEMANSE and S. E. DE JONGH (*Acta Brev. neerl. Physiol.*, 1935, 5, 27; *Chem. Zentr.*, 1935, ii, 238).—Non-cryst. extracts of follicular fluids and of urines are relatively more effective in causing opening of the vagina of infantile rats than are cryst. preps. Probably the former contain another biologically active substance. G. H. F.

Action of sex hormones on the prostate and its accessories in the mouse. S. E. DE JONGH (*Acta Brev. neerl. Physiol.*, 1935, 5, 28; *Chem. Zentr.*, 1935, ii, 240).—Injection of folliculin (especially the benzoate) into young mice causes typical hypertrophy of the anterior lobe of the prostate. Injection of an equiv. amount of male hormone protects the mice against this stimulus; corpus luteum hormone gives no protection. G. H. F.

Vitamin deficiency as a cause of disease and the vitamin requirements of man. H. J. JUSATZ (*Z. Volksernähr.*, 1935, 10, 97—99; *Chem. Zentr.*, 1935, i, 3000).—A review. Daily requirements are given for -A, -B₁, and -B₂ in adults, and -C and -D in infants and adults. G. H. F.

Vitamin-A, -B, and -C content of raw, boiled, and pasteurised milk. L. DE CARO and I. SPEIER (*Quad. Nutrizione*, 1935, 2, 171—188).—A daily dose of 3 ml. of raw milk (but not of the treated milks) or 6 ml. of either, provided sufficient vitamin-A for rats. For the -B complex, 10 ml. of all three milks sufficed, but 8 ml. of raw milk was not enough. The ascorbic acid content of raw milk was 4.8—14.5, of boiled milk 1.2—9.7, and of pasteurised milk 1.6—9.2 mg. per litre. NUTR. ABS. (m)

Relation between vitamin-A and -D intake by the hen and the output in eggs. W. C. RUSSELL and M. W. TAYLOR (*J. Nutrition*, 1935, 10, 613—623).—11—32% of ingested vitamin-A reappeared in eggs. The -A content of the liver varied inversely with egg production. 10% of ingested -D was transferred to eggs. Sunlight is more effective in increasing the -D content of eggs than is the amount of cod-liver oil given. A. G. P.

Metabolism of vitamin-A. A. PRZEŹDZIECKA (*Wiad. farm.*, 1935, 62, 201—203; *Chem. Zentr.*, 1935, ii, 244).—A colorimetric method for determining the vitamin in urine is described. G. H. F.

Minimum vitamin-A requirements with particular reference to cattle. H. R. GUILBERT and G. H. HART (*J. Nutrition*, 1935, 10, 409—427).—Vitamin-A requirement may be related to body-wt. rather than to energy requirement. Requirements

per unit body-wt. for chicken and turkeys are > those of mammals. A. G. P.

Influence of breed and ration on carotene and vitamin-A content of milk. W. M. BEESON (*Proc. Amer. Soc. Animal Prod.*, 1935, Jan., 54—56).—The carotene (I) content was highest in Guernsey and lowest in Holstein and Ayrshire butters, and the vitamin-A (II) content was highest in Holstein and lowest in Guernsey butters, so that the total (II) potency varied little with different breeds of cows. Large amounts of (I) in the diet increased the (I) and (II) contents of the butters. NUTR. ABS. (m)

Application of the spectrophotometric method for the characterisation of photo-labile substances by their rate of decomposition. A. CHEVALLIER and P. DUBOULOZ (*Bull. Soc. Chim. biol.*, 1936, 18, 190—194).—The method is applied to β -ionone and vitamin-A. A. L.

Determination of vitamin-A. A. PRZEŹDZIECKA (*Biol. Lekarska*, 1935, No. 6).—A modification of the SbCl₃ method is proposed. If the mixture is heated with guaiacol for 2 min. at 60° a rose or red colour is produced which is stable and may be compared with a standard solution of Sudan 3. NUTR. ABS. (m)

Determination of vitamin-A. E. M. HUME (*Nature*, 1936, 137, 277).—A defence of the decisions taken by the International Conference on vitamin standardisation (cf. this vol., 390). L. S. T.

B-Avitaminosis and detoxication in rabbits. T. KUMON (*J. Biochem. Japan*, 1935, 22, 213—224).—Conjugation of administered BzOH, CH₃Ph·CO₂H, and CH₃Ph·CH₂·CO₂H with glycine is not affected by B-avitaminosis; excretion of BzOH following administration of BzOH of hippuric acid (I) is, however, diminished. The *in-vitro* hydrolysis of (I) by liver and kidney tissue is not affected. Other detoxication processes influenced include formation of ethereal sulphates by PhOH and indole and of indican and methylation of C₅H₅N, but not conjugation with glycuronic acid. F. O. H.

Avian B-avitaminosis and enzyme action. S. TSUNOO, M. TAKAMATSU, T. KAMACHI, and M. IMAIZUMI (*J. Biochem. Japan*, 1935, 22, 225—231).—The enzymic activities of normal pigeon and fowl tissues vary considerably in individual vals. No significant changes appear to be due to B-avitaminosis but the data indicate a diminished activity of kidney-phosphatase and increased activity of pancreatic esterase and hepatic amylase. F. O. H.

Utilisation of sugars. Vitamin-B and alimentary equilibrium. L. RANDOIN and F. MILHAUD (*Compt. rend.*, 1935, 201, 1426—1428).—Death of rats on a diet consisting only of glucose, fructose, sucrose, lactose (I), or especially galactose (II) is more rapid than that from actual starvation (H₂O only). Compared with vitamin-B-free diets containing these sugars, life is prolonged to > 150 days by addition of -B except with (I) and (II). F. O. H.

Effect of lack and excess of vitamin-B on the calcium and magnesium content of the tissues of pigeons. S. MURZA-MURZICZ and H. BOHDANO-

WICZÓWNA (Biochem. Z., 1936, 284, 139—145).—The Ca contents of muscle, heart, and brain, but not liver, are decreased by overdoses of vitamin-B, whilst Mg remains unaffected or is slightly increased. Lack of -B causes increase in Ca and Mg. W. McC.

Differentiation of the antidermatitis factor. A. G. HOGAN and L. R. RICHARDSON (Science, 1936, 83, 17—18).—When vitamin-B carriers are exposed to ultra-violet irradiation, at least one member of the -B complex is destroyed, and the preps. cause a severe dermatitis and ultimate death of rats. This destructive action cannot be demonstrated when the diet contains significant amounts of maize starch. EtOH extracts of the starch heal the lesions, indicating that the preventive agent is not identical with -B₂. L. S. T.

Vitamins and tissue-diastase in relation to organ function. F. MAIGNON (Ann. Physiol. Biochim. biol., 1934, 10, 903—904; Chem. Zentr., 1935, i, 3000).—Diastase from various organs caused no improvement in pigeons suffering from B-avitaminosis or in scorbutic guinea-pigs. G. H. P.

Vitamin-B complex in the root of the manioc. F. A. DE MOURA CAMPOS (Ann. Fac. Med. Univ. São Paulo, 1935, 11, 27—31).—Manioc (cassava) meal is a fairly good source of the -B complex. NUTR. ABS. (m)

Accumulation of the antineuritic vitamin-B in the animal organism. N. L. JARUSOVA (Problems of Nutrition, Moscow, 1935, 4, No. 4, 98—106).—Tests on pigeons indicate a storage of -B₁. NUTR. ABS. (m)

Nitrogen metabolism of birds with vitamin-deficiency polyneuritis. B. A. LAVROV and N. L. JARUSOVA (Problems of Nutrition, Moscow, 1935, 4, No. 4, 88—98).—Pigeons receiving a vitamin-B₁-free diet lost more N than those receiving the same amounts of diet which contained the -B₁. When birds were completely starved addition of 1 g. daily of a -B₁ concentrate did not result in increased N retention. NUTR. ABS. (m)

Is the occurrence of methylglyoxal in the urine specific for avitaminosis-B? J. LEHMANN (Skand. Arch. Physiol., 1935, 71, 157—165).—AcCHO is present in the urine of rats deficient in vitamin-B₁ or -B₂, and also in control animals in small quantities; it is destroyed if the urine is kept for 12 hr. AcCHO in the urine is therefore not sp. for avitaminosis-B₁. R. N. C.

Antineuritic vitamin(-B₁) contents of some oil-rich seeds. V. ZAGAMI (Quad. Nutrizione, 1934, 1, 284—294; Chem. Zentr., 1935, i, 3949).—Vitamin-B₁ occurs in varying quantities in walnuts, hazelnuts, peanuts, pistachios, and sesame, pine, and sunflower seeds; almonds and olive oil contain none, or only traces. R. N. C.

Antineuritic vitamin.—See this vol., 487.

Growth studies. III. Avitaminosis-B₁ and -B₂ in caecetomised rats. IV. Vitamin-B₁ and -B₂ contents of body tissues of normal and experimental rats. W. H. GRIFFITH (J. Nutrition, 1935, 10, 667—674, 675—682).—III. Prolonged sur-

vival of rats on vitamin-B₂-deficient diets is not due to a caecal supply of -B₂.

IV. Vitamin-B₂ is stored in the tissues, from which it is not readily lost during feeding of a deficient diet. -B₂ may function, in part, as a tissue constituent. A. G. P.

Vitamin-B₂ requirement of poultry. L. C. NORRIS, G. F. HEUSER, A. T. RINGROSE, H. S. WILGUS, and V. HEIMAN (Proc. 5th World's Poultry Congr. Rome, 1933, 2, 510—520).—The factor essential for growth, hatchability, prevention of a pellagra-like syndrome and of leg and foot paralysis is probably vitamin-B₂. The latter consists of at least two factors, one preventing paralysis and another necessary for growth. CH. ABS. (p)

Behaviour of vitamin-B₇ towards various solvents. E. MONTEVECOHI (Biochem. Terap. sperim., 1935, 22, 143—150; Chem. Zentr., 1935, ii, 244).—The vitamin is insol. in the usual fat solvents. It is extracted completely by 95% and partly by 70% EtOH. G. H. F.

Influence of ascorbic acid on normal human carbohydrate metabolism. S. STOICESCO and N. GINGOLD (Bull. Acad. Méd. Roumanie, 1936, 1, 130—132).—Intravenous or oral administration of ascorbic acid (0.24—0.50 g.) lowers the fasting blood-sugar and diminishes alimentary hyperglycaemia. F. O. H.

Crystalline vitamin-C: its effects on the capillary fragility. I. S. WRIGHT and A. LILLENFELD (Arch. Int. Med., 1936, 57, 241—274).—A capillary-fragility test for diagnosing human vitamin-C deficiency is described. The val. of ascorbic acid in various diseases is discussed. H. G. R.

Effect of ascorbic acid on the proliferation of monocytes. L. E. BAKER (Compt. rend. Soc. Biol., 1936, 121, 427—429). R. N. C.

Cystine and vitamin-C deficiency. L. DE CARO and W. BELTRAMI (Quad. Nutrizione, 1935, 2, 165—170).—Death of guinea-pigs on a scorbutic diet is greatly accelerated by cystine (I) or HCl. Ascorbic acid counteracts the effects of (I). NUTR. ABS. (m)

Effect of diphtheria toxin on the vitamin-C content of guinea-pig tissues. C. M. LYMAN and C. G. KING (J. Pharm. Exp. Ther., 1936, 56, 209—215).—Subcutaneous administration of diphtheria toxin to guinea-pigs rapidly lowers the vitamin content of the tissues, especially adrenals, kidney, and pancreas. W. O. K.

Fixation of ascorbic acid in the adrenal and the liver of the scorbutic guinea-pig. Determination of the minimum curative dose of l-ascorbic acid. V. DEMOLE and F. IPPEN (Compt. rend. Soc. Biol., 1936, 121, 687—689).—The daily min. dose is slightly < 0.5 mg. for an animal of 250 g. wt. The ingested ascorbic acid is stored in the adrenals, but not in the liver. R. N. C.

Ascorbic acid in course of cadaverisation. A. GIROUD, R. RATSIMAMANGA, M. RABINOWICZ, and E. HARTMANN (Compt. rend. Soc. Biol., 1936, 121, 739—740).—Ascorbic acid decreases slowly in the rat and the guinea-pig during cadaverisation; the rate of fall in the adrenals is > in the liver and kidney. R. N. C.

Secretion of ascorbic acid by the healthy and diseased organism. H. SCHROEDER (Klin. Woch., 1935, 14, 484—487; Chem. Zentr., 1935, i, 3001).—Ascorbic acid administered to healthy individuals, but not in various pathological conditions, is excreted in increased amounts in the urine, although the vitamin metabolism may be $>$ normal. G. H. F.

[Distribution of] ascorbic acid. A. GIROUD and C. P. LEBLOND (Bull. Soc. Chim. biol., 1936, 18, 173—175).—By the use of acidified aq. AgNO_3 , ascorbic acid is detected in the thymus, lymphatic ganglia, intestines, liver, sympathetic ganglia, suprarenal medulla and cortex, corpus luteum, ovaries, and pituitary. A. L.

Vitamin-C in fresh-water fish and crabs. G. VON LUDÁNY (Biochem. Z., 1936, 284, 108—110).—Data for various tissues are tabulated. In some cases the amounts exceed those found in warm-blooded animals. W. McC.

Ascorbic acid in the lens of the eye. H. VON EULER and M. MALMBERG (Arch. Augenheilk., 1935, 109, 225—234).—Indophenol titration of vitamin-C in the eye lens of animals revealed high vals. for sea fish, and -C was detected in the ox, rabbit, horse, and guinea-pig. While the animal received a -C-deficient diet, the -C content of the eye lens fell in guinea-pigs but not in rabbits. The -C content of the lens in rabbits was uninfluenced by high doses of -C. The reducing capacity of the lens in the rat was largely due to glutathione, the -C content being $<$ in most cases investigated. No marked variation was detected in the -C content of the lens in rats fed on a -B₂-deficient diet. The -C content of the human lens in cataract was $<$ normal. Attempts to induce cataract in rabbits by C_{10}H_8 poisoning were unsuccessful and the poisoning did not affect the -C content of the lens. Possibly part of the -C in the lens is synthesised there. NUTR. ABS. (m)

Vitamin-C in the lens and aqueous humour in human cataract. B. NAKAMURA and O. NAKAMURA (Arch. Ophthalmol., 1935, 134, 197—200).—A diminution was observed. NUTR. ABS. (m)

Relative vitamin-C values of milk and curd. A. R. GHOSH and B. C. GUHA (Indian Med. Gaz., 1935, 70, 382).—The vitamin-C content of curd was the same as that of the original milk, even though the curdling process was carried out for 24 hr. at 35°. In fresh milk stored at 0° for 24 hr., there was considerable loss of -C. There appeared to be no synthesis of -C by the lactic acid bacillus employed. NUTR. ABS. (m)

Milk as a source of vitamin-C. C. H. WHITNAH and W. H. RIDDELL (Science, 1936, 83, 162).—The milk of four major dairy breeds of cow gave an average val. of 25.9 ± 4.3 mg. per litre. L. S. T.

Vitamin-C in brain and cerebrospinal fluid. Effect of diet on the vitamin-C content of the fluid: examination of the fluid in diagnosis of latent scurvy. F. PLAUT and M. BÜLOW (Z. ges. Neurol. Psychiat., 1935, 152, 84—97, 324—336).—The vitamin-C content of the brain in newly born or foetal rabbits and mice was 2—3 times $>$ in the mother. In human cadavers the -C val. for the brain fell

steadily from foetus to 60—80 years of age. The same tendency was observed in the cerebrospinal fluid, but the concn. was always $<$ in brain. The concn. in serum did not appear to decline with age. Daily treatment with 90 mg. of -C caused slow progressive rise in the -C content of the fluid of patients and a similar relationship between -C content of food and fluid was observed in rabbits. NUTR. ABS. (m)

Histochemistry. V. Vitamin-C concentration of the corpus luteum with reference to the stage of the oestrus cycle and pregnancy. G. R. BISKIND and D. GLICK (J. Biol. Chem., 1936, 113, 27—33; cf. A., 1935, 1264).—The fully developed corpus luteum of the cow contained 1.4 mg. of vitamin-C per g. of tissue, which decreased to 0.3 mg. with regression. In gestation the content of -C remained at 1.5—2.2 mg. per g. for the first 7 months and decreased to 1.1 mg. in the 8th month. -C may be related to progesterone. J. N. A.

Determination of vitamin-C and the influence of technological treatment on its preservation in cabbage. S. G. VINOKUROV, M. M. EIDELMAN, and M. L. BUTOM (Kharkov State Med. Inst. Jubilee J., 1935, 142—161).—Food extracts should always be treated with H_2S before titration with indophenol in vitamin-C determinations. 40—70% of the -C content passed into H_2O when cabbage was cooked for 30 min. Cooking for longer periods involved heavy losses of -C. NUTR. ABS. (m)

Provitamin-D of heat-treated cholesterol. M. L. HATHAWAY and D. E. LOBB (J. Biol. Chem., 1936, 113, 105—110).—The provitamin of crude cholesterol (I) is destroyed by purification through the dibromide. When purified (I) is heated at 200° for 2 hr. its proantirachitic activity is increased. It is concluded that irradiation of heat-treated (I) produces a new form of vitamin-D which more closely resembles natural -D from cod-liver oil than -D of irradiated ergosterol. J. N. A.

Evaluation of the antirachitic vitamin in comparison with the international standard. M. PODZIMKOVÁ-RIEGLOVÁ (Trav. Inst. Hyg. publ. Tchecosl., 1935, 6, 20—30).—The degrees of calcification of the head of the radius produced by 0.4, 0.2, 0.1, and 0.05 international units of vitamin-D daily, and that observed in control rats receiving no -D are recorded. 0.4 unit was not always sufficient to produce normal calcification. After keeping for 13 months at -5° the activity of the international standard had not diminished. NUTR. ABS. (m)

Size and structure of the thyroid gland of the cat after the administration of irradiated ergosterol. A. M. LANDS and O. O. STOLAND (Endocrinol., 1935, 19, 701—704). R. N. C.

Calcium, inorganic phosphorus, and serum-phosphatase in normal animals and in animals influenced by irradiated ergosterol. S. FREEMAN and C. J. FARMER (Amer. J. Physiol., 1935, 113, 209—220).—Toxic doses of irradiated ergosterol (I) increase serum-Ca and/or -P, and proportionately decrease serum-phosphatase (II) in dogs and rabbits. (II) is decreased by bleeding and a high-protein diet,

and increased by a high-carbohydrate diet; the increase is enhanced by sub-toxic doses of (I). (II) activity is probably inversely \propto acid-sol. org. P of the whole blood. R. N. C.

Isolation from wheat-germ oil of an alcohol, α -tocopherol, having the properties of vitamin-E. H. M. EVANS, O. H. EMERSON, and G. A. EMERSON (J. Biol. Chem., 1936, 113, 319—332).—The unsaponifiable matter yielded (?) β -amyirin allophanate, m.p. 250°, the allophanate, m.p. 138°, of an alcohol, $C_{29}H_{50}O_2$, and the allophanate, m.p. 158—160°, of α -tocopherol (I), $C_{29}H_{50}O_2$ (p-nitrophenylurethane, m.p. 129—131°). (I) has a characteristic absorption band at 298 $m\mu$, and treatment with MeOH-AgNO₃ yields a substance with bands at 271 and 262 $m\mu$. A single dose of 3 mg. of (I) enables vitamin-E-deficient rats to bear young. H. G. R.

Kinetics of penetration. XII. Hydrogen sulphide. A. G. JACQUES (J. Gen. Physiol., 1936, 19, 397—418).—The rate of entry of total sulphide ($H_2S + S''$) into *Valonia macrophysa* is, during the first 5 min., \propto external concn. of mol. H_2S . H_2S thus differs from NH_4^+ and guanidine (cf. A., 1935, 671, 1179). The mode of entry appears to be diffusion of mol. H_2S through the cell wall; the rate deviates from a unimol. law. F. A. A.

Amylogenic capacity and organic matter of plastids. A. MAIGE (Compt. rend., 1935, 201, 1411—1414).—The relation of starch formation in potatoes, beans, etc. to the structure, constituents, and developments of starch plastids is discussed. F. O. H.

Transport in the cotton plant. III. Independence of solute movement in the phloem. T. G. MASON, E. J. MASKELL, and E. PHILLIS. IV. Simultaneous movement of solutes in opposite directions through the phloem. E. PHILLIS and T. G. MASON (Ann. Bot., 1936, 50, 23—58, 161—174; cf. A., 1934, 707).—III. Movements of carbohydrates (I), N, P, K, and Ca in petioles and stems of cotton plants, and the effects of ringing, are examined. Results are discussed in the light of current conceptions of the transport of solutes in plants.

IV. Examination of ringed and unringed plants grown in culture solutions shows that (I) and N may movesimultaneously and in opposite directions through the phloem. A. G. P.

Influence of light on the permeability of plant tissues to sugar. L. BRAUNER and M. BRAUNER (Rev. Fac. Sci. Univ. Istanbul, 1936, 1, No. 2, 58—73; cf. A., 1935, 671).—The action of light probably causes a loss of electric charge in the electro-negative membrane cells, and a shrinking. H_2O or solutions of salts having a dipole moment find less resistance on passing the membranes, whilst compounds having no dipole moment are hindered. E. P.

Effect of light intensity on manganese content of plants. M. M. MCCOOL (Contr. Boyce Thompson Inst., 1935, 7, 427—437).—Visible injury to plants due to the addition of $MnSO_4$ to soil decreased with the prevailing intensity of light. The % of Mn in leaves decreased, and, in some cases, that of stems increased, with declining light intensity. A. G. P.

Chemical restoration in *Nitella*. II. Restorative action of blood. W. J. V. OSTERHOUT (J. Gen. Physiol., 1936, 19, 423—425; cf. A., 1935, 1038, 1289).—The "K effect" in *Nitella* is restored by exposure to Ca-free blood-plasma (human, cat, calf, sheep). F. A. A.

Effect of potassium chloride on diurnal changes of carbohydrates of the potato leaf. D. J. WATSON (Ann. Bot., 1936, 50, 59—83).—Diurnal fluctuations in sucrose contents of leaflets were $>$ those of reducing sugars. The rate of removal of dry matter (but not of carbohydrates) during darkness was increased by applications of KCl. KCl probably increases the efficiency of photosynthesis. The H_2O content per unit of dry matter was increased by KCl and the increase did not vary with time. A. G. P.

Action of radium emanation on the germination of grains. M. DE CARAMAN and C. CHAMPY (Compt. rend. Soc. Biol., 1936, 121, 750—752).—The % germination is increased, and early growth is accelerated. R. N. C.

Energy balance of carbonic acid assimilation [by plants]. K. WOHL (Z. physikal. Chem., 1935, B, 31, 152—156).—Energy considerations show that it is impossible that $CH_2O + 2H_2O_2$ should be the intermediate product in the assimilation. The Franck-Willstätter-Stoll theory of the mechanism of CO_2 assimilation (A., 1933, 326, 577; A., 1935, 794) is therefore untenable. R. C.

Amino-acid content of plants at different stages of growth. A. I. VIRTANEN and T. LAINE (Nature, 1936, 137, 237).—The tryptophan and aspartic acid contents of peas and clover vary considerably during different stages of growth, indicating that the ratio of various proteins changes during growth, or that in the growing plant the protein has no fixed composition, new NH_2 -acid groups being continuously incorporated with the growing protein mol. L. S. T.

Nitrogen metabolism of the apple fruit. II. Course followed by certain nitrogen fractions during the development of the fruit on the tree. A. C. HULME (Biochem. J., 1936, 30, 258—268; cf. A., 1935, 422).—Non-protein-N was separated from the peel and pulp of apples by extraction with aq. EtOH and determined as total sol., free NH_3 , NH_2 , and residual N. Titratable acid was also determined. The changes in these fractions during the course of development of two series of fruits was determined. The two series showed similar trends; an early stage of rapid increase in sol. N compounds was followed by a stage of relative equilibrium between protein and non-protein compounds. When mature a state of net synthesis of protein ensued. H. D.

Nitrogen-free aliphatic compounds as organic nutrients of algæ. H. MEYER (Biochem. Z., 1936, 283, 364—381).—The effect of 0.2% of 90 org. substances on the growth of *Chlorella luteoviridis*, as measured by increase in cellular vol. or dry wt. or intensity of division, in a medium containing $MgSO_4$, $CaCl_2$, $FeCl_3$, $(NH_4)_2HPO_4$, and phosphate buffer is investigated. With saturated acids, alcohols, and

aldehydes, the first member of the series (HCO_2H , MeOH , CH_2O) is toxic, the second member has the highest nutritive val. and the higher homologues are utilised to a decreasing content. *iso*-Acids and unsaturated acids are toxic. β -Hydroxybutyric acid and $\text{CH}_3\text{Ac}\cdot\text{CO}_2\text{H}$ are readily utilised. Polybasic and sugar acids are indifferent. Hexoses form the best source of C, pentoses are not utilised, polysaccharides are used according to the ease of hydrolysis, whilst methylglucoside and glycerophosphoric acid are indifferent.

P. W. C.

Fat metabolism in plants with special reference to sterols. P. L. MACLACHLAN (J. Biol. Chem., 1936, 113, 197—204).—The sterol and fatty acid constituents of soya beans during germination in the light and dark were determined. A decrease in the fat content occurred during germination accompanied by a continuous synthesis and esterification of sterol. Small differences in the behaviour in the light and dark were observed.

H. D.

Nitrogen fixation by the alder. A. I. VIRTANEN and S. SAASTAMOINEN (Biochem. Z., 1936, 284, 72—85).—Since peas inoculated with N-fixing bacteria grow normally in an aerated N-free aq. medium it follows that there is no difference in this respect between leguminous plants and the alder. Inoculated alder seedlings grow better in N-free media than do non-inoculated in media containing NH_4NO_3 ; the growth of the former is optimal at p_{H} 6. Inoculated alder enables pine seedlings planted in the same N-free medium to grow normally and appears to give up N compounds to the medium.

W. McC.

Interaction of factors in the growth of *Lemna*. VII. Effect of potassium on growth and multiplication. H. L. WHITE (Ann. Bot., 1936, 50, 175—196).—Mathematical relationships between the [K] of the nutrient and the growth of *Lemna minor* are established. Deficiency of K is associated with high starch and dry matter contents per unit area, low rates of assimilation, and diminished amyolytic activity.

A. G. P.

Supply of iron to plants in water cultures. W. SCHROPP (Z. Pflanz. Dting, 1936, 42, A, 35—42).—In media containing FeCl_3 , the accumulation of Fe by plants was inversely related to the reaction of the nutrient. When Fe^{III} citrate was used, growth was improved and the Fe intake was independent of p_{H} .

A. G. P.

Skatole as a growth-promoting substance. J. GLOVER (Nature, 1936, 137, 320—321).—Experiments with young oat shoots indicate that skatole (I) acts as a growth-promoting hormone. (I) and β -indolylacetic acid are both markedly light-sensitive.

L. S. T.

Growth-promoting substance at the base of the oat coleoptile. H. SÖDING (Ber. deut. Bot. Ges., 1935, 53, 843—846).—The growth hormone is present in the base of the coleoptile. No evidence was obtained of a "bound" or inactive form.

A. G. P.

Absorption and movement of synthetic growth-substances from soil as indicated by responses of aerial parts [of plants]. A. E.

HITCHCOCK and P. W. ZIMMERMAN (Contr. Boyce Thompson Inst., 1935, 7, 447—476).—Application of heteroauxin, indolyl- or phenyl-propionic acids, naphthyl- or phenyl-acetic or indolylbutyric acid to soil induced responses in tomato and tobacco plants similar to those obtained by treatment of the aerial parts of the plants. The rate of absorption of active substances was influenced by the amount present in the soil and by the transpiration rates of the plants. The action of growth-substances (I) applied to aerial parts is not affected by transpiration rates. Within the plant translocation of (I) in living tissue was > in dead tissue and upward > downward movement. Strictly polar movement was not observed in either stems or leaves. Unilateral lighting favoured the bending-response of stems to (I) but light was not essential. Addition of (I) to soil hastened flowering without retarding vegetative growth. The optimum dosage for flowering was < that for root initiation.

A. G. P.

Response of roots to "root-forming" substances. P. W. ZIMMERMAN and A. E. HITCHCOCK (Contr. Boyce Thompson Inst., 1935, 7, 439—445).—Application of lanoline preps of α -naphthyl-, indolyl-, and phenyl-acetic acids, indolyl-butyric, -propionic, and -valeric acids to aerial roots of *Cissus sicyoides*, L., var. *Jacquini*, caused the initiation of new root branches, inhibition of growth of the tip and/or swelling of the root. New rootlets ceased to grow when the main tip resumed elongation, but recommenced on a second treatment of the tip. The dominance of the tip disappeared when the treated area was immersed in H_2O . Results are discussed in relation to the movement of growth-substance in roots.

A. G. P.

Selenium in native range plants occurring on soils derived from Permian or Triassic (?) sediments [of the Chugwater formation, Albany Co., Wyoming]. O. A. BEATH (Science, 1936, 83, 104).

L. S. T.

Natural poisoning of hens by acid sorrel (*Rumex acetosella*): poisoning by oxalic acid and potassium hydrogen oxalate. C. ORLANDINI (Boll. Soc. Eustach., 1933, 31, 217—229).—Poisoning by the sorrel is attributable to $\text{H}_2\text{C}_2\text{O}_4$ and KHC_2O_4 .

CH. ABS. (p)

Compounds of hydroxylamine in fresh leaves of higher plants. M. LEMOIGNE, P. MONGUILLON, and R. DESVEAUX (Compt. rend., 1935, 201, 1437—1439).—Distillation of the juice of fresh leaves of *Poa pratensis* yields NH_2OH (1—2 mg. per litre); NH_2OH probably participates in the N metabolism of higher plants.

F. O. H.

Excretion of amino-acids from root nodules and their chemical nature. A. I. VIRTANEN, T. LAINE, and S. VON HAUSEN (Suomen Kem., 1936, 9, B, 2).—The rate of excretion is greatest at an early stage of growth, before blooming. A cold- H_2O extract of the sand on which peas had grown contained exclusively $\text{NH}_2\text{-N}$. About 50% of the total N was due to aspartic acid, while the remainder was probably lysine (I). Barley will grow with (I) as sole source of N.

J. N. A.

Glutamine and asparagine in tobacco leaves. H. B. VICKERY and G. W. PUCHER (J. Biol. Chem., 1936, 113, 157—160).—Glutamine (I) occurs, as well as asparagine (II), in the leaves of the tobacco plant, and may be extracted. Of the total amide-N, (II) appears to account for about $\frac{2}{3}$, (I) for about $\frac{1}{3}$, but other amide substances may be present. F. A. A.

Biologically active substances in the fruit of the tomato (*Solanum esculentum*) with histamine-like action. Therapeutic action of fresh vegetable juice. F. GLEICHMANN (Z. klin. Med., 1934, 127, 111—131; Chem. Zentr., 1934, ii, 3982).—The cryst. substance extracted from green or ripe tomatoes or conserve is stable to heat, pepsin, and HCl, and resembles histamine in its pharmacological action. R. N. C.

Chemical examination of Punar-Nava (*Borhaavia diffusa*, Linn.). R. R. AGARWAL and S. DUTT (Proc. Acad. Sci. U.P. India, 1935, 4, 73—76).—Boiling EtOH extracts *borhaavic acid*, $C_{10}H_{18}O_3$, m.p. 108—109° (decomp.) (Pb salt; Br_3 -derivative, m.p. 73°), tannins, phlobaphens, and glucose from the entire plant. J. L. D.

Chemical examination of the roots of *Citrullus colocynthis*, Schrader. R. R. AGARWAL and S. DUTT (Proc. Acad. Sci. U.P. India, 1935, 4, 295—300; cf., J.C.S., 1910, 47, 99).—Boiling EtOH extracts α -elaterin (0.2%); m.p. 229—230° [Ac_2 derivative, m.p. 122—123° (cf. A., 1907, i, 230)], hentriacontane (?), saponins, and reducing sugars from the powdered roots. J. L. D.

2':6'-Dihydroxy-4'-methoxy- β -phenylpropio-phenone from the essential oil of *Populus balsamifera*, L. A. GORIS and H. CANAL (Compt. rend., 1935, 201, 1435—1437).—The oil from the buds yields the above ketone, m.p. 168°. F. O. H.

Localisation of rotenone in derris root. P. A. VAN DER LAAN (Pharm. Weekblad, 1936, 73, 313—318).—Cells containing rotenone (I) are coloured green (transient) when treated with HNO_3 and then with NH_3 , and the colour produced on samples of derris root may be used as a rough measure of the (I) content. The (I) is localised in the parenchyma and pith cells present in both the wood and the bast. S. C.

Constituents of *Hamamelis virginica*. F. MERCIER and J. BALANSARD (Compt. rend. Soc. Biol., 1936, 121, 671—672).—The leaves contain choline, an acid saponin, and a sol. glucoside fraction. R. N. C.

Acid saponin of beetroot juice. K. SMOLEŃSKI (Rocz. Chem., 1935, 15, 554—564).—A review. R. T.

Sterols of *Achillea millefolium*. O. GISVOLD (J. Amer. Pharm. Assoc., 1935, 24, 1071).—The sterols consist of sitosterol and stigmasterol (cf. A., 1933, 1216). E. H. S.

Phytosterol and resin of *Fabiana denudata*, Miers. L. FLORIANI (Rev. Centr. Estud. Farm. Bioquim., 1934, 25, 60—62; Chem. Zentr., 1935, i, 3569).—A phytosterol, $C_{27}H_{46}O$, a resin, m.p. 44°, an α -resin-acid, m.p. 37°, and a β -resin-acid, m.p. 39°, are isolated. H. N. R.

Sterols in the leaves and flowers of the lily. M. MIRANDE (Compt. rend., 1936, 202, 238—240).—The distribution of sterols in species of lily is examined. H. G. R.

Determination of carotene and xanthophyll.—See this vol., 493.

Lycoxanthine and lycophyll.—See this vol., 452.

Occurrence of carotenoids in plants. P. KARRER, F. RÜBEL, and F. M. STRONG (Helv. Chim. Acta, 1936, 19, 28—29).—Treatment of the seeds of *Passiflora coerulea* with EtOH followed by boiling $CHCl_3$, evaporation of the $CHCl_3$, and crystallisation of the residue from ligroin (b.p. 60—80°) gives lycopene in considerable amount. β -Carotene and zeaxanthin are obtained cryst. from *Halyserys polypodioides* but homogeneous fucoxanthin could not be isolated. H. W.

Colouring matters of violet potatoes.—See this vol., 480.

Colourless compounds which accompany carotenoids in plants. L. ZECHMEISTER and P. TUZSON (Z. physiol. Chem., 1936, 238, 204—209; cf. Euler *et al.*, A., 1908, ii, 724; 1930, 1627; 1932, 785).—100 kg. of carrots yield 1.06 g. of daucosterol (I), $C_{35}H_{60}O_6$, decomp. at 305°, $[\alpha]_D^{20}$ —49.6° in C_5H_5N , hydrolysed by acid to *d*-glucose and sitosterol. The sepals of the sunflower contain a dihydric sterol *helisterol*, $C_{26}H_{44}O_2$, m.p. 242°, $[\alpha]_D^{20}$ +45.4° in $CHCl_3$ (diacetate, m.p. 166—167° (corr.), $[\alpha]_D^{20}$ +58.7°), a monohydric sterol, m.p. 217°, $[\alpha]_D^{20}$ +42.8° in $CHCl_3$, a sterolin, $C_{33}H_{56}O_6$, m.p. 303°, $[\alpha]_D^{20}$ —50.5° in C_5H_5N , which gives glucose and a sterol, $C_{27}H_{46}O$, m.p. 159°, $[\alpha]_D^{20}$ —49.9° in $CHCl_3$ on acid hydrolysis, an alcohol, $C_{21}H_{40}O$, m.p. 73° (corr.), and hentriacontane. W. McC.

Formation of anthocyanins in plants. R. ROBINSON (Nature, 1936, 137, 172—173).—A summary. L. S. T.

Glycosides of the flowers of *Linaria vulgaris*.—See this vol., 458.

Inulinogenesis in the *Compositae*. H. COLIN (Compt. rend., 1935, 201, 1414—1416).—Data for the contents of reducing sugar, sucrose, and inulin (I) and for $[\alpha]$ before and after hydrolysis are given to illustrate the discussed formation of (I) in the root, stem, leaf, and wood of various *Compositae*. F. O. H.

Determination of starch in plant tissue, particularly apple fruit. C. S. HANES (Biochem. J., 1936, 30, 168—175).—After a preliminary extraction of the tissue with 70—80% EtOH the residue is boiled with dil. HCl-EtOH which renders the starch (I) sol. in hot H_2O . The H_2O extract is then hydrolysed by β -malt-amylase (II), which produces maltose (III) as almost the only reducing product. The degradation of (I) by (II) proceeds to a definite "hydrolysis limit" The amount of (III) formed is determined either by an alkaline $Fe(CN)_6^{4-}$ or a Cu method. Apple-(I) is hydrolysed to the same extent by (II) throughout the season, with the production of 0.6 mg. of (III) per mg. of (I), much the same val. as for potato-(I). The (I) content of apples on storage falls nearly to zero in 10 days. If taka-diastase (IV) is used

instead of (II) the apparent (I) content is much higher and falls after 10 days to 1.5 mg. per g. This is due to non-(I) fractions hydrolysed by (IV) but not by (II), some of which are not metabolised, and so persist during storage. Methods are given for the prep. of (II) and control (I) from apples. E. A. H. R.

Polysaccharides in sweet maize. M. W. PARRKE (Plant Physiol., 1935, 10, 713—725).—Electrodialysis of the sol. polysaccharide fraction yields an anodic fraction and a further non-migratory fraction. With advancing maturity of the grain, the physical and chemical properties of the fractions approach more closely to those of α - and β -amylose, and differ from those of dextrin. In maize the sol. polysaccharides may form the units from which starch grains are ultimately formed. A. G. P.

Polysaccharides of *Iridaea laminarioides*. II. T. TADOKORO, K. YOSHIMURA, and M. YANASE (J. Chem. Soc. Japan, 1935, 56, 188—191; cf. A., 1935, 268).—Hydrolysis of the product obtained by extraction with hot H_2O and pptn. with 70% EtOH yielded galactose and smaller amounts of glucose, fructose, and arabinose. The fraction not pptd. by EtOH contained an unidentified sugar having $[\alpha]_D^{20} +31.4^\circ$, and yielding a phenylosazone, m. p. 125—130°. CH. ABS. (p)

Hai-jen-tsao (*Digenia simplex*, Ag). C. F. HSÜ (Science [China], 1934, 18, 1418—1437).—This marine alga is used as a vermifuge. Alginic acid, extracted by 2% Na_2CO_3 , contains uronic and either glycuronic or mannuronic acids. The boiling- H_2O extract yields galactan, *d*-pararabin, and small amounts of alkaloid and fucoidin. The I content is 0.20%. CH. ABS. (p)

Isolation of pectic substances from wood. E. ANDERSON (J. Biol. Chem., 1936, 112, 531—539).—The sap-wood and cambium of *Robinia pseudacacia*, L., yield < 3% and < 13%, respectively, of pectic substances (yielding *d*-galacturonic acid but no methylpentoses), probably present largely as Ca pectate, protected by later deposition of other materials. R. S. C.

Vegetable chitin. J. M. DIEHL (Chem. Weekblad, 1936, 33, 36—38).—Analytical data, including determinations of Ac, show that animal and vegetable chitins from *Crangon vulgaris*, *Amanita muscaria*, and *Phycomyces Blakesleeanus* are identical. Like other chitins, that from *Lycoperdon gemmatum* gives AcOH and not HCO_2H on hydrolysis. S. C.

Irritant principle in *Mimosoideae*. A. SOLTYS and K. UMRATH (Biochem. Z., 1936, 284, 247—255).—Fractionation of aq. extracts of *Mimosa* or *Neptunia plena* leaves (4 kg.) by Hg and Pb acetates, C_5H_5N , EtOH, and $Ba(OH)_2$ yields 10 mg. of a highly irritant (as indicated by plant movements) OH-acid of high O content, equiv. wt. 250, and mol. wt. 500. The activity is destroyed on acetylation but returns on subsequent hydrolysis. F. O. H.

Digitalis. I. New principles in evaluation. B. NIELSEN (Acta med. scand., 1935, 84, 315—354; Chem. Zentr., 1935, i, 3162—3163).—A biological method, employing the toxicity of digitalis preps. for mice, is described. H. N. R.

Decomposition of nicotine by the fermentation of tobacco. W. WEBER (Mitt. Lebensm. Hyg., 1935, 26, 214—249).—Aeration of moist tobacco or its H_2O extract leads to loss of nicotine (I) by decomp. as distinct from atm. oxidation or volatilisation. This is inhibited by antiseptics and occurs in sterile media after inoculation with bacteria from tobacco leaves. Bacterial decomp. of (I) takes place in artificial media, and there is evidence that oxidase, peroxidase, and catalase are produced. NH_3 (but no C_5H_5N) is produced, but unlike the NH_2Me found, it is not derived from (I) but from NH_2 -compounds. A reagent suitable for determining (I) is best prepared by neutralising a mixture of 1 kg. of $Na_2WO_4 \cdot 2H_2O$ and 117.1 g. of 26.3% Na_2SiO_3 with H_2SO_4 , filtration, extraction of the filtrate with Et_2O in the presence of 50% H_2SO_4 , and slow evaporation of the Et_2O . J. G.

Nornicotine.—See this vol., 488.

South American curare. F. W. FREISE (Pharm. Ztg., 1936, 81, 241—243).—The characteristics and analyses of cork tissues of varying ages from 6 varieties of *Strychnos* are given. The isolation of two alkaloids, $C_{23}H_{28}O_4N_2$ (similar to or identical with vellosine), and *eucurarine*, $C_{20}H_{23}ON_2$, m. p. 135—144°, decomp. 182° (toxic dose for frogs, 0.13 mg. per kg.), is described. E. H. S.

New alkaloid of ergot.—See this vol., 489.

Alkaloids of *Sinomenium* and *Cocculus*.—See this vol., 491.

Barley proteins. I. S. JAITSCHNIKOV and A. D. AVETISJAN (J. Appl. Chem. Russ., 1935, 8, 1439—1443).—The protein-N of barley from different localities of the U.S.S.R. varies from 2.16 to 3.07%; the distribution of the N amongst the albumin, globulin, glutenin, and prolamine fractions is recorded. Varying the order in which the various fractions are extracted (by H_2O , aq. NaCl, and aq. NaOH) affects the results. R. T.

Distribution of nucleic acids and proteins in chromosomes. T. CASPERSON (Naturwiss., 1936, 24, 108).—With the aid of a precipitant containing La, sp. for nucleic acids (I), ultra-violet photomicrographs of chromosomes (II) of extraordinarily fine structure are obtained. Distribution of (I) is identical in both halves of chromosomes. The non-absorbing segments have the properties of proteins. Digestion with proteolytic enzymes dissolves out one of the components, the chromosomes disintegrating into discs and granules of high (I) content. E. A. H. R.

Highly polymerised compounds. CIII. Application to biology of investigations on the constitution of highly polymerised compounds. H. STAUDINGER (Zangger-Festschr., 1934, 939—953; Chem. Zentr., 1935, i, 3528; cf. A., 1934, 1336).—The application of earlier work to biological problems, especially protein and rubber chemistry, is discussed. Terminal groups, present in relatively small amount, may be very important factors in determining the chemical properties of fibres. H. N. R.

Biochemical apparatus. E. McDONALD (J. Franklin Inst., 1936, 221, 103—138). W. McC.

Spectrographic analysis of biological materials. G. H. SCOTT and P. S. WILLIAMS (*Anat. Rec.*, 1935, 64, 107—127).—A method is described. Spectra of normal and pathological tissues are shown.

R. N. C.

Nephelometric determinations using the photo-electric cell. J. RENAUDIN (*Bull. Soc. Chim. biol.*, 1936, 18, 301—304).—Nephelometric biological determinations are liable to inherent faults in the apparatus and errors due to the difference in size of suspended particles, and to interfering constituents in the media.

A. L.

Manometer for comparative study of physiological processes. B. N. SINGH and P. B. MATHUR (*Biochem. J.*, 1936, 30, 323—325).—Direct reading of the scale suffices when the manometer is used for comparisons. When it is used for quant. determinations the degree of accuracy is $\pm 1.25\%$.

W. McC.

p_{H} determination in biological liquids with the Thompson electrode. X. THIESSE, M. VERAINE, and A. ZIEGLER (*Bull. Soc. Chim. biol.*, 1936, 18, 203—207).—The glass electrode (A., 1933, 367) may be used.

A. L.

Method for testing the sense of smell and for the establishment of olfactory values of odorous substances. C. A. ELSBERG, I. LEVY, and E. D. BREWER (*Science*, 1936, 83, 211—212).

L. S. T.

Mosaic collodion membranes as analogues of the plasma membrane. S. C. BROOKS (*J. Exp. Biol.*, 1935, 12, 36—38).—"Anion-impermeable" and "cation-impermeable" membranes arranged in pairs on glass cells did not accumulate or exchange ions except traces of Cl^{-} .

CH. ABS. (p)

Histochemical detection of phosphate conglomerates in tissue. C. HEIDERMANNS and H. WURMBACH (*Z. wiss. Mikrosk.*, 1935, 51, 375—378; *Chem. Zentr.*, 1935, i, 3574).—The material is treated successively with uranyl sulphate, HNO_3 , and $K_4Fe(CN)_6$, and observed microscopically.

H. N. R.

Choice of counterstains. H. D. MURRAY (*J. Roy. Microscop. Soc.*, 1935, [iii], 55, 233—237).—The absorption spectra of a no. of dyes are examined in relation to their suitability as stains.

H. D.

Histological applications of tannic acid and ferric chloride. H. T. NORTHERN (*Stain Tech.*, 1936, 11, 23—24).—The use of tannic acid or $FeCl_3$ with a cellulose-wall stain (light-green or crystal-violet) and a nuclear lignin stain (safranin) gives clear preps. of plant stems superior to those stained by the usual safranin-crystal-violet and other combinations.

P. G. M.

Comparative study of dehydration [of animal tissues]. T. T. BAIRD (*Stain Tech.*, 1936, 11, 13—22).—Whatever method of fixation is used, dioxan is the best of known dehydrating agents. The greatest distortion is produced by the $EtOH-CHCl_3$ method.

P. G. M.

Counterstains for Davenport reduced silver preparations of peripheral nerves. J. O. FOLEY (*Stain Tech.*, 1936, 11, 3—8).

P. G. M.

Lacto-phenol preparations. W. E. MANEVAL (*Stain Tech.*, 1936, 11, 9—11).—Fungi, algæ, germin-

ating spores, etc. may be stained and mounted in Amann's lacto-phenol containing aniline-blue, cotton-blue, or acid fuchsin either singly or in combination, with or without addition of 20—25% $AcOH$. Detailed formulæ are given.

P. G. M.

Determination of carbamide.—See this vol., 459.

Determination of alcohol in putrefied blood and tissues. M. NICLOUX (*Compt. rend. Soc. Biol.*, 1935, 120, 1301—1303).—The blood or tissue is treated with $AgNO_3$ and picric acid and distilled; the distillate is treated with $KOCl$, Na_2CO_3 , and $AgNO_3-NH_3$, and again distilled, the distillate being acidified and again distilled. $EtOH$ is determined in the third distillate by any standard method. This process practically eliminates reducing substances, and $> 99\%$ of $EtOH$ added to the blood can be recovered.

R. N. C.

Micro-determination of alcohol in putrefied blood and in corpses. M. NICLOUX (*Bull. Soc. Chim. biol.*, 1936, 18, 318—351).—The material is first distilled with picric acid and $AgNO_3$, then with $KOCl$ in aq. Na_2CO_3 to remove reducing substances which interfere, the determination being made according to the author's method (A., 1931, 1327). $EtOH$ administered to white mice previous to killing disappears from the bodies in a regular manner, the rate increasing with rise of temp. Considerable quantities (0.8 g. per kg.) of $EtOH$ are formed during the putrefaction of corpses, this being accompanied in some cases by 15% of $BuOH$.

A. L.

Micro-determination of alcohol in biological material. R. N. HARGER (*J. Lab. Clin. Med.*, 1935, 20, 746—751).— $EtOH$ is removed from tissue, blood filtrates, urine, etc. by steam distillation. The distillate is oxidised by $H_2SO_4-K_2Cr_2O_7$, excess of the latter being titrated with a solution containing $FeSO_4$ and Me-orange.

CH. ABS. (p)

Determination of small amounts of citric acid in biological material. G. W. PUCHER, C. C. SHERMAN, and H. B. VICKERY (*J. Biol. Chem.*, 1936, 113, 235—245).—Citric acid (I) (0.1—1.0 mg.) was determined in CCl_3CO_2H extracts by oxidation with $KMnO_4$ and Br. The pentabromoacetone produced was extracted with light petroleum and treated with aq. Na_2S ; the colour in the aq. phase was stabilised with C_5H_5N and its intensity determined spectrophotometrically. Non-volatile ketones and keto-acids interfere if present in large amounts. Small quantities of (I) occur in saliva and erythrocytes.

H. D.

Isolation from human tissues of easily volatile organic liquids and their identification. A. O. GETTLER and H. SIEGEL (*Arch. Path.*, 1933, 19, 208—212).— $EtCl$, $C_2H_4Cl_2$, $C_3H_6Cl_2$, CCl_4 , CCl_2F_2 , $CHCl_3$, CS_2 , C_6H_6 , and Et_2O were identified.

CH. ABS. (p)

Spectrographic determination of phenol in tissue. G. BARAC and A. LAMBRECHTS (*Bull. Soc. Chim. biol.*, 1936, 18, 239—240).—The ultra-violet spectrum of the Et_2O extract of the material after defecation with CCl_3CO_2H is determined. Under these conditions $PhOH$ gives a max. at 280.7 $m\mu$ with an extinction coeff. of 2400.

A. L.

Diazo-coupling reaction for detection of o- and p-phenols in histological technique. M. CLARA

(Z. wiss. Mikrosk., 1935, 51, 316—337; Chem. Zentr., 1935, i, 3574).—Commercial, stabilised diazo-compounds are used.
H. N. R.

Detection of intravenously injected substances (especially 1-3:4-dihydroxyphenylalanine) inside epithelial cells. Detection of reducing sugar-like substances in the skin of men and animals, by means of silver nitrate. F. SCHAAF and W. BURCKHARDT (Arch. Derm. Syph., 165, 157—173; Chem. Zentr., 1935, ii, 3018).
H. N. R.

Chemico-toxicological detection of physostigmine. I. MALANDRUCCO (Biochim. Terap. sperim., 18, 242—247; Chem. Zentr., 1935, i, 3020).—A colour reaction is described.
H. N. R.

Colorimetric determination of morphine and its derivatives. G. RIZZOTTI (Arch. Farm. sperim., 1935, 60, 545—563).—Blood or tissue extracts are deproteinised by $\text{Na}_2\text{WO}_4\text{--H}_2\text{SO}_4$, the resulting clear fluid is treated with $\text{K}_3\text{Fe}(\text{CN})_6$, Na_2CO_3 , and NaCN at 100° , cooled, and $\text{Fe}_2(\text{SO}_4)_3$ added, and the Prussian-blue developed is compared with that from suitable glucose standards. The method is based on reduction of $\text{K}_3\text{Fe}(\text{CN})_6$ by the phenolic OH of morphine and certain of its derivatives.
F. O. H.

Extraction and determination of small amounts of morphine in organs. B. ZANELLA (Arch. Ital. Sci. farmacol., 1, 120—140; Chem. Zentr., 1935, i, 3020).—An improved isolation process is described.
H. N. R.

Emmiden's cholesterol determination. S. MIYAMORI (Nagoya J. Med. Sci., 1935, 8, 135—137).—The material (2 g.) is hydrolysed with 25% aq. KOH at 100° , the Et_2O extract of the product, dried and dissolved in CHCl_3 , is treated with Ac_2O and H_2SO_4 , and the colour measured. The vals. obtained agree with those from the digitonin method.
NUTR. ABS. (m)

Colorimetric determination of small amounts of cholesterol in blood and other liquids of the organism. M. N. DEL AGUILA (Bol. Soc. quim. Peru, 1935, 1, No. 3, 73—74).—Blood is extracted with Et_2O after addition of EtOH (with or without NaOH), and cholesterol is determined by Grigaut's Ac_2O method.
CH. ABS. (p)

Determination of phytic acid. L. YOUNG (Biochem. J., 1936, 30, 252—257).—Phytic acid (I) is determined by addition of excess of FeCl_3 , pptn. of Fe phytate at 100° in $N/6\text{-HCl}$, and determination of the excess of Fe colorimetrically with CNS'. In faeces extracts (I) is pptd. as before and the ppt. is separated and decomposed with NaOH , and after removal of $\text{Fe}(\text{OH})_3$ the liberated (I) is determined as above.
H. D.

Detection and determination of copper in organic matter by benzoinoxime. Z. GRUZEWSKA and G. ROUSSEL (Compt. rend. Soc. Biol., 1936, 121, 289—291; cf. this vol., 260).—Cu is accurately determined in rabbit liver by incineration and pptn. from the ash with benzoinoxime in slightly alkaline solution after removal of Fe. The ppt. is sol. in CHCl_3 , forming a green solution which serves for the detection of Cu.
R. N. C.

Colorimetric determination of copper in biological material. E. LASAUSSE and L. FROCRAIN (J. Pharm. Chim., 1936, [viii], 23, 77—82; cf. Fleury *et al.*, A., 1929, 784; Delépine, A., 1908, i, 511).—Org. matter is destroyed by ignition at low red heat after addition of $\text{Mg}(\text{NO}_3)_2$. The residue, dissolved in HCl , is freed from Fe and Ca by addition of aq. NH_3 and aq. $(\text{NH}_4)_2\text{CO}_3$, and Cu is determined colorimetrically by Na dithiocarbamate.
W. McC.

Modifications of the 2:2'-dipyridyl method for available iron. G. O. KOHLER, C. A. ELVEHJEM, and E. B. HART (J. Biol. Chem., 1936, 113, 49—53; cf. A., 1935, 115).—Chlorophyll and all interfering pigments are pptd. by $\text{Pb}(\text{OAc})_2$, and the method can be applied to green vegetables and other pigmented products, as well as to animal tissues. Wherever possible, a fresh and not a dried sample should be used.
J. N. A.

Non-interference of sodium chloride in the determination of copper and iron in biological material. L. FROCRAIN and E. LASAUSSE (J. Pharm. Chim., 1936, [viii], 23, 84—85).—If $\text{Mg}(\text{NO}_3)_2$ or MgO is present, no loss of Fe or Cu occurs when material is ignited in presence of very large excess of NaCl .
W. McC.

Quantitative spectrographic analysis of biological material. I. Determination of lead in cerebrospinal fluid. J. S. FOSTER, G. O. LANGSTROTH, and D. R. MCRAE (Proc. Roy. Soc., 1935, A, 153, 141—152).—This micro-method is applicable to concns. of 1×10^{-8} — 2×10^{-5} g. per c.c. with a precision of $>15\%$. It is based on the fact that when the atoms of a sample are excited by a d.-c. spark under suitable conditions, the intensity of a Pb line $\propto [\text{Pb}]$, if $[\text{Pb}]$ is low.
L. L. B.

Determination of small amounts of lead in biological material. H. CHEFFTEL and M. L. PIGEAUD (Ann. Falsif., 1936, 29, 76—92; cf. A., 1933, 621; B., 1933, 170).—The dithizone (I) method is substituted for the PbS colorimetric method (*loc. cit.*), which is not sufficiently sensitive. Cu etc. are removed by treatment with KCN. Fe is then liable to interfere by producing a brown colour with (I), but this is prevented by avoiding any excess of KCN. Sn does not interfere if present as Sn^{IV} .
E. C. S.

Determination of lead.—See this vol., 443.

Micro-determination of ferrocyanide in muscle and urine. J. G. EDWARDS and W. D. LANGLEY (J. Biol. Chem., 1936, 112, 469—475).— $\text{Fe}(\text{CN})_6^{4-}$ (1—40 mg.) is determined in tissues by hydrolysis with H_2SO_4 , absorption of the volatilised HCN in aq. NaOH , and titration with AgNO_3 .
H. D.

Determination of nitrate in animal tissues. M. WHELAN (J. Lab. Clin. Med., 1935, 20, 755—757).—The ground tissue is acidified (H_2SO_4) and extracted first with Et_2O and then with hot H_2O . Et_2O is removed from the combined extract, which is then made alkaline, and diluted. An aliquot is treated with HgCl_2 to remove interfering substances and NO_3^- is determined in the clear liquid.
CH. ABS. (p)