BRITISH CHEMICAL ABSTRACTS

A.—PURE CHEMISTRY

APRIL, 1935.

General, Physical, and Inorganic Chemistry.

Ground state of H_2. H. M. James and A. S. Coolidge (J. Chem. Physics, 1935, 3, 129—130).—A correction and addition to a recent paper (A., 1934, 23). F. L. U.

The two-quantum Σ-states of the hydrogen molecule. R. D. Present (J. Chem. Physics, 1935, 3, 122—128).—Results of calculations for two of the two-quantum states are given. F. L. U.

Effect of a strong electric field on light emission of para-helium in the extreme ultra-violet. H. Bomke (Physikal. Z., 1935, 36, 158—161).—A positive-ray tube for the investigation of the Stark effect at very high field strengths is described. An electrical splitting of the para-He series $1S-mP$ could not be observed. Four He lines were ascribed to the new series $1S-mS$ and $1S-mD$. A. J. M.

Intensity modifications of the helium spectral lines emitted by high-frequency excitation. S. Matsuda (Sci. Rep. Tokyo Bunrika Daigaku, 1935, 2, A, 115—123).—The intensities of lines excited by high-frequency and an ordinary transformer are compared for the range 7300—2400 Å. N. M. B.

Ultra-violet absorption band of Li_2. J. E. Vance and J. R. Huffman (Physical Rev., 1935, [ii], 47, 215—216).—Data, assignments, and a vibrational analysis are given for 60 band heads in the range 3100—3500 Å. N. M. B.

Fine structure of the components in the Paschen-Back effect of multiplets. P. Jacquinot (Compt. rend., 1935, 200, 383—384).—In agreement with theory, the Li 6707 Å. doublet gives Paschen–Back effect components which themselves show fine structure. J. W. S.

Interpretation of band spectroscopic results of nitrogen. N. R. Tawde (J. Univ. Bombay, 1934, 3, No. 2, 53—57).—Rydberg's conclusions are tested (cf. A., 1932, 104). D. R. D.

Excitation of band spectra : rotational structure. G. O. Langstroth (Canad. J. Res., 1935, 12, 6—13).—The contours of three second positive N bands change in shape as the energy of the exciting electrons is varied. The results can be explained when there is a probability that an impinging electron will excite the electronic configuration of a mol. and then interact with the rotation before escaping from the mol. field. E. S. H.

Spectra F III, F II, and F I. B. Edlén (Z. Physik, 1935, 93, 433—449). A. B. D. C.

Magnetic weakening of the fluorescence of Te_2 and S_2. I. I. Agarbiceanu (Compt. rend., 1935, 200, 385—386).—Theoretical. J. W. S.

Interference measurements in the infra-red arc spectrum of iron. W. F. Meggers (J. Res. Nat. Bur. Stand., 1935, 14, 33—40).—Wave-length data are given, relative to Ne standards, for the 91 strongest lines in the range 7164·469—10216·351 Å. characteristic of integrated light from an Fe arc at atm. pressure and measured by the Fabry–Perot interferometer. Deviations from the vals. obtained from the vac. arc are interpreted as pressure and Stark effects. The use of integrated light from an Fe arc at atm. pressure for infra-red sub-standard $\lambda\lambda$ is suggested. J. W. S.

(A) **Absolute intensity of the zinc resonance line 3076 Å. and the life period of the 2^3P_1 state of zinc.** (B) **Isotope displacement effect with the 3076 Å. zinc resonance line.** W. Billeter (Helv. phys. Acta, 1934, 7, 505—513, 524—536; Chem. Zentr., 1934, ii, 2364).—(A) Vals. are recorded. The life period of the 2^3P_1 state of Zn ($2{\cdot}6\times10^{-5}$ sec.) is > that of Cd ($2{\cdot}5\times10^{-6}$ sec.) or Hg (1×10^{-7} sec.).

(B) Analysis of the hyperfine structure shows an effect attributed to Zn^{64}, Zn^{66}, and Zn^{68}. H. J. E.

Structure of Br III. K. R. Rao and S. G. Krishnamurty (Nature, 1935, 135, 309).—The spark spectrum of Br has been photographed over the range 450—7000 Å. The structure identified for Br III is analogous to that of Se II. L. S. T.

Zeeman splitting of lines of krypton I, argon I, and xenon I spectra. B. Pogány (Z. Physik, 1935, 93, 364—377). A. B. D. C.

Spectrum of molybdenum I. II. M. A. Catalan and P. de Madariaga (Anal. Fís. Quím., 1933, 31, 707—734).—644 lines between 2326 and 9767 Å. are classified in quintet and septet levels. Kiess' fundamental limit (a^7S), 59,560, is not satisfactory, but 57,200±200 gives vals. analogous to those for the other elements of the same period, except for the 7s term, which is regarded as fictitious. The ionisation potential is 7·06 volts. H. F. G.

Molecular spectrum of cadmium vapour. J. K. Robertson (Nature, 1935, 135, 308—309).—The view that Cd can emit light of λ 2212 Å. is maintained (cf. A., 1934, 1147). L. S. T.

Molecular spectrum of cadmium vapour. J. G. Winans and S. W. Cram (Nature, 1935, 135, 344—345).—Evidence is discussed indicating that the emission max. at 2212 Å. in the Cd arc is due to an impurity. L. S. T.

Nuclear moments of tellurium and selenium isotopes. S. Rafalowski (Acta Phys. Polon., 1933, **2**, 119—123).—From hyperfine structure measurements of the arc spectrum of Te and Se, the even isotopes of Te and Se have zero nuclear moments. Ch. Abs. (e)

Spectrum of doubly-ionised iodine. J. B. Seth (Nature, 1935, **135**, 269).—Most of the terms have been identified in the 6*s* and 6*p* levels and a few in the 5*d* level. L. S. T.

Iodine spectra of feeble excitation. G. Balasse and (Mlle.) Galet (Bull. Acad. roy. Belg., 1935, [v], **21**, 87; cf. A., 1930, 830).—A correction. N. M. B.

Nuclear moment of holmium (Ho^{165}). H. Schüler and T. Schmidt (Naturwiss., 1935, **23**, 69).—Most of the lines in the range 4000—6500 Å. show a hyperfine structure, the commonest being made up of eight lines with decreasing distances apart and intensities. The nuclear moment is 7/2. A. J. M.

Hyperfine structure in the hafnium spectrum. E. Rasmussen (Naturwiss., 1935, **23**, 69—70).—The lines at 5550, 5452, 5373, 5243, and 4655 Å. are very narrow doublets; weaker components are found at greater distances. The strong lines are due to Hf^{178} and Hf^{180}, the weaker components being due to the magnetic separation of Hf^{177} and Hf^{179}. Isotopic displacements are very small; lines 5613, 5552, 4837, and 4000 Å. show none. The nuclear moment is probably ½, and is certainly ≯ 3/2. A. J. M.

Fine structure of the mercury line 5461 A. in absorption. H. C. Burger and P. H. van Cittert (Physica, 1935, **2**, 87—96).—Measurements by a modification of the Fabry–Perot interferometer giving multiple interference are recorded. H. J. E.

Intensity distributions of spectral lines and emission of the continuous spectra in luminous mercury vapour. M. Fukuda (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1935, **26**, 21—32).—Intensities of Hg lines (I) appearing in the luminous glow have been compared with (I) in the arc (II). The variation of (I) with the distance from (II) has been studied, and the origin of the continuous spectra is attributed to collision of free electrons and ions. R. S.

Absorption by metastable thallium atoms. F. Müller (Helv. phys. Acta, 1934, **7**, 488—491; Chem. Zentr., 1934, ii, 2363).—Absorption measurements of λλ 5350 and 3530 Å., arising from the metastable $6^2P_{3/2}$ state, are recorded for various temp. and used to calculate the concn. of metastable atoms. H. J. E.

Spectra of Pb IV and Bi V. G. K. Schoepfle (Physical Rev., 1935, [ii], **47**, 232—234).—For Pb IV, 34 term vals. and classifications of 79 lines in the region 198—5005 Å., and for Bi V 14 term vals. and classifications of 18 lines in the range 176—1487 Å., are tabulated. Ionisation potentials are 42 and 55·7 volts, respectively. N. M. B.

Quadratic Zeeman effect in the principal series of sodium. E. Segrè (Nuovo Cim., 1934, **11**, 304—308; Chem. Zentr., 1934, ii, 2499). H. J. E.

Atmospheric bands in the ultra-violet. F. W. P. Götz (Arch. Sci. phys. nat., 1934, [v], **16**, 266—268).—A summary and discussion of recent results and their bearing on the distribution of O_3 with altitude. N. M. B.

Ozone and oxygen in planetary atmospheres. R. Wildt (Nachr. Ges. Wiss. Göttingen, 1934, [ii], **1**, 1—9; Chem. Zentr., 1934, ii, 2176; cf. A., 1933, 587).—The O_3 content of the atm. of Uranus cannot, from spectrographic data, exceed the equiv. of 0·5 cm. under normal conditions. J. S. A.

Comparison of atmospheric extinction in the ultra-violet and visible spectrum. P. Rossier (Arch. Sci. phys. nat., 1934, [v], **16**, Suppl., 68—72).—A correction must be applied to the usual equations when observations are not made at the zenith. F. L. U.

Light of the night sky. J. Kaplan (Nature, 1935, **135**, 229).—The auroral green line has been excited by a rapidly interrupted discharge through $N_2+1\%\ O_2$. The conditions indicate a manner of production similar to that in the light of the night sky. L. S. T.

Spectrum of *Nova Herculis*, 1934. A. Beer and F. J. M. Stratton (Nature, 1935, **135**, 346).—Forbidden lines of O I are prominent. L. S. T.

Spectrum and composition of the gaseous nebulæ. I. S. Bowen (Astrophys. J., 1935, **81**, 1—16).—H is the most abundant element and He is the next. N, O, Ne, S, and possibly C and A, are present, but much rarer. L. S. T.

Redward shift of spectral lines of nebulæ. P. I. Wold (Physical Rev., 1935, [ii], **47**, 217—219).—An explanation is proposed, based on the characteristics of a wave travelling in a medium in which the velocity of light is a function of time. N. M. B.

Absolute wave-length of the aluminium $K\alpha_{1,2}$ line determined by the plane lattice method. E. Bäcklin (Z. Physik, 1935, **33**, 450—463).—This is given as 8·3395 Å., and leads to the val. $4{\cdot}805\times10^{-10}$ e.s.u. for the electronic charge. A. B. D. C.

Emission lines and absorption edges in the *L* series of barium and cæsium. G. Kellström and B. B. Ray (Ark. Mat. Astr. Fysik, 1934, **B**, **24**, No. 13, 5 pp.; Chem. Zentr., 1934, ii, 2495).—Data are recorded and discussed. H. J. E.

***O* series of Röntgen spectra.** M. Siegbahn and T. Magnusson (Ark. Mat. Astr. Fysik, 1934, **B**, **24**, No. 27; Chem. Zentr., 1934, ii, 2174).—A line attributed to the *O* series has been identified in the Th spectrum. J. S. A.

Higher series of Röntgen spectra. M. Siegbahn and T. Magnusson (Ark. Mat. Astr. Fysik, 1934, **B**, **24**, No. 6; Chem. Zentr., 1934, ii, 2172).—Lines attributed to transitions between *N* and *O* levels are given by the elements from Cs to Eu, but not by preceding or following elements. Tl, Pb, Bi, Th, and U also give series attributed to transitions $O \longrightarrow P$ or $N \longrightarrow O$. J. S. A.

Equilibrium emission and activity changes in oxide-coated cathodes. A. J. Maddock (Phil. Mag., 1935, [vii], 19, 422—436).—Investigation of cathodes having a mixture of BaO and SrO on a Ni core at various temp. indicate that a layer of Ba exists at the outer oxide surface giving the enhanced emission, and that for any temp., equilibrium is reached when the rate of loss of Ba by temp. evaporation equals the rate of gain by diffusion from the body of the oxide; the higher is the temp. the less is the amount of surface covered. High-temp. treatment alone is sufficient for the ageing process; cathodes after such treatment show high activity. Curves of activation and deactivation at various temp., and data for the loss of emission on flashing at temp. > normal, are given. N. M. B.

Pressure displacement of spectral lines near the series limit. C. Reinsberg (Z. Physik, 1935, 93, 416—426).—Theoretical. If the Ramsauer cross-section for slow electrons has a min. the displacement is towards the red, otherwise towards the violet. A. B. D. C.

Growth of an electron stream and the calculation of the current strength in a gas discharge that is not self-sustaining. N. Kaptzov (Physikal. Z. Sovietunion, 1934, 6, 82—120). Ch. Abs. (*e*)

Electric moment of an electron. A. Lees (Proc. Camb. Phil. Soc., 1935, 31, 94—98).—The views of Frenkel and Dirac regarding an electron possessing an electric moment in addition to a magnetic moment are analysed. An electron does not possess an electric moment. W. R. A.

Electrical density and electronic radius. E. Reichenbächer (Physikal. Z., 1935, 36, 173—177).—Theoretical. A. J. M.

Possible physical interpretations of negative energy electrons. H. Mandel (Z. Physik, 1935, 93, 329—337).—A theory equiv. to that of Dirac is given. A. B. D. C.

Production of positive electrons by β-rays. D. Skobelzyn and (Miss) E. Stepanova (J. Phys. Radium, 1935, [vii], 6, 1—11).—A cloud-track investigation was made of the β-radiation emitted by $RaBr_2$. Positrons are produced by the passage of Ra-*C* β-rays through thin layers of C, celluloid, and Pb. Velocity distribution analysis shows that the emission intensity is inversely $\propto$ (positron energy)^2. The effective cross-section of the Pb atom, $\propto$ (at. no.)^2, is of the order 10^{-22} cm. Results appear to diverge from Dirac's theory of positron "holes." N. M. B.

Artificially excited positrons. C. Ramsauer (Z. Physik, 1935, 93, 432; cf. Rupp, this vol., 139). A. B. D. C.

Production of ions in a high vacuum. R. Planiol (Compt. rend., 1935, 200, 539—540).—A beam of electrons of definite velocity and a mol. jet of the substance of which ions are required are allowed to impinge at right angles in a very high vac. The ions produced by collision of a mol. with one electron are taken off at right angles to the two beams by a low-intensity electric field before further collisions can occur. J. W. S.

Accommodation coefficient of mercury ions on a mercury surface. R. C. Mason (Physical Rev., 1935, [ii], 47, 241—248).—The anomalously high pressures exerted on a Hg surface to which were attracted Hg positive ions produced in a Hg arc are explained on the hypothesis that each ion sputters a large no. of atoms and the reaction on the surface of these escaping sputtered atoms gives the observed forces. The observed force was a linear function of the energy of the ions. The limits found for 1000-volt ions, where a=accommodation coeff., n=no. of atoms sputtered per ion, and V_s=electron volt equiv. energy of the sputtered atoms, were $100>n>7\cdot8$; $0\cdot92>a>0$; $0\cdot78<V_s<128$. N. M. B.

Molecular scattering by gases. L. F. Broadway (Z. Physik, 1935, 93, 395—396).—Knauer's criticism (A., 1934, 1150) of systems lacking cylindrical symmetry is refuted. A. B. D. C.

Molecular scattering in gases. F. Knauer (Z. Physik, 1935, 93, 397).—A reply to Broadway (cf. preceding abstract). A. B. D. C.

Recent at. wt. determinations [of carbon, nitrogen, and fluorine]. W. Cawood (Nature, 1935, 135, 232—233).—Limiting ratios of N_2O, C_2H_4, CO_2, and CF_4 with O_2 have been determined using an improved micro-balance. At. wts. obtained are N 14·006(8), C 12·012(2) and 12·010(1) from C_2H_4 and CO_2, respectively, and F 18·995. Calc. compressibilities at 21° are N_2O 0·00559, C_2H_4 0·00636, CO_2 0·00522, and CF_4 0·00418. The high val. for C is in agreement with other recent determinations and 12·01 is probably the best val. for C. This indicates the presence of approx. 1% of C^{13}. A repetition of the measurements with MeF using the new apparatus confirms the val. 18·995 for F in preference to 19·01 (A., 1931, 1207). L. S. T.

Rare earths. XLIII. I. At. wt. of europium. II. Specific gravity of europium chloride. E. L. Meyers [with B. S. Hopkins] (J. Amer. Chem. Soc., 1935, 57, 241—243).—The ratio $EuCl_3$: Ag gives the at. wt. of Eu 152·30±0·018 (cf. Aston's val., 151·9; A., 1934, 1150). $EuCl_3$ has d^{35} 4·471. E. S. H.

Radioactivity : old and new. (Lord) Rutherford (Nature, 1935, 135, 289—292).—A lecture. L. S. T.

Investigation of the upper limit of the thorium-C+C'' β-ray spectrum by means of the Wilson cloud chamber. P. C. Ho (Proc. Camb. Phil. Soc., 1935, 35, 119—124).—The upper limit of the continuous Th-C+C'' β-ray spectrum is $9250H_\rho$, and no β-particles of higher energy were observed. The val. is in good agreement with vals. obtained by Henderson (this vol., 275). W. R. A.

Studies with thorium-C''. J. Zirkler (Z. Physik, 1935, 93, 477—478).—Th-C'' can be used as an indicator despite its short life. A. B. D. C.

Scattering of hard γ-rays and annihilation radiation. E. J. Williams (Nature, 1935, 135, 266). L. S. T.

Slowing down of neutrons by collisions with hydrogen nuclei. C. H. Westcott and T. Bjerge (Proc. Camb. Phil. Soc., 1935, 31, 145—152).—Neutrons are more readily captured by various atoms when their kinetic energies are reduced by hydrogen nuclei (cf. Fermi *et al.*, A., 1934, 1284). The neutron source was surrounded by various thicknesses of H_2O and the no. of neutrons captured by an apparatus consisting of two semi-cylinders of Ag sheet exposed to neutron bombardment for 1 min. determined by Geiger–Müller counter. Collision cross-sections for primary neutrons and for slow neutrons have been determined. The nature of the " gas " of slow neutrons is discussed, but no definite conclusion regarding the energy of the neutrons concerned is reached. W. R. A.

Attempt to detect spontaneous emission of neutrons photographically. S. Pieńkowski and J. Starkiewicz (Acta Phys. Polon., 1933, 2, 105—110).—Swientoslawski and Dorabialska's results (A., 1933, 335) were not confirmed. Ch. Abs. (*e*)

Selective capture of slow neutrons by certain nuclei. F. Perrin and W. M. Elsasser (Compt. rend., 1935, 200, 450—452).—Neutron energy and effective cross-section of neutrons and nuclei are considered. N. M. B.

Directed diffusion or canalisation of slow neutrons. F. L. Hopwood and T. A. Chalmers (Nature, 1935, 135, 341—342).—Neutrons are directed or canalised along tubes having walls made of a material such as paraffix wax with high H content. Graphite, but not impure ebonite, gives a small effect. L. S. T.

Artificial radioactivity. A. I. Alichanov, A. I. Alichanian, and B. S. Dželepov (Z. Physik, 1935, 93, 350—363).—The limit of continuous positron radiation is $3{\cdot}7\times10^6$ for P and $1{\cdot}45\times10^6$ volts for N_2, and that of electron radiation from Mg is $3{\cdot}05\times10^6$ volts. A. B. D. C.

Artificial radioactivity excited in gold and the complexity of its radiation. L. Sosnowski (Compt. rend., 1935, 200, 391—393).—Bombardment of Au by neutrons from Be irradiated with Ra γ-rays yields a radioactive material of half-life 2½ days and emitting β-rays. The velocity distribution is the same as with the radioactive Au produced by neutrons from Be bombarded by α-rays (A., 1934, 1284). A γ-radiation of $2{\cdot}5\times10^5$ e.v. has been observed, but it is not associated with the main β-radiation, since its half-life period is only 5 hr. J. W. S.

Radioactivity excited in platinum by neutrons. L. Sosnowski (Compt. rend., 1935, 200, 446—447).—Investigation by a Geiger–Müller counter and by retardation in Al of the radiation from Pt activated by slow neutrons from a Be source irradiated by Ra γ-radiation indicated the emission of β-particles of energy $1{\cdot}5\times10^6$ e.v., due to the isotopic transformation $Pt^{78} \longrightarrow Au^{79}$. N. M. B.

Detection of nuclear disintegration in a photographic emulsion. H. J. Taylor and M. Goldhaber (Nature, 1935, 135, 341; cf. this vol., 277).—Exposure of a photographic plate treated with borax to a Rn–Be neutron source produces numerous short straight tracks of which the equiv. in air is 1·1±0·1 cm. These are due to the disintegration of B by slow neutrons: $B^{10}+n^1 \longrightarrow Li^7+He^4$, which requires a mass of 10·011±0·001 for B^{10}. With Li-impregnated plates, tracks corresponding with the reaction $Li^6+n^1 \longrightarrow He^4+H^3$ have been obtained. Their lengths represent the sum of the ranges of the two resultant particles, which is 6·9±0·2 cm. in air. L. S. T.

Range of disintegration particles obtained from lithium and boron by bombardment with protons. S. Kikuchi, S. Nakagawa, and H. Aoki (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1935, 26, 33—35).—The results of Oliphant *et al.* (cf. A., 1933, 1100) have been confirmed. No evidence of additional particle groups could be obtained. R. S.

Nuclear transformation of nitrogen by fast α-rays. O. Haxel (Z. Physik, 1935, 93, 400—410).—N gives O^{17} and a radioactive nucleus of half-life 1·2 min. A. B. D. C.

Nuclear chemistry. K. K. Darrow (J. Chem. Educ., 1935, 12, 76—82). L. S. T.

Ionisation by cosmic and radioactive radiation at different gas pressures. Influence of the wall of the vessel. Disintegration of heavy atoms by cosmic rays. J. Clay (Physica, 1935, 2, 111—124).—Vals. are recorded for the ionisation (I) in A up to 100 atm. A method of separating (I) due to particles originating in the gas from that due to particles emitted by the walls is described. From Fe walls particles of range 1 cm. in 78 atm. of A were observed. With Au or Pb walls other particles, of much higher energy, were emitted. An intermediate photon radiation is indicated. H. J. E.

Secondary effects of cosmic rays. P. Auger and A. Rosenberg (Compt. rend., 1935, 200, 447—449).—From the effect of Pb screens the mechanism is proposed for the production of electron clusters of two signs from matter subjected to cosmic rays. N. M. B.

Classification of radiations in the complete system of cosmic rays. H. Geiger and E. Fünfer (Z. Physik, 1935, 93, 543—555). A. B. D. C.

Attempt to detect the neutrino. M. E. Nahmias (Proc. Camb. Phil. Soc., 1935, 31, 99—107).—The magnetic moment of a neutrino is shown experimentally by different methods to be $<2\times10^{-4}$ Bohr magneton. W. R. A.

Ionisation power of a neutrino with magnetic moment. H. A. Bethe (Proc. Camb. Phil. Soc., 1935, 31, 108—115).—Mathematical. The no. of ions produced by a neutral particle of small mass with a magnetic moment of n Bohr magnetons is $103n^2$ per km. path in air at n.t.p. and is practically independent of the mass and energy of the particle. A large fraction of secondary electrons produced have high energy and may be counted if they are produced in the wall of the Geiger counter instead of in the counter itself. W. R. A.

Neutrino theory of light. P. JORDAN (Z. Physik, 1935, **93**, 464—472).—The light field is assumed to consist of neutrinos the interaction of which with electric charge gives the appearance of light quanta. A. B. D. C.

Nuclear synthesis and stellar radiation. H. J. WALKE (Phil. Mag., 1935, [vii], **19**, 341—367; cf. this vol., 7, 275).—A general survey of the relations of annihilation of matter, synthesis of elements, and the nature of cosmic radiation. A complete theory of nuclear synthesis by neutron capture and β-radioactivity is proposed. The neutron is regarded as the fundamental nuclear component; protons and α-particles are formed mainly within nuclei as a result of the β-radioactivity of missing isotopes. N. M. B.

Interaction between matter and the magnetic field. L. DE BROGLIE (Compt. rend., 1935, **200**, 361—363).—Theoretical. J. W. S.

Relation between vector and linking Eigenfunction methods for spin degeneracy. R. S. BEAR and H. EYRING (J. Chem. Physics, 1935, **3**, 98—106; cf. A., 1934, 7).—Mathematical. F. L. U.

Precision light absorption measurements with a prism mirror spectrometer and thermo-element. H. GUDE (Z. Physik, 1935, **93**, 388—394).—Wadsworth and Leiss systems are discussed. A. B. D. C.

Temperature variation method to assist in vibrational analyses of complex molecular spectra. J. H. CLEMENTS (Physical Rev., 1935, [ii], **47**, 220—224).—The initial (lower) vibrational levels of the absorption bands of an electronic band system of a polyat. mol. are determined from photometric measurements of the absorption at two temp. not widely separated. The method is restricted to spectra in which the rotation lines are fairly broad compared with the intervals between them, or are very closely spaced. N. M. B.

Measurement of intensity distribution and width of predissociation lines of the AlH molecule. L. FARKAS and S. LEVY (Z. Physik, 1935, **93**, 427).—Measurements have been made to determine reflexion coeffs. (cf. A., 1934, 1051). A. B. D. C.

Ultra-violet band spectrum of magnesium hydride and magnesium deuteride. A. GUNTSCH (Z. Physik, 1935, **93**, 534–538).—Predissociation has been detected in both mols. A. B. D. C.

Band spectrum of barium hydride at 10,000 Å. W. W. WATSON (Physical Rev., 1935, [ii], **47**, 213—214; cf. A., 1933, 207).—Frequencies and combination differences for the 10,052 Å. band are tabulated. The state and origin of this and the 8924 Å. band are discussed. N. M. B.

Absorption spectrum of sulphur dioxide. J. H. CLEMENTS (Physical Rev., 1935, [ii], **47**, 224—232).—Complete data for bands in the region 3900—2600 Å. are tabulated, and assignments and analyses proposed. N. M. B.

Absorption spectra of saturated halides. R. S. SHARMA (Bull. Acad. Sci. Agra and Oudh, 1933, **3**, 87—92; Chem. Zentr., 1934, ii, 2179).—The vapours of BCl_3, BBr_3, $SiCl_4$, $SiBr_4$, $TiCl_4$, $TiBr_4$, $SnCl_4$, $SnBr_4$, $TeCl_4$, $TeBr_4$, and PCl_5 show continuous absorption (I) below a limiting λ, with bands. With $TiBr_4$ (I) is broken by two regions of transmission; $SnCl_4$ has one such. Heats of formation from thermochemical data are 2—3 times those calc. from the λ of the absorption limit. J. S. A.

Theory of the co-ordinate linking. V. Absorption spectra of simple salts of the transition elements. M. KARIM and R. SAMUEL (Bull. Acad. Sci. Agra and Oudh, 1934, **3**, 157—168; Chem. Zentr., 1934, ii, 2049; cf. A., 1933, 886).—Absorption coeffs. of aq. VCl_3, Na_2CrO_4, $K_2Cr_2O_7$, $CrCl_3,6H_2O$, $MnCl_2$, $KMnO_4$, $FeCl_3,6H_2O$, $FeCl_2$, $CoCl_2,6H_2O$, YCl_3, $RuCl_3$, $RhCl_3,4H_2O$, $PdCl_2,2H_2O$, $OsCl_4$, $IrCl_4$, and $NiCl_2,6H_2O$ have been measured. The halogen salts show a correspondence between the absorption max. and term differences. The curves for Na_2CrO_4 and $K_2Cr_2O_7$ are similar, the chief absorbing ion being probably $HCrO_4'$ in each case. H. J. E.

Ultra-violet absorption spectra of the stannic halides in various solvents. (MISS) M. I. GRANT (Trans. Faraday Soc., 1935, **31**, 433—440).—Solutions of SnI_4 over Sn are stable and obey Beer's law, although $Sn(OH)_4$ is gradually formed. The absorption curve, with two max. at λ 365 mμ and 285 mμ, in C_6H_{14} is that of undeformed SnI_4. In EtOH the first max. is suppressed and the second shifted to 295 mμ, owing to deformation of the mol. Greater deformation takes place in MeOH. $SnBr_4$ in solution over Sn gradually forms $SnBr_2$ and deposits $Sn(OH)_4$. $SnBr_2$ is insol. in C_6H_{14} but sol. in MeOH; no change of the absorption curve therefore takes place in C_6H_{14}. In MeOH the $SnBr_4$ curve is gradually replaced by that of $SnBr_2$. M. S. B.

Theory of co-ordinate linking. VI. Absorption spectra of some complex salts in different solvents. R. SAMUEL and M. UDDIN (Trans. Faraday Soc., 1935, **31**, 423—432).—Absorption spectra in saturated solutions of NaCl, KCl, KBr, K_2CO_3, Na_2CO_3, and Na_2SO_4 have been investigated for the following salts: $[Co(NH_3)_6]Cl_3$ (I), $[Co(NH_3)_5Cl]Cl_2$ (II), $[Co(NH_3)_5NO_2]SO_4$ (III), $Na_2[Fe(CN)_5NO]$ (IV), $Na_2[RhCl_6]$ (V), $K_2[PtCl_4]$ (VI). Changes in the absorption max. of (I), (II), (III), and (IV), mainly due to a Stark effect as a result of the influence of a foreign ion of opposite charge, are observed. In the presence of CO_3'' new bands appear, indicating the introduction of CO_3'' into the complex ion. The absorption curves of (V) and (VI) in presence of KCl and NaCl show a small shift only, due to the Stark effect; negative ions except Cl′ produce a large displacement. From these and earlier results it is concluded that co-ordinated ions may exhibit quite different types of linking in solution, some being bound by non-electrostatic linkings and others by electrostatic forces only. M. S. B.

Ultra-violet absorption of pyridine, measured with the help of the decomposition of fructose in ultra-violet light. General method for deter-

mining ultra-violet absorption of pure liquids and solutions. R. Cantieni (Helv. Chim. Acta, 1935, 18, 3—4).—A vertical cylindrical quartz tube of 1 cm. bore, closed at the top and connected at the bottom with a levelling tube, is filled with 10% aq. fructose solution. It is surrounded by a second quartz tube of 2 cm. bore, and the liquid of which the absorption is to be measured is contained in the annular space. After exposure for 1 hr. to light from a quartz-Hg lamp the vol. of CO generated in the fructose solution is measured. This vol. $\propto$ the quantity of ultra-violet light transmitted by the external liquid. Pure C_5H_5N and aq. solutions more conc. than 1% are opaque, and solutions more dil. than 0·001% transparent, to ultra-violet light. F. L. U.

Ultra-violet absorption of the thiocarbimide and thiocyanate groups. M. Pestemer and B. Litschauer (Monatsh., 1935, 65, 239—244).—By measurements of the ultra-violet absorption of EtNCS and $OMe\cdot CH_2\cdot NCS$ in C_6H_{14} and MeOH it is shown that the absorption band with its max. at $\nu' = 4020$ mm.$^{-1}$ observed by Kremann *et al.* (A., 1933, 885) in $CH_2\!:\!CH\cdot CH_2\cdot NCS$ must be due to the $\cdot NCS$ group and not to $\cdot C\!:\!C\cdot$. S appears to be the absorbing atom, since both EtNC and EtCN have practically no absorption whilst EtSCN and $Bu^{\alpha}SCN$ both show absorption bands. M. S. B.

Ultra-violet absorption of binary liquid mixtures. VI. System ethyl thiocyanate–hexane. M. Pestemer and G. Schmidt. **VII. System aniline–*m*-cresol in ethyl alcohol.** (Frl.) P. Bernstein. **VIII. System acetone–benzene.** M. Pestemer and B. Litschauer (Monatsh., 1935, 65, 239—244, 245—251, 252—261).—VI. 7 mixtures were examined and no marked shift of the absorption band of EtSCN was noticed.

VII. The extinction coeffs. of NH_2Ph and *m*-cresol are additive.

VIII. Measurements on 7 mixtures indicate considerable deviations from additivity. Since C_6H_6 has practically no dipole moment, dipole association is not necessarily the cause of positive or negative variations of the extinction curves of binary mixtures. M. S. B.

Metachromatism. II. Spectro-photometric study of metachromatic colouring matters. L. Lison (Bull. Acad. roy. Belg., 1934, [v], 20, 1160—1167).—The absorption curves in the visible region of various metachromatic substances have been studied at various concns. It is concluded that only metachromatic substances change in colour in relation to their concn. The modification in structure which produces this characteristic is possible only if one partly substituted NH_2 is present. The phenomenon appears to occur only in presence of H_2O. (Cf. A., 1934, 473.) J. W. S.

Optical absorption of porphyrins. W. Herold (Z. physikal. Chem., 1934, 171, 463—464).—Polemical against Stern and Wenderlein (this vol., 10). R. C.

Optical absorption of porphyrins. A. Stern and H. Wenderlein (Z. physikal. Chem., 1934, 171, 465).—A reply to Herold (cf. preceding abstract). R. C.

Effect of temperature on the absorption of crystals in the infra-red. M. Blackman (Nature, 1935, 135, 233).—Consideration of the reasons for the effect. L. S. T.

Rotation–vibration bands of hydrogen cyanide near 10,381 Å. W. Scheib and K. Hedfeld (Z. Physik, 1935, 93, 428).—A revised allocation of lines gives moments of inertia 19·7 and 18·93 × 10^{40} g.-cm.^{2} (cf. this vol., 10). A. B. D. C.

Infra-red spectrum of fluorine oxide, F_2O. G. Hettner, R. Pohlman, and H. J. Schumacher (Naturwiss., 1935, 23, 114—115).—The spectrum of F_2O was investigated over the range 1—27 μ. Strong bands were found at 5·75, 7·6—8·4, 10·8, and 12·0 μ, the first, and last two, being double. The last three are ascribed to ground vibrations, and F_2O thus has a bent structure. There is a close relationship between the spectrum of F_2O and that of Cl_2O, if the band at 14·5 μ, ascribed by Bailey and Cassie to CO_2 (A., 1933, 1228), is due to Cl_2O. A. J. M.

Smekal–Raman effect in inorganic substances. J. Weiler (Naturwiss., 1935, 23, 125—130, 139—144).—A review. A. J. M.

Raman spectrum of phosphine. J. M. Delfosse (Bull. Acad. roy. Belg., 1934, [v], 20, 1157—1159).—The Raman spectrum of solid PH_3, near its m.p., excited by 22,938, 24,705, and 24,516 cm.$^{-1}$ lines shows a strong vibration frequency of 2306 cm.$^{-1}$, corresponding with the 3336 cm.$^{-1}$ frequency of NH_3. J. W. S.

Raman effect in electrolyte solutions. L. Simons (Soc. Sci. fenn., Comm. phys.-math., 1934, 7, No. 9, 24 pp.; Chem. Zentr., 1934, ii, 1898).—Intensity measurements for Raman lines (I) in aq. nitrates of Na, K, NH_4, Ca, Cd, and Pb, and in aq. $(NH_4)_2SO_4$, $CdSO_4$, HNO_3, and H_2SO_4 are recorded. For the salts the relative intensities of (I) $\propto$ concn., indicating complete dissociation. Two stages in the ionisation of H_2SO_4 were detected. H. J. E.

Raman effect. XXXVIII. Raman spectrum of organic substances. Isomeric paraffin derivatives. V. K. W. F. Kohlrausch and F. Köppl. **XXXIX. Polysubstituted benzenes. V.** K. W. F. Kohlrausch and A. Pongratz (Monatsh., 1935, 65, 185—198, 199—204).—XXXVIII (cf. A., 1934, 239). Data are recorded and discussed for $Bu^{\alpha}OH$, NH_2Bu^{α}, $(\cdot CH_2\cdot OH)_2$, $(\cdot CH_2\cdot NH_2)_2$, *n*-$C_6H_{13}I$, 3 isomeric $C_5H_{11}Cl$, 7 $CHRCl_2$, ααα- and ααβ-$C_2H_3Cl_3$.

XXXIX. Spectra have been determined for $C_6H_4Cl\cdot X$ ($X{=}NH_2$, OH, F, CN, Br, or I in *o*-, *m*-, and *p*-positions). The three positions are characterised by the lines 1030, 1000, and 630, respectively; 600 cm.$^{-1}$ is common to all (cf. A., 1934, 346). M. S. B.

Raman effect and dipole moment in relation to free rotation. II. Modes of vibration of ethylene halides. S. Mizushima and Y. Morino (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1934, 26, 1—10; cf. this vol., 13).—Mathematical. It is shown that the Raman lines 653 and 752 cm.$^{-1}$, previously reported, correspond with the antisymmetric and the symmetric vibrations, respectively, in the *trans*-state. N. M. B.

Raman effect. XL. Raman spectra of *cis-trans* isomerides. O. Paulsen (Z. physikal. Chem., 1935, **B**, **28**, 123—134).—Measurement of the Raman spectra and polarisation relations of *cis-* and *trans-*$C_2H_2Cl_2$ has confirmed Trumpy's results (A., 1934, 1056). Most of the observed lines could be allotted to particular types of vibration of the mol. R. C.

Raman effect of normal nonyl, decyl, and dodecyl nitrates. L. Médard and R. Alquier (J. Chim. phys., 1935, **32**, 63—65).—A large no. of lines and frequencies are tabulated for the three nitrates. The vals. change only slightly amongst the higher members of this homologous series (cf. A., 1934, 716). J. G. A. G.

Investigation of molecular compounds by Raman spectra. I. Saturation of affinity of oxygen in molecular compounds of alcohols, ethers, ketones, and aldehydes. G. Briegleb and W. Lauppe (Z. physikal. Chem., 1935, **B**, **28**, 154—166).—The Raman spectrum of a solution of HBr in Et_2O at room temp. consists of the superimposed spectra of EtBr and Et_2O, but if the solution is prepared and examined at —40° a different spectrum, that of the mol. compound, appears. The Raman spectrum shows that with formation of $SnCl_4,Et_2O$ considerable changes occur in the $SnCl_4$ mol. R.C.

Raman spectra of ketonic terpenes. R. Dulou (Bull. Inst. Pin, 1934, 214—219).—As expected from the exaltation of $[M]_D$, the frequency of the Raman lines due to the ethylenic linking and CO of conjugated ketones is lowered. Examples are given from the carvone, pulegone, and thujone series. R. S. C.

Luminescence in water caused by ultrasonic waves. H. Frenzel and H. Schultes (Z. physikal. Chem., 1934, **B**, **27**, 421—424).—Ultrasonic waves cause luminescence in H_2O, unless the latter is gas-free. This observation supports the theory of electric processes at the interface between expelled air bubbles and H_2O (cf. A., 1933, 473). R. C.

Fluorescence in liquids. J. Franck and H. Levi (Z. physikal. Chem., 1934, **B**, **27**, 409—420).—By analogy with gases it is deduced that the extinction of fluorescence by collisions must occur in liquids in such a way that the electron excitation energy reappears as near as possible in its entirety as electron excitation energy. This may occur either by electron quantum transitions in the other colliding mol. (I) or by chemical reaction between the two. It is a general condition for fluorescence in solution that the excitation energy shall be < the energy necessary for any possible change in (I). Examination of the effect of foreign substances on the fluorescence of chlorophyll in EtOH solution shows that there are cases where photo-oxidation occurs by the acceptor itself taking up energy, thus becoming attackable by O_2 (cf. A., 1933, 1214), not by activation of O_2 (cf. *ibid.*, 1256). The relation between intensity of fluorescence and duration of irradiation has been examined. R. C.

Fluorescence spectra of rubene (tetraphenylrubene) in benzene solution and in the solid state. C. Dhéré and (Mlle.) A. Raffy (Compt. rend., 1935, **200**, 386—388).—The fluorescence spectrum of a C_6H_6 solution of rubene extends from 6500 to 5400 Å., and consists of two bright bands separated by a region of lower intensity. The spectrum is identical whether excited by a C arc or by monochromatic radiation. The solid shows fluorescence only when irradiated with violet or ultra-violet light. J. W. S.

Yield of fluorescence in aqueous fluorescein solutions on anti-Stokes excitation. A. Jabłoński (Acta Phys. Polon., 1933, **2**, 97—103).—A fall in the yield was observed on exciting with longer waves than that at which the max. in the fluorescence band was observed. Ch. Abs. (*e*)

Lenard phosphors in theory and practice. E. Tiede (Chem.-Ztg., 1935, **59**, 105—106, 127—129).—A review of the general nature of Lenard phosphors, and their methods of prep., structure, and technical applications. A. J. M.

Unsaturated nature of dyes and the photovoltaic phenomenon. (Mlle.) C. Stora (Compt. rend., 1935, **200**, 552—554).—The photopotential (I) of many dyes is determined under standard conditions and is independent of the no. of NH_2 and substituted or unsubstituted groups. Fluorescent dyes have a strongly positive (I), influenced by secondary reactions such as photochemical change and oxidation in air. Auxochromes are not concerned in the phenomenon. J. L. D.

Spectral sensitivity of photo-electric counters. R. Audubert and C. Reithmuller (Compt. rend., 1935, **200**, 389—391).—Photo-electric cathodes of amalgamated Cu, CuI, Cu_2S, Cu_2O, PbO, PbI_2, and black SnO show rapidly increasing sensitivity with decreasing λ between 2700 and 2400 Å. The sensitivity of Mg, Cd, CdS, and anodically oxidised Al and Ta increases from about 3300 Å., with max. between 2200 and 2400 Å. Amalgamated Zn has a max. about 2500 Å. and is still sensitive in the visible region. It is possible with various photo-electric cathodes to cover the whole region of emission during chemical reactions. J. W. S.

Detectors. H. Geismann (Physikal. Z., 1935, **36**, 132—138).—The properties of crystal detectors are examined. Pure PbS is incapable of acting as a detector unless its surface is covered with an insulating rectifying layer (I), which may be uni- or poly-mol. A detector may consist of the arrangement Pt surface–(I)–Pt point. The Pt may be replaced by other metals, and the nature of (I) is not important. For rectification, one of the electrodes must be a point electrode; provided it conducts, it may be of any material. A. J. M.

Effect of magnetic field on the crystal photo-effect. G. Groetzinger (Physikal. Z., 1935, **36**, 169—173).—The effect on the crystal photo-effect (I) of a magnetic field (II) perpendicular to the direction of the incident light is two-fold: (1) there is a decrease in the e.m.f. produced by (I) in the direction of the light (III); (2) a component of the e.m.f.

perpendicular to (II) and (III) is produced. The latter is quite distinct from the Hall effect.
A. J. M.

Crystal photo-effect with single crystals of cuprite. R. Deaglio (Physikal. Z., 1935, 36, 144—146).—The crystal photo-effect was investigated for crystals of cuprite from various sources, in order to verify the author's theory (A., 1933, 554). The effect depends on the purity of the crystal.
A. J. M.

Photo-effect in cuprite crystals. N. I. Barbaumov, D. L. Shutak, and A. F. Zivchinski (Physikal. Z. Sovietunion, 1934, 5, 666—675).—It is more difficult to establish a barrier-layer photo-effect in cuprite than in a Cu_2O plate. The effect is more a vol. than a layer effect. Ch. Abs. (e)

Oxygen content and the electrical properties of valve layers of W, Ta, and Nb. O. Mohr (Z. Physik, 1935, 93, 298—314).—Potential variations of capacity (Günther-Schulze and Betz, A., 1931, 1130) were investigated for W, Ta, and Nb, and are ascribed to variations in conductivity due to movement of O in the monocryst. oxide lattice. Structure and variations of valve layers are discussed theoretically.
A. B. D. C.

Rotational state of molecules in liquids. P. Debye (Physikal. Z., 1935, 36, 100—101).—The rotation of mols. in liquids cannot be free, but there is a rotational vibration about an axis, of which the orientation gradually changes. Consideration of the dipole moments (I) of a substance in the liquid and vapour states gives the ratio of the mol. polarisations (II), from which the energy required to rotate a mol. 90° out of its position may be calc. In the case of H_2O this is $10kT$. The variation of (I) with the solvent is also explained on this basis. The fact that the Kerr const. (III) for a substance in the liquid state is $<$ that in the gaseous state is connected with the limited rotation of mols. in the liquid state. The effect of the solvent on (III) will be twice as great as that on (II): verified by recent work on PhCl.
A. J. M.

Properties of layers of molecular dipoles. C. E. Guye (Arch. Sci. phys. nat., 1934, [v], 16, Suppl., 143—145).—Forces due to a single layer and to superposed layers of oriented dipoles are calc.
F. L. U.

Dielectric constants of weakly polar crystals and their variation with temperature. A. Eucken and A. Buchner (Z. physikal. Chem., 1934, B, 27, 321—349).—Born's theory of the dielectric const., ϵ, of solids is valid only for ionic crystals of extremely high polarity. Even the alkali halides do not entirely fulfil this condition, and the theoretical vals. of ϵ are always $>$ the observed vals., and with less polar substances (I) the discrepancies are much greater, with the temp. coeff. of ϵ sometimes qualitatively incorrect. By means of the curves derived by Kirkwood (A., 1932, 447) and Bartholomé (A., 1933, 1227) for the variation of the dipole moment of two oppositely charged atoms with their distance apart, the high observed vals. of ϵ for (I) and the variation of ϵ with temp. are explained. The ϵ of various salts at room temp. and, for several, between −190° and 100° has been measured. R. C.

Dielectric constant and conductivity of ionised gases. T. V. Ionescu and C. Mihul (J. Phys. Radium, 1935, [vii], 6, 35—48).—The variations of capacity and conductance of a condenser containing ionised gases are due to free electrons and to others having a characteristic vibration frequency. An applied electric field strongly modifies the variations due to the free electrons; a magnetic field separates the effects of the two types of electrons. The characteristic frequency is explained by electrons attached to the O_2 mols., and having a precession in the magnetic field of the mol., the frequency being equal to the characteristic frequency. Data on the effect of moisture and pressure variation are given.
N. M. B.

Dipole moment of associated molecules and validity of mass law for association. E. Hertel and E. Dumont (Z. physikal. Chem., 1935, B, 28, 14—16).—Sakurada's method of determining the dipole moment of associated mols. (A., 1934, 475) is of little val. R. C.

Dipole moments of chlorine monoxide and chlorine dioxide. D. Sundhoff and H. J. Schumacher (Z. physikal. Chem., 1935, B, 28, 17—30).—The vals. $1\cdot69 \pm 0\cdot09$ and $0\cdot78 \pm 0\cdot08 \times 10^{-18}$ e.s.u. have been obtained for ClO_2 and Cl_2O, respectively. These show the mols. to be bent, which agrees with chemical and spectroscopic data (cf. A., 1933, 557, 1228). R. C.

Significance of some anomalous dipole moments. E. Bergmann and (Miss) A. Weizmann (Chem. and Ind., 1935, 150—151).—The abnormal dipole moments (I) of *p*-nitrosodialkylanilines, assumed to be due to resonance, may be connected with the abnormal ease of hydrolysis and reaction with MeI and BzCl, which seem to occur by way of $NO^-{:}C_6H_4{:}NR_2^+$. The relatively slight abnormality in (I) for xanthone (3·07; calc. 1·92) compared with pyrone is in line with the more normal ketonic properties of the former and may be due to its more truly aromatic character. R. S. C.

Electric moments of phenylethylene and substituted phenylethylenes. M. M. Otto and H. H. Wenzke (J. Amer. Chem. Soc., 1935, 57, 294—295).—The following electric moments are recorded: $CHPh{:}CH_2$ 0·37, *p*-bromo- 1·35, *p*-chloro- 1·28, *p*-ethyl-phenylethylene 0·61, *p*-tolylethylene 0·63, all $\times 10^{-18}$. E. S. H.

Permanent electric moments of some alkyl chlorosulphites. P. Trunel (Compt. rend., 1935, 200, 557—559).—The electric moments of OMe·SOCl and OEt·SOCl, calc. from the dielectric const. of dil. solutions in C_6H_6 and the mol. refractions, are 2·30 and $2\cdot63 \times 10^{-18}$ e.s.u., respectively, at 25°. The vals. for OPr·SOCl, OBu·SOCl, and $C_6H_{13}O{\cdot}SOCl$ are each about $2\cdot70 \times 10^{-18}$ e.s.u. The vals. for 45° are about $0\cdot03 \times 10^{-18}$ e.s.u. higher in each case. It is concluded that the angles of the linkings are independent of the alkyl radicals, and that they do not vary appreciably with temp. J. W. S.

Negative results in variation of dielectric constant. J. Weigle and R. Luthi (Arch. Sci. phys. nat., 1934, [v], 16, Suppl., 148—150).—The dielectric const. (*D*) of five polar liquids exposed to ultrasonic waves remained const. to 0·05%. For H_2O and $COMe_2$ in turbulent flow corresponding with a Reynolds no. of 60,000, *D* is const. within 0·02%. F. L. U.

Refractive index of thallium vapour near the line λ 5350·46 Å. G. Balin and S. Mandelstam, jun. (Physikal. Z. Sovietunion, 1934, 6, 159—162).—The val. of $n-1$ for Tl vapour at λ 5461 Å. is 300—450 times < McClennan's val., and is compatible with Fermi and Rasetti's val. Ch. Abs. (*e*)

Refractive indices of *p*-azoxyphenetole in the state of anisotropic liquid. P. Chatelain (Compt. rend., 1935, 200, 412—413).—Using the Newton ring method with plain and half-platinised glass plates and lenses, the ordinary and extraordinary refractive indices of *p*-azoxyphenetole have been determined at 135—185° and for λλ 6500, 5460, 4850, and 4360 Å. Results agree with previous vals. J. W. S.

Dispersion and rotatory dispersion of simple sugar derivatives. N. A. Sörensen and B. Trumpy (Z. physikal. Chem., 1935, B, 28, 135—153).—The dispersion (I) and rotatory dispersion (II) of α- and β-methyl-glucoside, -galactoside, and -*l*-rhamnoside have been measured in the visible. For each (I) is simple, corresponding with a centre of absorption at ~ 830 Å. Except for β-methyl-galactoside (II) is simple, the absorption centre responsible for rotation lying between about 1400 and 1500 Å. The displacement of this relative to the centre for refraction agrees with Kuhn's theory. The consts. of the dispersion formulæ, λ_{OR}, λ_{Oa}, and k_R, are for each β-form > for the α-form, but this is not true for some sugars studied by others. Most of the cases of (II) reported by Hirst *et al.* as complex (cf. A., 1934, 1092) prove to be instances of simple (II) if damping is taken into account. R. C.

Circular dichroism of optically active β-octyl nitrite in the vapour state. H. B. Elkins and W. Kuhn (J. Amer. Chem. Soc., 1935, 57, 296—299).—The ultra-violet absorption spectra of gaseous Me, *iso*amyl, and β-octyl nitrite (I) have been examined and compared. No fine structure was observed. Measurements of the circular dichroism of (I) have been made at 90°. The inconstancy of the anisotropic factor is a property of the alkyl nitrite mols., and is partly due to the fact that the absorption has to be attributed when various nitrites are compared to two different electronic transitions producing an anisotropy of opposite sign and showing a shift in wave no. of opposite sign. E. S. H.

Structure of the six-membered rings C_6H_6 and C_6Cl_6. R. Kaiser (Physikal. Z., 1935, 36, 92—99).—The theory of the determination of mol. structure by *X*-ray interference methods is discussed. For C_6Cl_6, a new steel cell with mica windows which will withstand the action of C_6Cl_6 vapour at 450° is described. The scattering curve of C_6H_6 agrees best with a plane model, but no quant. results could be obtained for scattering intensities. The results for C_6Cl_6 are more satisfactory. The C—C distance in C_6H_6 and C_6Cl_6 is 1·42 ± 0·03 Å.; the Cl—Cl distance in C_6Cl_6 is 3·35 ± 0·05 Å. A. J. M.

Systematisation of simple inorganic acids. H. Erlenmeyer (Z. physikal. Chem., 1934, B, 27, 404—408).—These acids can be regarded as formed by some or all of the four cells in the outer electron shell of the central atom, Si, P, S, or Cl, coming to be occupied by a complete octet, the extra electrons being derived from added atoms or groups, *i.e.*, the two-electron groups in the inert-gas configuration of the ion of the central atom undergo equiv. replacement by octets. R. C.

Problem of valency. R. C. Menzies (Chem. and Ind., 1935, 200—202).—Examples are cited in favour of the view that the stability of many compounds may be correlated with the dual tendency of elements to function with an even covalency and to complete the electron systems of the inert gases. H. W.

Can cobalt have a co-ordination number 8? C. Duval (Compt. rend., 1935, 200, 399—401).—Analysis of Co^{III} oxalatopentammine tartrate indicates a formula $[Co(NH_3)_5C_2O_4]_2C_4H_4O_6$ containing no H_2O. This is confirmed by the optical activity being purely a function of the tartrate radical. The salts with other acids are also either anhyd. or lose their H_2O of crystallisation readily. The results are in agreement with co-ordination nos. 6 for Co and 1 for $H_2C_2O_4$. J. W. S.

Pair linking theory of valency. H. Lessheim and R. Samuel (Nature, 1935, 135, 230—231).—Theoretical. L. S. T.

Electronic theory and organic chemistry. I. Valency; polarity; energy. V. Rasumovski (Bull. Soc. chim., 1935, [v], 2, 179—194).—An electronic theory of valency is developed based on dynamical principles. It is assumed that the formation of a chemical linking involves the pairing of electrons, in a neutral zone between the two atoms, but coupled and free valency electrons are all under the influence of the two atoms involved, thus giving rise to charges which cause deformation of the system and oppose an increase of polarity. The difference between polar $(\overset{+}{M}\overset{-}{X})$ and non-polar compounds is thus only one of relative degrees of polarity, of particular and variable magnitude for each compound. From an analysis of the duration of the period in which electrons are within the sphere of influence of the two atoms it is concluded that no electrons are either completely free or completely paired, and that the degree (I) of coupling is the fundamental criterion of chemical activity. Increase of (I) is accompanied by diminution in normal activity and increase in the co-ordinating activity of their mols. Applications are discussed. J. W. B.

Association and polarisability. G. Berger (Z. physikal. Chem., 1935, B, 28, 95—111).—The association of various aromatic hydrocarbons in C_6H_{14}, C_6H_6, and CCl_4 has been investigated ebullioscopically. Association is, in general, greatest in C_6H_{14} and smallest in C_6H_6, but the ratio of the vals. in the two depends on the structure of the solute. The results are interpreted on the basis of London's theory of van der Waals forces, assuming that association $\propto$ the energy of attraction between two dissolved mols. and inversely $\propto$ the square of the energy of attraction between solvent and solute mols. With plate-shaped mols. markedly anisotropic in respect of polarisability, *e.g.*, C_6H_6 and $C_{10}H_8$, on association an orientation parallel to the surface of max. polarisability is assumed. The observed association in CCl_4 is $\ll$ the theory indicates, which is ascribed to the polarising action of the C·Cl dipoles on the double linkings of the solutes. R. C.

Atomic bromine. G. M. Schwab (Z. physikal. Chem., 1934, **B**, **27**, 452—459).—Free Br atoms are produced by electric discharge in Br_2 under 0·1 mm. Every collision with the wall, irrespective of the nature of the latter, leads to recombination. R. C.

Spectroscopy and valency. III. Periodic functions of non-hydride di-atoms. C. H. D. Clark (Proc. Leeds Phil. Soc., 1935, **3**, No. 1, 26—41; cf. A., 1934, 476).—The bearing of the occurrence of max. or min. vals. of spectroscopic const. in group X on structural and valency problems is discussed. F. L. U.

Representation of potential curves for diatomic molecules. W. Lotmar (Z. Physik, 1935, **93**, 528—533).—Different potential-nuclear expressions are discussed. A. B. D. C.

Vibrations of symmetrical tetratomic molecules. (Miss) J. E. Rosenthal (Physical Rev., 1935, [ii], **47**, 235—237).—Mathematical. N. M. B.

The triple linking. (Mlle.) T. Aalam and J. Martinet (Bull. Soc. chim., 1935, [v], **2**, 142—155).—A survey is given of the relation between electronic structure and chemical and physical properties with special reference to compounds of N. J. G. A. G.

Characteristic vibrations of mechanical models of molecules. I. Three mass systems. F. Trenkler (Physikal. Z., 1935, **36**, 162—168).—The work of Kettering *et al.* (A., 1930, 1349) is extended, but limited to plane systems. Models were constructed of steel cylinders and screwed rods, and the form of the vibration was determined by cinematography. The linear symmetrical and asymmetrical and the symmetrical bent and ring forms were investigated. The frequencies, no., and type of the vibrational forms are in qual. and quant. agreement with the valency force system. A. J. M.

New molecular models. H. A. Stuart (Z. physikal. Chem., 1934, **B**, **27**, 350—358).—The radius of the sphere of action in the combined state has been calc. for the atoms of various elements from existing data. Mol. models in which the constituent atoms are represented by caps of spheres instead of true spheres give a moderately correct picture of the space-filling in homopolar mols.; spherical models do not (cf. A., 1932, 446). By using transparent material, the disposition of the nuclei can be shown. R. C.

Space-charge in molecular-ray experiments. M. Kratzenstein (Z. Physik, 1935, **93**, 279—291).—Space-charge effects appear in mol.-ray observations when the mean free path within the furnace is less than 3/2 that of the furnace aperture. A. B. D. C.

Molecular diameter of deuterium as determined by viscosity measurements. A. B. van Cleave and O. Maass (Canad. J. Res., 1935, **12**, 57—62).—Viscosity measurements of H^2_2 over the range 23° to −183° and of the system H^2_2–H_2 over the whole concn. range at 22° show that H^2_2 has the same mol. diameter as H_2. The difference between the mol. vol. of liquid H^2_2O and H_2O is ascribed to a difference in equilibrium between associated and non-associated mols. E. S. H.

Zero point energy and physical properties of H_2O and H^2_2O. J. D. Bernal and G. Tamm (Nature, 1935, **135**, 229—230).—The marked differences in the physical properties of H_2O and H^2_2O must be ascribed to differences in the frequency of angular vibration or libration of the mols. Differences in sp. heat, heats of evaporation and fusion of H_2O and H^2_2O, and the λ shifts in the spectrum of H_2O are accounted for quantitatively. L. S. T.

Changes of matter and their arrest. E. Lange (Z. Elektrochem., 1935, **41**, 107—111).—Physical and chemical changes are considered in a general way, in terms of attractive forces, thermal kinetic energy, and potential thresholds, an example of the last-named being the activation energy of a chemical reaction. R. S. B.

Approximate analytical calculation of exchange energies for Thomas–Fermi atomic systems. P. Gombás (Z. Physik, 1935, **93**, 378—387).—A method that avoids numerical integration is given, and is applied to RbBr and KCl. A. B. D. C.

Surface tension, density, and molecular constitution of a pure liquid. R. Lautié (Bull. Soc. chim., 1935, [v], **2**, 155—159).—By means of the equations relating characteristic temp. with surface tension, γ, and the change, Δ, of d between room temp. and T_c, vals. of Δ and γ of a normal liquid over a wide range of temp. are calc. from the sum of the parachors of its constituent atoms and linkings. J. G. A. G.

Parachor and structure of nickel carbonyl. F. W. Laird and M. A. Smith (J. Amer. Chem. Soc., 1935, **57**, 266—267).—The surface tension of $Ni(CO)_4$ at 8°, 14°, and 20° is 17·21, 16·55, and 15·88 dynes per cm., respectively. The parachor of $Ni(CO)_4$ is 259·9, indicating the val. 19·9 for P_{Ni}. E. S. H.

Parachors of ethyl orthoformate and triphenylmethane. D. L. Hammick and H. F. Wilmut (J.C.S., 1935, 207).—The re-determined parachors of $CH(OEt)_3$ and $CHPh_3$ (367·2 and 586·5, respectively) show no anomaly. There is no evidence that three large groups substituted in the CH_4 mol. produce parachor anomaly (cf. A., 1934, 350). J. W. S.

Interferometric determinations with *X*-rays in chlorine, methane, and trimethylamine. H. Richter (Physikal. Z., 1935, **36**, 85—91).—The scattering curve of Cl_2 agrees more closely with that based on the Hartree approximation than with the Fermi and Thomas approximation. The NMe_3 mol. is a very flat pyramid. A. J. M.

Simplification of Prins' formula for diffraction of *X*-rays by a perfect crystal. F. Miller, jun. (Physical Rev., 1935, [ii], 47, 209—212).—Mathematical. N. M. B.

Theory of anisotropic liquids. XXI. Molecular forces produced by liquid crystals. C. W. Oseen (Ark. Mat. Astr. Fys., 1934, A., 24, No. 19, 11 pp.; Chem. Zentr., 1934, ii, 1890; cf. A., 1934, 1162).—Difficulties in explaining the structure of cholesterol nematic substances persist on treating the mols. as three-dimensional. H. J. E.

Anisotropy in the velocity of growth of new grains on recrystallisation. M. Kornfeld (Physikal. Z. Sovietunion, 1934, 6, 170—174).—An anisotropy in the growth of new grains is observed when polycryst. Al is heated at temp. slightly > the recrystallisation temp. The degree of anisotropy depends on the temp. of heating. Ch. Abs. (*e*)

Study of crystal orientation by means of the Weissenberg *X*-ray goniometer. J. Palacios, J. Hengstenberg, and J. G. de la Cueva (Anal. Fís. Quím., 1933, 31, 811—821).—The interference diagram obtained on a single plate is used in conjunction with a nomogram to give a diagram showing the orientation of the crystals in a polycryst. material. Typical results for Al wire and foil are described. H. F. G.

Effect of a grain boundary on the deformation of a single crystal of zinc. R. F. Miller (Amer. Inst. Min. Met. Eng., Inst. Met. Div., 1934, Tech. Pub. No. 576, 9 pp.).—On elongation, the single-crystal section of the specimen became elongated by a single flexural gliding process, and assumed a characteristic shape on encountering the grain boundary. Ch. Abs. (*e*)

Transformation of NH_4Cl at −30°. J. Weigle and F. Huber (Arch. Sci. phys. nat., 1934, [v], 16, Suppl., 150—152).—Lattice consts. for the two modifications of NH_4Cl are given for the range −75° to 20°. A sudden expansion with rise of temp. occurs at about −30°, and two lattices, the dimensions of which differ by 0·3%, coexist over an interval of 5°. F. L. U.

Transformation of NH_4Br near −40°. J. Weigle and H. Saini (Arch. Sci. phys. nat., 1934, [v], 16, Suppl., 147—148).—A preliminary account of *X*-ray measurements showing that below −40° NH_4Br is no longer cubic. F. L. U.

***X*-Ray investigation of lattice distortions produced in copper by filing.** G. W. Brindley and F. W. Spiers (Proc. Leeds Phil. Soc., 1935, 3, No. 1, 4—11).—The at. scattering factor for filings from chill-cast and hard-drawn Cu is > that for pptd. Cu. The result, attributed to lattice distortion caused by the filing, can be explained by assuming a random displacement of the atoms of 0·125 Å. from the points of the undistorted lattice. F. L. U.

***X*-Ray studies on the hydrous oxides. V. β-Ferric oxide monohydrate.** H. B. Weiser and W. O. Milligan (J. Amer. Chem. Soc., 1935, 57, 238—241).—β-Fe_2O_3,H_2O is formed as a yellowish ppt. by the slow hydrolysis of aq. $FeCl_3$. *X*-Ray data show that the crystals are orthorhombic, having a_0 5·28, b_0 10·24, and c_0 3·34 Å. E. S. H.

***X*-Ray studies on the hydrous oxides. VII. Ferric oxide.** H. B. Weiser and W. O. Milligan (J. Physical Chem., 1935, 39, 25—34).—Ageing under H_2O of the brown gel pptd. by bases from aq. Fe^{III} salts is shown by *X*-ray analysis to produce α-Fe_2O_3 (I) in a few weeks or months when cold, or in a few hr. when near b.p. Systematic investigation shows the growth from finely-divided particles to crystals large enough to give sharp diffraction lines. Pptn. near 100° gives immediately a weak *X*-ray diagram. Contrary to the results of Thiessen *et al.* (A., 1930, 559), dehydration isotherms of the gel formed by slow hydrolysis of $Fe(OEt)_3$ show no breaks due to definite compounds. Rapid hydrolysis of Fe^{III} salts gives (I), whilst slow hydrolysis gives a yellow ppt. of hydrous α-Fe_2O_3,H_2O (II). $FeCl_3$ is an exception, giving β-Fe_2O_3,H_2O. Under certain conditions $Fe_2(SO_4)_3$ gives a definite basic sulphate instead of (II). M. S. B.

***X*-Ray determination of the structure of $FeAl_3$.** E. F. Bakhmetiev (J. Exp. Theor. Phys. U.S.S.R., 1934, 4, 292—293).—The dimensions of the unit cell are 15·48 × 8·11 × 11·92 Å. (24 mols. $FeAl_3$). Ch. Abs. (*e*)

Crystal structure of $LaTl_3$. A. Rossi (Gazzetta, 1934, 64, 955—957).—$LaTl_3$ has a hexagonal lattice with *a* 3·45 Å., *c*/*a* 1·60, $d_{obs.}$ 10·92, $d_{calc.}$ 10·89. O. J. W.

Constitution of lithium nitride. E. Zintl and G. Brauer (Z. Elektrochem., 1935, 41, 102—107).—Li_3N has hexagonal co-ordination, and not the cubic mol. lattice of Brill (cf. A., 1928, 108). *a* 3·658 Å., *c*/*a* 1·061; each cell contains one Li_3N. N''' at 000, $Li^{\cdot}$ at $00\frac{1}{2}$, $\frac{1}{3}\frac{2}{3}0$, $\frac{2}{3}\frac{1}{3}0$. Each N''' is distant 1·94 Å. from 2 $Li^{\cdot}$, and 2·11 Å. from 6 $Li^{\cdot}$. $d_{calc.}$ 1·28, $d_{obs.}$ 1·3. By replacing 6F′ by 3O″ or 2N‴ in LiF the "anion gap" lattices of Li_2O and Li_3N follow. R. S. B.

Crystal structure of hexachloro-salts. G. Engel (Centr. Min. Geol., 1934, A, 285—286).—Vals. are recorded for the *a* parameters of a series of salts of the $R^I_2R^{IV}Cl_6$ type (R^I=K, NH_4, Rb, Cs, Tl; R^{IV}=Ti, Se, Zr, Sn, Te, Pt, Pb). All except K_2TeCl_6 belong to the cubic K_2PtCl_6 type. Ch. Abs. (*e*)

Structure of cæsium enneachlorodiarsenite, $Cs_3As_2Cl_9$. J. L. Hoard and L. Goldstein (J. Chem. Physics, 1935, 3, 117—122).—The hexagonal unit cell, containing 1 mol., has a_0 7·37, c_0 8·91 Å., $d_{calc.}$ 3·42. The structure is discussed. F. L. U.

Compounds with the perowskite structure. A. Hoffmann (Z. physikal. Chem., 1935, B, 28, 65—77; cf. A., 1933, 1098; 1934, 615).—The dimensions of the perowskite (I) lattices of $SrXO_3$ (X=Ti, Sn, Hf, Zr, Ce) have been measured. The results agree with the condition that for the (I) structure in compounds YXO_3 the val. of the radius ratio $(R_Y+R_O)/\sqrt{2}(R_X+R_O)$ must be $< 1·1$, but $\nless 0·9$. The *compound* $BaPrO_3$ has been prepared. $PbZrO_3$ shows the lines of the (I) structure and of a superlattice, the length of the edge of the unit cell being tripled in at least one direction. R. C.

Crystal structure of arsenical struvite. R. Salvia (Anal. Fís. Quím., 1933, **31**, 822—824).—The rhombic pyramidal crystals have a_0 7·00, b_0 6·14, c_0 11·11 Å.; 2 mols. in the unit cell; space-group C_{2v}^7. H. F. G.

System Na_2O–B_2O_3. I. Preparation of crystalline B_2O_3 and some of its physical properties. S. S. Cole and N. W. Taylor. **II. Properties of anhydrous and hydrated metaborates of sodium and potassium.** S. S. Cole, S. R. Scholes, and C. R. Amberg (J. Amer. Ceram. Soc., 1935, **18**, 55—58, 58—61).—I. H_3BO_3 was dehydrated in vac. at 200° and then sintered at 225° for 400 hr. *X*-Ray examination showed the material to be free from glass. Cryst. B_2O_3 was also obtained by the devitrification of the anhyd. glass at 280—290°: *n* 1·458, *d* 1·805, m.p. 294°±1°; the cubic unit cell contains 16 mols. a_0 10·035 Å.

II. The prep. and physical properties (including *X*-ray data) of the salts are recorded. J. A. S.

Crystal structure of cyanuric triazide. I. E. Knaggs (Nature, 1935, **135**, 268).—Hughes' measurements (this vol., 286) are not sufficiently precise to permit his conclusions. L. S. T.

Crystal form of anhydrous citric acid. G. M. Bennett and J. L. Yuill (J.C.S., 1935, 130).—Anhyd. citric acid is monoclinic with β 99° 7′, $a : b : c =$ 1·935 : 1 : 1·150; d_4^{18} (vac.) 1·665, m.p. 156—157° (corr.). It has low positive double refraction. The transition point of the anhyd. and monohydrated forms is 36·3°. J. W. S.

Properties of cellulose esters of homologous fatty acids. S. E. Sheppard and P. T. Newsome (J. Physical Chem., 1935, **39**, 143—152).—Physical properties of a series of cellulose tri-esters of homologous aliphatic acids, from AcOH to stearic acid, show that the cellulose character is gradually submerged as the length of the chain increases. The structure of the solids is discussed on the basis of *X*-ray and wetting and spreading data. M. S. B.

Crystallographic and *X*-ray investigation of some diphenylamine derivatives. R. G. Wood, S. H. Ayliffe, and N. M. Cullinane (Phil. Mag., 1935, [vii], **19**, 405—416).—2 : 4 : 6-Trinitrodiphenylamine exists in two identical forms, reddish-orange prisms and yellowish-orange needles, the former separating from EtOAc, the latter from EtOH. *X*-Ray measurements gave $a : b : c = 1·49 : 1 : 2·13$, β 115° 33′; 4 mols. per unit cell, *d* 1·570, space-group C_{2h}^5 ($P2_{1/c}$). 2 : 4 : 6-Trinitro-4′-methyldiphenylamine exists as deep red needles (stable) from $COMe_2$, and yellowish-orange needles from CCl_4. The former has $a : b : c = 0·737 : 1 : 0·345$, β 103°; the latter, $a : b : c = 2·51 : 2 : 1·74$, β 114° 8′; each has *d* 1·532, 4 mols. per unit cell, space-group as above. N. M. B.

Crystal structure of ergosterol and cholesterol derivatives. G. E. R. Schulze (Z. physikal. Chem., 1934, **171**, 436—444).—The compound of ergosteryl acetate (I) with maleic anhydride has the space-group C_2^2. Comparison of the dimensions of the unit cells of the two isomerides with those of ergosterol (II) and (I) leads to conclusions as to the position of the double linkings consonant with Windaus' formula for (II) (A., 1934, 768). The dimensions of the unit cells of cholestene dibromide, hydroxycholestenone dibromide, cholestanedione, cholesteryl acetate, and acetoxybisnor*allo*cholanic acid have been determined. R. C.

Structure of cellulose trinitrate. M. Mathieu (Compt. rend., 1935, **200**, 401—403; cf. this vol., 286).—The monoclinic lattice defined by the parameters *a* 13·9, *c* 9 Å., β 90°, *b* (axis of fibre) 25·6 Å. is suggested. J. W. S.

α-Folliculin. See this vol., 413.

***X*-Ray diffraction studies of built-up films of long-chain compounds.** G. L. Clark, R. R. Sterrett, and P. W. Leppla (J. Amer. Chem. Soc., 1935, **57**, 330—331).—Technique for the investigation of reactions in uni- and multi-mol. films is described. E. S. H.

Diffraction of electron beams by a crystal lattice. T. Hayasi (Sci. Rep. Tôhoku, 1934, **23**, 491—522).—Mathematical treatment of the interference bands obtained by scattering of a non-symmetrical spherical wave by a crystal lattice. W. P. R.

One-dimensional electron diffraction. J. R. Tillman (Phil. Mag., 1935, [vii], **19**, 485—500; cf. Emslie, A., 1934, 243).—Investigation of the one-dimensional diffraction of fast electrons by the (110) face of Zn blende indicates that the electrons often become confined to potential tubes in the crystal surface, which contain whole or parts of both Zn and S ions. Measured vals. of the mean electrostatic potentials inside these tubes are accounted for theoretically. The diameter of the tubes is approx. that of a Zn ion, 1·6 Å. N. M. B.

Surface lattice interference in the passage of cathode rays through galena. S. von Friesen (Ark. Mat. Astr. Fysik, 1934, **B**, 24, No. 8, 4 pp.; Chem. Zentr., 1934, ii, 1894). H. J. E.

Electron diffraction by aluminium and aluminium oxides. C. Mongan (Helv. Phys. Acta, 1934, 7, 482—484; Chem. Zentr., 1934, ii, 2169).—The absence of Al_2O_3 lines from electron diffraction photographs of very fine Al powder shows that any Al_2O_3 layer must be $< 10^{-6}$ cm. thick. Results are given for corundum and Al_2O_3, showing very fine particle size. J. S. A.

Derivation of the free path of metal electrons in bismuth from the electrical resistance of very thin single crystal wires. A. Eucken and F. Förster (Nachr. Ges. Wiss. Göttingen, 1934, [ii], **1**, 43—54; Chem. Zentr., 1934, ii, 2186).—The sp. resistance (I) of very thin wires was given by $\rho_d = \rho_\infty[1 + \alpha^2/d]$, α being a measure of the reflexion of electrons from the metal surface. (I) was measured for single Bi crystals of 1·9—24 μ diameter from 20° to 550° abs. The free path, calc. from α, varied as T^{-2}—T^{-3}, in agreement with the classical, but not the Fermi–Sommerfeld, electron theory. J. S. A.

Effect of electric charge on the conductivity of a metal foil. M. Pierucci (Nuovo Cim., 1934, **11**, 277—287; Chem. Zentr., 1934, ii, 2507; cf. A., 1933, 117).—The conductivity of a W foil increased on giving it a positive or negative charge. H. J. E.

Variation of the resistance of nickel with temperature at the Curie point. B. Svensson (Ann. Physik, 1935, [v], **22**, 97—100).—The temp.-resistance curve of Ni shows a change of direction at the Curie point (362·9±0·2°), agreeing with the view that spontaneous magnetisation ceases at this temp. A. J. M.

Variation of the resistance of metals in a magnetic field. Ş. Ţiteica (Ann. Physik, 1935, [v], **22**, 129—161).—Mathematical. A. J. M.

Electrical resistance of cobalt in longitudinal magnetic fields. M. S. Alam (Z. Physik, 1935, **93**, 556—560).—The resistance increases with increasing magnetic field and reaches a saturation val. with magnetic saturation; hysteresis appears with decreasing magnetic field. A. B. D. C.

Thermodynamics of magnetisation. E. C. Stoner (Phil. Mag., 1935, [vii], **19**, 565—588).—Theoretical.

Energetic and magnetic anisotropy in polycrystalline ferromagnetic plates in a magnetic field. A. Drigo (Nuovo Cim., 1934, **11**, 345—356; Chem. Zentr., 1934, ii, 2508).—A theoretical discussion. H. J. E.

(A) **Can the magnetic coupling of spontaneous magnetisation be observed experimentally?** (B) **Origin of changes of susceptibility with the frequency.** A. Perrier (Helv. phys. Acta, 1934, **7**, 471—472, 474—475; Chem. Zentr., 1934, ii, 2508). H. J. E.

Dependence of the permeability of iron, nickel, and cobalt on frequency. R. Sänger (Helv. phys. Acta, 1934, **7**, 478—480; Chem. Zentr., 1934, ii, 2508—2509).—The origin of the fall in ferromagnetic permeability above a crit. frequency of the magnetic field is discussed. H. J. E.

Problems on the theory of ferromagnetism. T. Hirone (Sci. Rep. Tôhoku, 1934, **23**, 523—536).—The Heisenberg theory does not account for the existence of a saturation val. of magnetisation. At liquid H_2 temp. vals. deviate from an integral no. of one Bohr magneton. An analysis based on consideration of energy levels in each term of an elementary complex with the atoms in their ground state is given, which explains the deviation. The sp. heat of a ferromagnetic substance attains a max. just below the temp. of the crit. point. It is shown that the magnetic transformation is an endothermic change which explains the large increase in sp. heat just below the change point. The sp. heat due to the magnetic change is calc., and when added to that due to thermal vibrations results in a val. in close agreement with experiment. W. P. R.

Magnetic properties of pure nickel near the Curie point. L. Néel (J. Phys. Radium, 1935, [vii], **6**, 27—34).—Using an improved high-precision apparatus, data for the variation of susceptibility with temp. and magnetic field accurate to 0·005° were obtained for Ni, for the range 50—1000 gauss, from the Curie point (358°) to 368°. N. M. B.

Tribo- and photo-electric effects for palladium. P. A. Mainstone (Phil. Mag., 1935, [vii], **19**, 278—290).—The frictional charge is a min. and the photosensitivity a max. at moderately low pressures. Reversal of sign of the frictional charge is due to the presence of O_2. Occluded H_2 increases the photosensitivity to a max. at saturation, not diminished by subsequent removal of the H_2. The form of the low-pressure frictional isotherm is independent of the occlusion of gas. C. W. G.

Nature of the metallic state. W. C. Fernelius and R. F. Robey (J. Chem. Educ., 1935, **12**, 53—67).—A discussion. L. S. T.

Dispersion of optical activity of quartz in directions inclined to the optical axis. C. Münster and G. Szivessy (Physikal. Z., 1935, **36**, 101—106).—When the normal is inclined 56° 10′ to the optical axis, quartz behaves as if it were inactive to perpendicularly incident parallel light throughout the whole spectral range. Such plates should be used in certain optical instruments. A. J. M.

Plasticity of rock-salt crystals. E. N. da C. Andrade (Nature, 1935, **135**, 310).—Plates of rock-salt can easily be bent under running cold H_2O. L. S. T.

Deformation slip in single tin crystals. K. Bausch (Z. Physik, 1935, **93**, 479—506).—Slip was obtained in the new system [010](100). Slip-tension curves were obtained at different rates of deformation and different temp. A theory of crystal plasticity is given. A. B. D. C.

Allotropy of sulphur. K. Neumann (Z. physikal. Chem., 1934, **171**, 399—415).—Mol. wt. determinations with the vapour in equilibrium with the solid forms of S at 60—100° show the vapour of S_α and S_β to consist of S_8 mols. The existence of Muthmann's S has been confirmed (cf. A., 1933, 1258). Wigand's reaction velocity method for determining the mol. wt. of insol. S (A., 1908, ii, 676) is valueless. The vapour of this form contains mols. $< S_8$ probably identical with Aten's S_π; S_μ is a polymerisation product of these. The proportion of material sol. in CS_2 in plastic S does not change when the latter is drawn into threads. Meyer and Go's picture of the structure of S threads (A., 1934, 1296) seems to be incorrect; the considerable proportion of amorphous sol. material ($S_\lambda+S_\pi$) present cannot be disregarded. A thread which has hardened at room temp. recovers in hot H_2O, unless the amorphous part has been previously extracted with CS_2. R. C.

Mol. wt. of a pure liquid at its normal b.p. R. Lautié (Compt. rend., 1935, **200**, 455—456).—The mol. surface energy const. and the effect of polymerisation and the existence of double mols. are considered for liquefied gases and org. and inorg. liquids. N. M. B.

Diamagnetism of light and heavy water. F. W. Gray and J. H. Cruickshank (Nature, 1935, **135**, 268—269).—The mol. diamagnetism (I) of H^2_2O

is 12·96±0·02. Mixtures containing 44, 62, and 87% of H^2_2O show strictly additive susceptibility. H^1_2O, H^2_2O, and H^1H^2O thus appear to have identical (I). More refined measurements reveal a lag in which appears an observable magnetic difference between H^1_2O and H^2_2O. With freshly melted H_2O the susceptibility reaches a max. after 20 min. and then falls slightly to a const. val. This behaviour is interpreted in terms of the state of co-ordination of H_2O. With H^2_2O, a similar but less pronounced change occurs.

L. S. T.

Magnetochemical investigations. XII. Magnetic behaviour of some volatile fluorides. XIII. Fluorides of copper, nickel, and cobalt. P. Henkel and W. Klemm (Z. anorg. Chem., 1935, **222**, 70—72, 73—77).—XII. Diamagnetic measurements have been made on GeF_4 and all the known hexafluorides at the temp. of liquid O_2. The results are compared with the vals. calc. by Angus' method (A., 1932, 795). SF_6, SeF_6, and TeF_6 are in good agreement. GeF_4 shows an unexplained deviation. The experimental vals. for MoF_6, WF_6, and UF_6 are considerably $<$ the calc. vals., UF_6 being paramagnetic. The behaviour is compared with that of the O compounds.

XIII. The magnetic susceptibilities χ of CuF_2, NiF_2, CoF_2, and CoF_3 have been measured at $-183°$, $-78°$, and 20°. Effective magneton nos. are also given. These are considerably $<$ for salt-like compounds in general, the fluorides apparently standing between chlorides and oxides. For CoF_3 a magnetic moment similar to that of $Fe^{\cdot\cdot}$ is to be expected, *i.e.*, about 5·2, but it is 2·46 only, at 20°. M. S. B.

Paramagnetic properties of bivalent chromium salts. E. Lips (Helv. Phys. Acta, 1934, **7**, 537—583; Chem. Zentr., 1934, ii, 2375).—Measurements of the susceptibility of $CrSO_4,6H_2O$ follow the Curie–Weiss law (I) between 54° and 400° abs. The magneton no.=4·82 Bohr units. $CrCl_2$ deviates from (I) throughout the same temp. range. H. J. E.

Influence of physical state on the magnetic properties of some salts of the iron group. A. Lallemand (Ann. Physique, 1935, [xi], **3**, 97—180).—Variation of magnetic susceptibility with temp. was investigated. The magnetic moments of paramagnetic salts melted in their H_2O of crystallisation can assume vals. varying with the concn., the susceptibility decreasing at high concn. For $CoCl_2$ the effect at high concn. is not wholly reversible on dilution, and explains the two types of solution previously reported. Magnetic data for gaseous $FeCl_3$ establish the mol. as Fe_2Cl_6. The ions of Fe^{III} and Mn^{II} salts gave 29·5 and 29·2 magnetons respectively, compared with the quantum val. 29·38. The val. for the anhyd. chlorides deviates from the theoretical 28·7. The magnetic properties of the hydrated chlorides and their solutions were identical. Results in general agreed with Weiss' law. N. M. B.

Thermal expansion of rock-salt and pure NaCl. H. Saini (Helv. phys. Acta, 1934, **7**, 494—500; Chem. Zentr., 1934, ii, 2191).—The thermal expansion of rock-salt and of chemically pure NaCl, determined by *X*-rays, agree between 0° and 100°, but differ above that temp. J. S. A.

Cryoscopic properties of some terpenes. R. Dulou (Bull. Inst. Pin, 1934, 210—213).—The cryoscopic const. (I) of camphenilone, m.p. 36—37°, is 605 and the heat of fusion 3·2 g.-cal.; it gives good vals. for the mol. wt. of several substances. (I) for camphene is about 270. R. S. C.

Stoicheiometry. I. Heat of fusion of organic compounds. J. Timmermans (Bull. Soc. chim. Belg., 1935, **44**, 17—40).—Determinations of the heat (*L*) and mol. heat (*Q*) of fusion of org. compounds (1) by direct measurement, (2) from the cryoscopic const., and (3) from the f.-p. curves of binary mixtures of "normal" substances are discussed and the data tabulated. It is generally possible to predict the order of magnitude of *L* or *Q* from the chemical nature and the structure and shape of the mols., but a few anomalous vals. remain unexplained. F. L. U.

Purification and physical properties of organic compounds. VIII. Thermal study of liquid crystal formation. E. L. Skau and H. F. Meier (Trans. Faraday Soc., 1935, **31**, 478—480).—A time-temp. curve (cf. A., 1933, 667) has been obtained for *p*-methoxycinnamic acid. The f.p. is 172·1° and the transition point from the liquid-cryst. to the liquid-amorphous state is 187·3°. The ratio of the heat of fusion of the solid to the heat of transition of the liquid crystals is 7 : 1. M. S. B.

Purification and physical properties of organic compounds. VII. Effect of impurities on the apparent heat of fusion. E. L. Skau (J. Amer. Chem. Soc., 1935, **57**, 243—246; cf. A., 1934, 1085).—Determinations with pure and impure C_6H_6 show that large errors may be involved when the usual method of correcting for the presence of impurities is followed. E. S. H.

Heat of vaporisation of a pure substance from the measurement of temperature at two points and the vertical distance between them. S. C. Collins (J. Amer. Chem. Soc., 1935, **57**, 330).—Theoretical. E. S. H.

Heats of sublimation of organic molecules. K. L. Wolf and H. G. Triesohmann (Z. physikal. Chem., 1934, **B**, **27**, 376—380).—Measurement of the heat of sublimation, *Q*, of fumaric and maleic acids and their Me esters, and various aromatic substances has indicated a general divergence from Trouton's rule. The relation of *Q* to intramol. forces (cf. A., 1932, 21) is discussed. R. C.

Direct determination of heat of condensation. II. Experiments with intensively dried liquids. A. Smits and D. Cannegieter (Z. physikal. Chem., 1935, **172**, 1—32; cf. A., 1934, 836).—The heat of condensation, *Q*, of the vapour from C_6H_6 dried for a long time over P_2O_5 passes with increasing duration of drying through a min., $\sim 9\% <$ the normal val. (I), but ultimately rises to (I) again. The depression of *Q*, which is observed only if the whole apparatus has previously been heated while a current of dry O_2 passed through, is the greater the more rapid is vaporisation and condensation. With EtBr drying increases *Q*, but with Br the results were inconclusive. These effects are ascribed to the delaying by drying of the establishment of inner equilibrium. Q may from this cause either rise or fall. Between formation and condensation C_6H_6 vapour approaches inner equilibrium according to the unimol. law. The wall of a highly dried glass apparatus becomes moist again after a time, probably due to diffusion of H_2O to the surface from within. This increases the rate of internal transformation in the vapour phase. For C_6H_6 one pseudo-component is probably a polymeride of the other. R. C.

Anomalous specific heats. B. Ruheman and M. Ruheman (Physikal. Z. Sovietunion, 1934, 6, 186—188).—It is suggested that all the sp. heat anomalies at transition points (*e.g.*, transition of metals to superconductors) should be interpreted in terms of phase changes in binary systems. Ch. Abs. (*e*)

Calculations of heat capacities of gases at high pressures and temperatures. I. I. Gelperin and S. M. Rips (Khimstroi, 1934, 6, 455—458).—A formula was calc. for the mol. sp. heat of N_2, H_2, and CO at 0—600° and 700—1200 atm. Ch. Abs. (*e*)

Specific heats of light-metal fluorides at high temperatures. A. N. Krestovnikov and G. A. Karetnikov (Legk. Metal, 1934, 3, No. 4, 29—31).—Vals. are recorded for the sp. heats of MgF_2, BaF_2, and Na_3AlF_6 (300—1000°) and for NaF (300—800°). Ch. Abs. (*e*)

Determination of small density differences in water. E. Hofer (Z. physikal. Chem., 1934, B, 27, 467—472).—A combination of the methods of d determination of Gilfillan and Polanyi (A., 1933, 1136) and Lewis and Macdonald (J. Amer. Chem. Soc., 1933, 55, 1297) permits determination of d differences in H_2O with a precision of 5×10^{-7}. R. C.

Density of water in relation to its thermal history. M. Dole and B. Z. Wiener (Science, 1935, 81, 45).—Determinations of flotation temp. show that the freezing and melting of H_2O and ice produce no detectable changes in the internal structure of H_2O. Ice H_2O obtained by melting large commercial ice blocks appears to have a larger d than purified H_2O by 2·4 p.p.m. There is no evidence of an enhanced % of $(H_2O)_2$ in ice H_2O as compared with steam H_2O. L. S. T.

Low-temperature densities of WF_6 and OsF_8; CF_4 as immersion liquid. P. Henkel and W. Klemm (Z. anorg. Chem., 1935, **222**, 67—69).—Density measurements have been made in CF_4 at −183°, but, as the f.p. of CF_4 is $-183{\cdot}6\pm0{\cdot}2°$, no solid CF_4 must be present. For WF_6 d is $4{\cdot}75\pm0{\cdot}02$ and for OsF_8 $3{\cdot}87\pm0{\cdot}02$. These give 62 and 87 c.c., respectively, for the zero point mol. vols. Neglecting the vol. of the central ion the increases for F′ are, therefore, 10·3 and 10·6 c.c., respectively. These are little > the normal vol. 9·5 c.c. The ratios $d_{0°\text{ abs.}}/d_{\text{b.p.}}$ for the two compounds are 1·41 and 1·44, respectively, *i.e.*, the normal val. within the limits of experimental error. M. S. B.

Transition of thallous iodide. F. Ishikawa and Y. Satô (J. Chem. Soc. Japan, 1934, 55, 930—934).—Dilatometric data are recorded. The transition temp. was 170—171°. Ch. Abs. (*e*)

Kinetic-molecular theory and its relation to heat phenomena. J. A. Temm (J. Chem. Educ., 1935, **12**, 31—34). L. S. T.

Thermodynamic theory of the equation of state. V. Jacyno, S. Derevjankin, A. Obnorski, and T. Parfentjev (Z. Physik, 1935, **93**, 348—349).—The previous theory is extended to bring c_p and c_v into the equation (cf. A., 1934, 1070). A. B. D. C.

Properties of real gases according to the thermodynamic equation of state. IV. V. Jacyno (Z. Physik, 1935, **93**, 338—347).—Formulæ are given for the internal energy, enthalpy, entropy, "max. work," and thermodynamic potential of He (cf. this vol., 22). A. B. D. C.

Thermodynamic functions of tetramethylmethane. L. S. Kassel (J. Chem. Physics, 1935, 3, 115—116).—Mathematical. F. L. U.

Thermodynamic properties of dichloromethane. I. S. Sugawara (J. Soc. Mech. Eng., Tokyo, 1934, 37, 491—496).—V.-p. measurements are recorded (60° to −20°). The b.p., crit. temp., and crit. pressure were 40·18°, 216°, and 49·7 kg. per sq. cm. respectively. Ch. Abs. (*e*)

Critical constants of propane. J. A. Beattie, N. Poffenberger, and C. Hadlock (J. Chem. Physics, 1935, 3, 96—97; cf. this vol., 438).—Examination of isotherms in the crit. region give t_c $96{\cdot}81\pm0{\cdot}01°$, p_c $42{\cdot}01\pm0{\cdot}02$ normal atm., v_c 4·43 (±1%) c.c. per g. F. L. U.

Critical temperatures as microchemical test. J. Harand [with note by F. Emich] (Monatsh., 1935, 65, 153—184).—A simple micro-method for the determination of crit. temp. (I) is described. (I) of MeCl, CH_2Cl_2, $CHCl_3$, CCl_4, and Et_2O have been found. From these the crit. temp. of CH_4 has been calc. as 186·6° abs. (I) of *n*-, *iso*-, and technical C_4H_{10} have been determined and it is shown that the method may be used for the identification of substances, gaseous at room temp., which are not otherwise easily distinguishable from one another; it may also be applied to the determination of purity. (I) of C_6H_6–PhMe and $CHCl_3$–CCl_4 mixtures have been determined and are in good agreement with the vals. calc. from Pawlewski's formula. M. S. B.

Effect of intensive drying on establishment of inner equilibrium. III. A. Smits and D. Cannegieter (Z. physikal. Chem., 1934, **171**, 445—453; cf. A., 1931, 799).—V.-p. measurements cannot be made sufficiently rapidly to demonstrate the effect of intensive drying (I) on inner equilibria in liquids. Measurements of the heat of condensation (II) of vapour formed from the liquid, however, can be made with sufficient rapidity (cf. this vol., 436). The results which have been obtained explain Smith's observations on the effect of (I) on the rate of distillation of MeBr (A., 1932, 329). Baker's results for the effect of (I) on (II) (J.C.S., 1922, **121**, 568) are inconclusive. In Manley's experiments (A., 1929, 753) the C_6H_6 was not intensively dried. So far, the only properties of liquids conclusively shown to be affected by (I) are (II) and rate of condensation. R. C.

Vapour-pressure measurements with rhombic and monoclinic sulphur below the m.p. K. Neumann (Z. physikal. Chem., 1934, **171**, 416—420).—V.-p. measurements have been made at 60—115°. The calc. mol. heats of vaporisation are 24,080±70 and 23,240±70 g.-cal. for S_α and S_β, respectively, giving 840±100 g.-cal. for the heat of transition. R. C.

Vapour pressures of the hexafluorides of selenium and tellurium. P. Henkel and W. Klemm (Z. anorg. Chem., 1935, **222**, 65—66).—Previous measurements (A., 1932, 905) have been repeated and the vals. for SeF_6 at lower temp. have been corr., giving $5{\cdot}9_5$ instead of $5{\cdot}6_3$ kg.-cal. for the heat of sublimation σ. This brings the ratio $\sigma/T_{\text{subl.}}$ into line with the vals. for SF_6 and TeF_6. The results are not in agreement with those of Yost *et al.* (A., 1933, 466). M. S. B.

Vapour-pressure curve of thallium at very small vapour densities. F. Müller (Helv. phys. Acta, 1934, **7**, 491—492; Chem. Zentr., 1934, ii, 2363).—Vals. between 350° and 500° are deduced from the abs. intensity of absorption of the 3776 Å. Tl line in the vapour. H. J. E.

Vapour-pressure curve of nitrobenzene. M. T. Toval and E. Moles (Anal. Fís. Quím., 1933, **31**, 735—745).—Between 95·8° and 207·9° the v.p. is given by $\log p = 8{\cdot}172443 - 2552{\cdot}683/T$; calc. b.p. 209·6°. Latent heat of evaporation is 94·84 g.-cal., and the ebullioscopic const. 49·13. These results were obtained with the thermometer stem immersed in the vapour; results obtained with the thermometer stem emergent, even after correction, show discrepancies. H. F. G.

Hydrogen sulphide. T. Batuecas (J. Chim. phys., 1935, **32**, 58—62).—Polemical (cf. A., 1934, 355). J. G. A. G.

Compressibilities and expansion coefficients of gases at low pressures. J. B. M. Coppock (Phil. Mag., 1935, [vii], **19**, 446—457; cf. A., 1934, 40).—Simplified relations are deduced between compressibilities and expansion coeffs., and results are tabulated and applied for a large no. of gases. N. M. B.

Compressibility of and equation of state for gaseous ethane. J. A. Beattie, C. Hadlock, and N. Poffenberger (J. Chem. Physics, 1935, **3**, 93—96).—The compressibility has been measured at intervals of 25° from 25° to 250° for densities 0·5—5·0 mols. per litre. Consts. for the Beattie–Bridgeman equation of state are given. The calc. wt. of a normal litre of C_2H_6 is 0·2%, and the crit. pressure 10%, < observed vals. The v.p. of the liquid measured at 0° is 23·57 and at 25° 41·37 normal atm. F. L. U.

Changes of state of viscous systems. IX. Viscosity and elasticity. H. Umstätter (Kolloid-Z., 1935, **70**, 174—180; cf. A., 1933, 569).—A theory of the viscosity–time effect is advanced, which is supported by published results (cf. A., 1927, 309). E. S. H.

Viscosity of helium I and helium II. E. F. Burton (Nature, 1935, **135**, 265).—The η of He I, which is formed at 4·2° abs., increases as temp. is reduced to 2·3° abs.; at 2·2° abs. the liquid suddenly becomes much less viscous and changes to He II. L. S. T.

Viscosity, thermal conductivity, and diffusion of gas mixtures. XXX. Viscosity at low temperatures of hydrogen, helium, and neon, and binary mixtures of them down to 90° absolute. M. Trautz and H. Zimmermann (Ann. Physik, 1935, [v], **22**, 189—194).—The viscosity of He and Ne was determined at 194·6° abs. and 90° abs., and that of the three binary mixtures of Ne, He, and H_2 at 90° abs. Various consts. for the pure gases and mixtures calc. from the results agree with those already derived theoretically (A., 1934, 136). A. J. M.

Measurements on the viscosity of oxygen gas at liquid oxygen temperatures. A. van Itterbeek and W. H. Keesom (Proc. K. Akad. Wetensch. Amsterdam, 1935, **38**, 11, and Physica, 1935, **2**, 97—103).—The viscosity (η) has been determined by the oscillating-disc method between 79·4° and 90·2° abs. and at different pressures. Combined with the work of others the results show that η decreases linearly with fall of temp. above 140° abs., approx., but more rapidly below. A decrease in η with increase in pressure is indicated. M. S. B.

Effect of temperature on viscosity of tetrachlorides of elements of fourth group of periodic classification. G. P. Lutschinsky (Z. physikal. Chem., 1934, **171**, 348—352).—The variation with temp. of the viscosities, η, of CCl_4, $SiCl_4$, $TiCl_4$, and $SnCl_4$ follows Batschinski's formula $\eta = c/(v-\omega)$, where v is the sp. vol. ω increases with decreasing at. wt. of the central element, and $\omega M \propto$ the linear size of the mol. (M=mol. wt.). R. C.

Viscosity and molecular association. B. Prasad (J. Indian Chem. Soc., 1934, **11**, 913—918).—In $\log \eta = \alpha + \beta/T$ (η=coeff. of viscosity, T=abs. temp., α, β=consts.), β varies with mol. association (I). Comparison of β at two temp. gives the ratio of the mol. wt. at these temp. To obtain abs. vals. of (I), β for the unassociated liquid may be calc. from the approx. relationship, crit. temp. $T_c = 0{\cdot}7\beta$. Using this, (I) for H_2O decreases from 2·3 at 5° to 1·5 at 65°. A comparison of the results for H_2O, MeOH, PrOH, BuOH, and AcOH with those obtained by the Eötvös–Ramsay method shows qual. agreement, but the viscosity method is preferred. A. J. M.

Solutions of *iso*propyl alcohol in benzene, in water, and in benzene and water. A. L. Olsen and E. R. Washburn (J. Amer. Chem. Soc., 1935, **57**, 303—305).—Determinations of f.p., solubility, n, d, and η have been made. E. S. H.

Surface tension of binary liquid mixtures. System aniline–*cyclo*hexane. J. Wellm (Z. physikal. Chem., 1935, **B**, **28**, 119—122).—The surface tension, γ, of mixtures has been measured at 32° and 60°. The temp. coeff. of γ is abnormally small, owing to dissociation of associated NH_2Ph complexes with rising temp. Association of the component with the larger γ lowers the γ of the mixture, whilst association of the component with the smaller γ has the reverse effect. R. C.

Heats of reaction and viscosities of ether–chloroform mixtures. D. B. MACLEOD and F. J. WILSON (Trans. Faraday Soc., 1935, **31**, 596—603).—The heat evolved on mixing Et_2O and $CHCl_3$ is a max. for equimol. proportions, at 3°, 15°, and 24°, indicating the formation of a compound. Figures given in an earlier paper (A., 1934, 723) are corrected. F. L. U.

Heat of mixing, heat of vaporisation, and association. K. L. WOLF, H. PAHLKE, and K. WEHAGE (Z. physikal. Chem., 1935, **B**, **28**, 1—13).—Data are recorded for the heats of mixing of aliphatic alcohols (I) with hexane (II) and with C_6H_6 and of C_6H_6 and *cyclo*hexane with (II), and for the heats of vaporisation of (II) and ketones. Steric influences are more prominent in solvation of (I) with C_6H_6 than in association of (I) mols. with each other. With increasing steric shielding of (I) fewer triple and quadruple mols. are formed, but the formation of double mols. is scarcely affected by increasing chain length. C_6H_6 has a strong de-associating action compared with (II). With mols. having freely rotatable polar groups, the rotation of which is prevented by intramol. dispersion or directive effects, dipole moments in C_6H_6 are $>$ in (II). R. C.

Dependence of the internal friction [on the composition] of fused KCl–$MgCl_2$ mixtures. S. KARPATSCHOV and A. STROMBERG (Z. anorg. Chem., 1935, **222**, 78—80).—The coeff. of friction (I) has been determined at 500—750° by the damping of the swings of a Pt sphere. The curves obtained by plotting (I) against mol.-% $MgCl_2$ have a pronounced max. corresponding with the compound $2KCl,MgCl_2$. M. S. B.

Surface tension sensitivity of viscosity determinations. W. LINKE (Physikal. Z., 1935, **36**, 45).—The η-concn. curves of "nekal" solutions differ according as η is determined by an Ostwald or an Engler (I) viscosimeter. In (I) the surface tension affects the result. A. J. M.

Rates of evaporation of chlorine, bromine, and iodine from aqueous solutions. M. J. POLISSAR (J. Chem. Educ., 1935, **12**, 89—92).—In open vessels at an average temp. of 24°, the sp. rate of evaporation is the same for Br solutions, I solutions containing $< 0{\cdot}006M$-KI, and Cl_2 solutions of concn. $> 0{\cdot}001M$. The controlling factor is the rate of diffusion of the solute from the bulk to the surface of the solution. L. S. T.

Diffusion of gases through metals. T. FRANZINI (Nature, 1935, **135**, 308; cf. this vol., 25).—An adsorption threshold on one side and an evaporation pressure on the other side of the metal are presumed. Pd adsorbs H_2^2 considerably from a mixture of H_2 and H_2^2, whereas H_2^2 diffuses very slowly, in comparison with H_2, through the metal. L. S. T.

Linear crystallisation velocity of ice from ordinary and heavy water. G. TAMMANN and A. BÜCHNER (Z. anorg. Chem., 1935, **222**, 12—16).—The crystallisation velocity (I) of ice has been followed along thin capillary tubes. Admixture with an insol. substance, such as clay, lowers (I) for a small supercooling but, beyond 6°, produces no effect. This is explained by the character of the crystallisation process. With 12° supercooling (I) for ordinary H_2O is $>$ for H_2^2O ($>$ 99·5% purity). This is explained by the greater heat of fusion of heavy ice combined with the practically equal sp. heats. The max. (I), which alone can be regarded as characteristic, requires a supercooling of 25—30° and must be $>$ 10 m. per min. M. S. B.

Transitions in the copper–gold alloy. II. Migration of atoms in the copper–gold lattice. III. Effect of strain on the lattice equilibrium. V. S. GORSKY (Physikal. Z. Sovietunion, 1934, **6**, 69—76, 77—81; cf. A., 1928, 1078).—The velocity of transition of a 50% Cu–Au alloy to its equilibrium state has been determined by measuring the ratio of the tetragonal and digonal crystal parameters in its dependence on annealing time and temp. CH. ABS. (*e*)

Existence of a transformation of exactly the second order. U. DEHLINGER (Z. physikal. Chem., 1935, **B**, **28**, 112—118; cf. this vol., 155).—The continuous transition from an ordered to a random distribution in metallic mixed crystals (A., 1934, 1065) is a transformation of the second order and only as a limiting case, not observable practically, is it a transformation of the third order. A transformation of the second order is probably realisable experimentally in Fe_3Al (cf. *ibid.*, 954). R. C.

Correlation of equilibrium relations in binary aluminium alloys of high purity. W. L. FINK and H. R. FRECHE (Amer. Inst. Min. Met. Eng., Inst. Met. Div., 1934, Tech. Publ. 580, 14 pp.).—A comprehensive review and discussion. CH. ABS. (*e*)

Aluminium-rich alloys of the ternary system aluminium–tin–manganese. A. SCHÜCK (Z. Metallk., 1935, **27**, 11—18).—In alloys of Al with Mn 0—6 and Sn 0—20% the only compound present is $MnAl_7$, and only the two binary Al eutectics exist. Addition of Sn to the Al–$MnAl_7$ eutectic lowers the m.p. from 649° to a min. of 620—622° with 20% Sn. In alloys with 73% Mn the primary radial acicular structure prevents segregation of the Sn-rich eutectic. All the alloys tested are soft and easily workable, cannot be hardened by heat-treatment, and are readily oxidised by exposure to air or moisture. Adequate protection against corrosion is, however, afforded by lacquer coatings baked on at $<$ 220°. A. R. P.

ϵ-, γ-, and β-Phases of the system cadmium–silver. P. J. DURRANT (J. Inst. Met., 1935, **56**, Advance copy, 437—448).—Thermal and micrographic analysis of the system between 30 and 60% Ag has shown that the liquidus consists of 4 smooth curves intersected by peritectic horizontals at 592° (28—35·5% Ag), 640° (35·5—43·5% Ag), and 736° (56—62% Ag). The ϵ-field extends to 33·5% Ag at 590°, 34·2% Ag at 535—408°, 32·5% Ag at 305°, and 29% Ag at 100°, the $\epsilon+\gamma$-field to 35·5% Ag at 592°, 37·4% Ag at 510°, and 36% Ag at 100°, and the γ-field to 41·5% Ag at 640—230° and 40% Ag at 100°. In the range 40—60% Ag the system is very complex since the β-phase is stable only at high temp. and decomposes on cooling first into β′, then into β″, the transformation points depending on the composition; in $\beta+\gamma$ alloys a peritectic horizontal exists at 470° (41·5—47·8% Ag) with a triple point at 42·5% Ag, and in $\alpha+\beta$ alloys a eutectoid horizontal occurs at 440° (49—57% Ag) with the eutectoid point at 50·5% Ag. The $\beta' \longrightarrow \beta''$ transformation occurs at 230° in $\beta'+\gamma$ alloys (41·5—49% Ag) and at 240° in $\alpha+\beta'$ alloys (49—54·5% Ag); the β′-field commences at 45·3% Ag at 230°. The range of pure β″ is about 1% Ag around 49% Ag at 230° and around 47% Ag at 100°. At both the eutectoid points the solid solution decomposes into a characteristic Widmannstätten structure. A. R. P.

Constitution and properties of cadmium–tin alloys. D. Hanson and W. T. Pell-Walpole (J. Inst. Met., 1935, 56, Advance copy, 449—470).—Re-examination of the system by thermal analysis and micrographic examination has shown the eutectic to be at 176° and 33% Cd, and a very small solid solubility to exist at both ends. Above 131° 5—6% Cd is sol. in Sn, but below this temp. two conjugate solid solutions are formed containing at 127° 1·25 (I) and 5% Cd (II), respectively. At 127° in all alloys between 1·25 and 99·5% Cd (II) undergoes a eutectoid transformation, and at 170° there is a slight transition, connected with a change of solubility of Sn in Cd, in alloys with 40—90% Cd. The grain-size of Sn is considerably reduced by addition of Cd, only 1% Cd being sufficient to increase the no. of grains per sq. cm. after rolling to 80% reduction from 1600 to 26,000. After annealing for 1 day at 160° Sn with 5% Cd shows 48,000 grains per sq. cm. The Brinell hardness of alloys quenched from 160° rises to a max. of 34 with 5% Cd, but this val. falls to 21 after storage for 2 months; similarly the tensile strength of the 5% Cd alloy falls from 9 tons per sq. in. immediately after quenching to just > 4 tons per sq. in. in 3 months. A. R. P.

Electrochemical and *X*-ray investigation of solid thallium amalgams. A. Ölander (Z. physikal. Chem., 1934, 171, 425—435).—The electrode potentials and their temp. coeffs. for Tl amalgams containing 20—30 at.-% Tl have been measured. The results establish the boundary of the δ phase, which is face-centred cubic, and show that the structure of the alloy of composition Tl_2Hg_5 is not ordered. $TlHg_2$ possibly corresponds with an ordered structure, but $TlHg_3$ does not. The belief that the δ phase undergoes a transition a little below its m.p. (A., 1916, ii, 329) is erroneous. *X*-Ray examination shows the existence of an intermediate phase with a body-centred cubic lattice between 86 and 90 at.-% Tl. R. C.

Rhodium–copper alloys. O. E. Zvjagintsev and B. K. Brunovski (Ann. Inst. Platine, 1935, 12, 37—66).—Thermal, microscopic, *X*-ray, and hardness data afford evidence of the *compound* Rh_2Cu_2 (transition point 1015°, cubic face-centred structure), and possibly of *Rh_3Cu*. R. T.

(A) Platinum–antimony alloys. (B) Platinum–rhodium alloys. V. A. Nemilov and N. M. Voronov (Ann. Inst. Platine, 1935, 12, 17—25, 27—35).—(A) F.-p., conductivity, hardness, and crystallographic data confirm the existence of $PtSb_2$, but not of Pt_5Sb_2 (Friedrich and Leroux, A., 1909, ii, 96); other possible *compounds* are Pt_4Sb and PtSb with transition points at 670° and 660°.

(B) The f.p., hardness, conductivity, and microstructure of Pt–Rh alloys indicate that solid solutions only are formed. R. T.

Osmiridium. III. *X*-Ray analysis. O. E. Zvjagintsev and B. K. Brunovski (Ann. Inst. Platine, 1935, 12, 5—15).—The *X*-ray diagrams indicate a fibrous structure, with a tendency to recrystallisation. R. T.

Heusler alloys. S. Valentiner and G. Becker (Z. Physik, 1935, 93, 629—633).—Magnetic susceptibility and electric resistance show that $MnAlCu_2$ is stable up to 300°. A. B. D. C.

Penetration of a magnetic field into superconductive alloys. J. de Haas and J. M. Casimir-Jonker (Proc. K. Akad. Wetensch. Amsterdam, 1935, 38, 2—7).—The effect on a cylindrical rod of the alloy of a magnetic field perpendicular to the axis, at temp. below the transition point, has been studied by measuring the resistance of a Bi wire threaded along the axis of the rod. No magnetic disturbance of Bi_5Tl_3 was observed at the b.p. of He with approx. 4000 gauss. The magnetic transition curves of a Pb–Tl (64·8% Tl) alloy are given for 3 temp. < transition point. The increase in resistance of a Bi wire has been plotted against field strength for Bi_5Tl_3 at 4·21° and 3·70° abs., and for Pb–Tl at 4·21°, 3·75°, 2·99°, and 2·01° abs. The lowest field which can penetrate into the superconductive Pb–Tl alloy has been plotted as a function of the temp. and the region of magnetic disturbance of the superconductive state indicated. The connexion with thermal conductivity is discussed. M. S. B.

***X*-Ray study of the system ferric oxide–aluminium oxide.** R. Yosimura, S. Kosobe, and S. Ito (J. Soc. Chem. Ind. Japan, 1935, 38, 22B—25B).—Fe_2O_3 and Al_2O_3 pptd. from $FeCl_3$ and $AlCl_3$ mixtures with aq. NH_3 and ignited at 1000° form solid solutions of the same type of crystal structure as either oxide separately but not in all proportions. The solubility of Al_2O_3 in Fe_2O_3 is about 36 mol.-% and that of Fe_2O_3 in Al_2O_3 17—27 mol.-%. C. I.

Active oxides. LXXXIV. Changes in the magnetic properties of mixtures of beryllium, calcium, copper, cadmium, and lead oxides with chromic oxide during their chemical combination. H. Kittel (Z. anorg. Chem., 1935, 222, 1—11).—The investigations are similar to those previously made (this vol., 158). For BeO, CuO, and CdO a rise in magnetic susceptibility χ takes place at 600—700°, accompanied by changes in colour and an increase in bulk *d*. The rise for CaO is at 1000°. CaO shows an initial slight fall at about 500° and CdO a more marked fall at 400°. The system PbO–Cr_2O_3 shows a very marked fall in χ at 400° and subsequently a very small rise above 800°, although the change in bulk *d* still takes place at the higher temp. Cryst. chromites are formed in all cases and none of the systems has ferromagnetic properties. M. S. B.

Absorption of hydrogen chloride into various organic liquids and calculation of the heat of absorption. I. S. Hamai (Bull. Chem. Soc. Japan, 1935, **10**, 5—16).—The solubility (*S*) of HCl in CCl_4, $(CH_2Cl)_2$, $(CHCl_2)_2$, and $(CH_2Br)_2$ has been determined at 15°, 20°, and 25°, and 400—700 mm., and the heats of dissolution have been calc. The influence of electric moment, internal pressure, and bond energy of the solvent on *S* is discussed. R. S. B.

Semi-quantitative measurements of the solubility of quartz in super-critical steam. C. J. van Nieuwenberg and (Miss) P. M. van Zon (Rec. trav. chim., 1935, **54**, 129—132).—The solubility (*S*) of SiO_2 in super-crit. steam has been determined approx. at 300—500 atm. at 380°, 400°, and 425°. *S* increases with falling temp. (more H_2O is present at the same pressure at a lower temp.), and decreases with decreasing pressure, tending towards zero at the crit. pressure, in analogy with the system Et_2O–anthraquinone (cf. A., 1930, 1521). R. S. B.

Solubility of calcium sulphate in saturated solutions of potassium and sodium chlorides. A. P. Palkin and N. M. Brikman (Trans. State Inst. Appl. Chem. U.S.S.R., 1932, No. 16, 16—23).—Vals. at 0—175° are recorded. Ch. Abs. (*e*)

Influence of salts on the solubility of double mercuric thiocyanates. B. V. J. Cuvelier (Natuurwetensch. Tijds., 1935, **17**, 26—29).—The solubility of $CdHg(SCN)_4$ and of $ZnHg(SCN)_4$ in aq. solutions of KSCN has been measured. D. R. D.

Solubility of non-electrolytes. I. Free energy of hydration of some aliphatic alcohols. J. A. V. Butler, C. N. Ramchandani, and D. W. Thomson (J.C.S., 1935, 280—285; cf. A., 1933, 772).—The v.-p. curves of *n*-, *iso*-, *sec*.-, *tert*.-butyl, *n*-, *iso*-, *sec*.-, *tert*.-amyl, *n*-hexyl, *n*-heptyl, and *n*-octyl alcohol have been determined. The partial pressures *p* of the isomeric propyl, butyl, and amyl alcohols over their dil. aq. solutions (mol. fraction *N*) are given, and the free energy of hydration $\bar{F}-\bar{F}_g=RT\log(p/N)$ calc. In the normal alcohols, the increment of $RT\log(p/N)$ is 160 g.-cal. per CH_2, whilst smaller differences occur in the isomeric alcohols, the significance of which is discussed. R. S.

Distribution of (A) saturated fatty acids between water and toluene; (B) triethylamine between water and aromatic hydrocarbons; (C) benzoic acid between water and *iso*butyl alcohol, (D) dimethylmalonic acid, (E) monochloroacetic acid; (F) dichloroacetic acid between two contiguous liquid phases. N. A. de Kolosovski (J. Gen. Chem. Russ., 1934, **4**, 1064—1069, 1070—1072, 1073—1076, 1077—1080, 1091—1095, 1096—1098).—(A) [with N. P. Ponomareva]. See A., 1934, 726.

(B) [with S. A. Andriuschtschenko]. Data are given for NEt_3–H_2O–C_6H_6 and –PhMe at 25°.

(C) [with A. Bekturov]. Data given for 25°.

(D) [with N. P. Ponomareva]. Data are given for $(\cdot CHMe\cdot CO_2H)_2$–$H_2O$–$C_5H_{11}\cdot OH$ and –Et_2O at 25°.

(E) and (F) [with F. S. Kulikov]. Data are given for $CH_2Cl\cdot CO_2H$–H_2O–PhMe, –$CHCl_3$, –$PhNO_2$, –$Bu^{\beta}OH$, –*n*- and –*iso*-$C_5H_{11}\cdot OH$, and for $CHCl_2\cdot CO_2H$–H_2O–PhMe, –$CHCl_3$, and –$PhNO_2$, at 25°. R. T.

Adsorption of oxygen on charcoal. Calorimetry and kinetics of slow adsorption. A. Lendle (Z. physikal. Chem., 1935, **172**, 77—94).—The mol. integral heat of adsorption, *Q*, on sugar C has been measured over a wide pressure range. When the amount of O adsorbed is small, *Q*=80 kg.-cal., but this falls with increasing adsorption and tends to a limit of 5500 g.-cal. The temp. coeff. is positive. With rise in the temp. of preliminary outgassing from 550° to 780° *Q* rises considerably, doubtless due to increase in the no. of adsorbing centres of high potential. The adsorption consists of an almost instantaneous process and a slower process (I) with a much larger *Q* val. which at higher temp. determines the character of the total reaction. (I) is a chemical process, not merely dissolution. A calorimetric method of measuring the rate of O adsorption is described. R. C.

Absorption of iodine vapour by active carbon and silica gel. P. Demougin (Compt. rend., 1935, 200, 662—665).—The quantities of I adsorbed by various types of C and SiO_2 gel are approx. the same at 128° (above the m.p. of I) as at 17°, 60°, and 100°. These quantities are also $\propto$ the absorptive powers of the samples for Et_2O vapour near the saturation point, but they are not $\propto$ the absorptive powers for CO_2 or for I from solution. It is inferred that the I film adsorbed from the gas phase is liquid, even at temp. considerably $<$ m.p. J. W. S.

Adsorption of ethylene on active centres of nickel. G. M. Schwab (Z. physikal. Chem., 1934, **171**, 421—424).—Strassen's data for the catalysed hydrogenation of C_2H_4 (A., 1934, 974) agree with the exponential relation between temp. and kinetically measured adsorption coeff. demanded by the Langmuir–Hinshelwood theory of heterogeneous reaction velocity, and the heat of adsorption of C_2H_4 on Ni so calc. agrees with that determined directly. R. C.

Adsorption of gases by glass walls. XI. Nitric oxide. M. Crespi (Anal. Fís. Quím., 1933, **31**, 825—829).—The adsorption of NO by glass at pressures between 760 and 95 mm. has been determined. The magnitude of the correction for adsorption in v.d. measurements is discussed. H. F. G.

Adsorption isotherm. K. Fischbeck, H. Maas, and H. Meisenheimer (Z. physikal. Chem., 1934, **171**, 385—398).—The equation $x=(Ap+Bp^2)/(C+p)$ has been deduced to express the connexion between the amount of gas sorbed, *x*, and the pressure, *p*. This equation requires rise of *x* with *p* in the saturation region and agrees with existing experimental data. It also accords with data for swelling, and successfully represents the simultaneous adsorption of two gases even in cases where Langmuir's theory fails (A., 1933, 1241). R. C.

New interpretation of the adsorption isotherm. G. E. Cunningham (J. Physical Chem., 1935, **39**, 69—77).—A new theory of the kinetics of gas adsorption is developed on the assumption that a gas mol. must not necessarily collide with a surface in order to be adsorbed, but must come within a certain range of attraction of the adsorbing surface. The amount of gas adsorbed on a given kind of elementary surface ∝ the pressure, but different kinds of surface are saturated at different pressures. The mathematical formulæ deduced are in better agreement with experimental data than is Langmuir's equation. A discrepancy between the latter and the Langmuir theory is indicated. The relation between Freundlich's equation and the new theory is discussed. M. S. B.

Relation between adsorption, solubility, and nature of the solvent. IV. N. Sata and S. Watanabe (Kolloid-Z., 1935, 70, 159—165; cf. A., 1934, 140).—The solubility and adsorption by C of *o*-, *m*-, and *p*-OH·C_6H_4·CO_2H and NEt_4I in binary mixtures of H_2O, MeOH, EtOH, BuOH, $COMe_2$, C_6H_6, and CCl_4 have been determined. The curves are antibatic in mixtures of polar liquids, especially when one of the components is H_2O. E. S. H.

Interfacial energy and the molecular structure of organic compounds. III. Effect of organic structure on absorbability. E. R. Linner and R. A. Gortner (J. Physical Chem., 1935, 39, 35—67).—A comparative study of the adsorption of a large no. of org. acids on Norit has been made. The Freundlich adsorption isotherm is valid, except at low concns., and has been used to calculate the areas under the curves for the fatty acids. Ratios of these areas for successive members of homologous series have a constancy > that obtained by Freundlich's method. The Langmuir equation (I) is applicable to the data, low concns. again excepted. The const. β of (I) is equal to the max. adsorption α when the equilibrium concn. is that of a saturated solution. The different acids have been compared at max. adsorption (α=β) by determining the relative cross-sectional areas of the mols. calc. after certain assumptions have been made. The branched chain has little effect on β. Introduction of more ·CO_2H, ·OH, or :CO decreases β. CHO·CO_2H,H_2O is more readily adsorbed than AcOH. There is little difference between *cis*- and *trans*-isomerides, but the double linking decreases adsorption. An alternation exists for the vals. of β for odd and even acids of the homologous series of both mono- and di-carboxylic acids. This appears to confirm the view that the lower members of both series are adsorbed in the solid state. M. S. B.

Models of the superposition and interpenetration of components in gas mixtures adsorbed on thermionic, photo-electric. and catalytic surfaces. I. Principles. M. C. Johnson (Proc. Physical Soc., 1935, 47, 287—305). N. M. B.

Measurement of the interfacial tension at a mercury–mercurous sulphate solution interface by the drop-weight method. K. E. Glidden (J. Amer. Chem. Soc., 1935, 57, 236—237).—Data are recorded for different concns. at 20°. Interfacial tension is a linear function of log concn. down to 0·0001*M*-Hg_2SO_4. E. S. H.

Thin films of insoluble substances on liquid surfaces. I. Uhara (J. Chem. Soc. Japan, 1934, 55, 928—929).—By passing H_2S gently over the surface of aq. $Pb(NO_3)_2$, a film of PbS of thickness 10^{-5}—10^{-6} cm., and with reflecting power comparable with that of Hg, was obtained. Ch. Abs. (*e*)

Unimolecular films of lecithin and related compounds. A. Hughes (Biochem. J., 1935, 29, 430—436).—The surface potential (I) of films of tripalmitin, triolein (II), and cholesterol shows no change from p_H 2 to 12, but for lecithin (III) and lysolecithin (IV) (I) decreases from p_H 3 to 6 and 2 to 5, respectively, as the result of ionisation. The area per hydrocarbon chain in the liquid expanded film of (IV) is about twice that for (III). On dil. $KMnO_4$ solutions, (III) is oxidised more rapidly than (II) or (IV). Homogeneous mixed films are obtainable from ovalbumin (V) and (II), but films of (III) and certain other fats do not appear to be changed by injection of (V) at any p_H. A. E. O.

Thickness of a surface film of copper. M. L. Nichols (J. Amer. Chem. Soc., 1935, 57, 267—269).—A method for determining the least thickness of metal which will give the same e.m.f. as the massive metal is described. The val. for Cu is 0·39 mμ. E. S. H.

Wetting characteristics of galena. F. E. Bartell and G. B. Hatch (J. Physical Chem., 1935, 39, 11—23).—Four different methods for the determination of contact angles have been used. The pressure of displacement method gives results for powdered galena (I) which can be duplicated. It is the only method which can be used for powders. The horizontal plate method is not suitable for (I) or for any substance having two different angles of contact—advancing and receding. The vertical rod method gives trustworthy results, provided a smooth clean surface can be obtained. The deposited film method is satisfactory when a film of the pure material can be prepared by sublimation. With a clean surface of (I) the advancing contact angle of H_2O is 90° and the receding 0°. Powdered (I) is less organophilic than freshly cleaved or sublimed (I), but the latter approaches powdered (I) in surface properties when heated, probably due to oxidation. (I) functions as an organophilic or hydrophilic solid depending on whether it is first wetted by an org. liquid or H_2O. This is in contrast to SiO_2 which is hydrophilic only, and to C which is organophilic only. The wetting produces no permanent change since, when dried, (I) behaves like fresh material again. The deposited film method indicates that As_2S_3, Bi, S, Ph_2, and $C_{10}H_8$ also behave like (I). M. S. B.

Influence of adsorbed films on the potential difference between solids and aqueous solutions, with special reference to the effect of xanthates on galena. P. A. Lintern and N. K. Adam (Trans. Faraday Soc., 1935, 31, 564—574).—K Et (or Bu) xanthate (I) makes the potential of an oxidised surface of galena (II) against aq. KCl up to 0·3 volt negative to that observed in its absence. The potential of reduced (II) is little affected except in acid solutions which decompose (I), nor is it changed by (I) when acting as a reversible electrode, as it does in aq. Na_2S. No significant change in the potential of Ag–AgCl electrodes was produced by adding substances likely to be adsorbed. F. L. U.

Capillary systems. XII (3). Sphere-spiral as a structure element in homogeneous and heterogeneous spherical packing. E. MANEGOLD (Kolloid-Z., 1935, 70, 149—159; cf. this vol., 284).—Mathematical. E. S. H.

Determination of the electrophoretic migration velocity of suspended particles, and a process for measuring the charge of hydrophobic sols. O. ENSLIN, G. LINDAU, and R. RHODIUS (Kolloid-Z., 1935, 70, 189—198).—A modified microscopical method of determining the velocity of electrophoresis is described. The cell is disposed vertically, so that observations on an individual particle can be repeated indefinitely. Results with particles of SiO_2 in H_2O and electrolyte solutions are recorded. Repeated observations on the same particle yield different velocities, and the velocities of different particles may differ by 25%, due to variations in the shape of the particles. Variation in the mean vals. of several series of determinations in the same system is about 5%. Observations on the migration of particles, on which are adsorbed the micelles of a hydrophobic sol, are reported. E. S. H.

Indene as a cryoscopic solvent. W. KLATT (Z. physikal. Chem., 1934, **171**, 454—462).—Indene (I) has m.p. −1·76°, latent heat of fusion 19·9 g.-cal. per g., and mol. f.-p. depression per 1000 g. 7·28°. Monohydric alcohols and monobasic org. acids are associated in (I) solution. $C_{10}H_8$ raises the f.p. of (I), indicating complete miscibility in the solid state. R. C.

Solvent action. IX. Rotatory powers of the *l*-menthyl esters of *m*-nitro- and 3 : 5-dinitrobenzoic acids in relation to the solvent, concentration, temperature, and wave-length of light. A. McLEAN (J.C.S., 1935, 229—236; cf. A., 1934, 476).—Mol. wt. determinations show that *l*-menthyl *m*-nitrobenzoate and 3 : 5-dinitrobenzoate are associated in hexane, whilst in C_6H_6 combination with the solvent occurs also, due possibly to hexapolar association (I). In substituted benzenoid solvents, (I) should decrease with increasing dipole moment in agreement with the observed increase in rotatory powers (II). The variation of (II) with concn. and temp. has been measured and the results are discussed in relation to current theories. R. S.

Solutions of electrolytes. A. W. DAVIDSON (J. Chem. Educ., 1935, **12**, 24—30).—An introduction to modern views. L. S. T.

B.-p. elevations of aqueous solutions of strong electrolytes. E. PLAKE (Z. physikal. Chem., 1935, 172, 113—128).—Measurements have been made with ternary and bi-bivalent salts at concns. of 0·0008—0·3M. The relation between the osmotic coeff., O, and concn. agrees at low concns. and for ionic diameters of 3—5 Å. with the extended Debye theory (A., 1931, 1127). Comparison with f.-p. data shows the ionic diameters to be practically independent of the temp. The variation of O with temp. indicates that in aq. solutions of some ternary salts there is association in the sense of Nernst's hypothesis. For partly dissociated solutes O varies with temp. < for completely dissociated salts. R. C.

Theory of diffusion of electrolytes. M. PLANCK (Z. Physik, 1935, 93, 696—697).—Sitte's equation (A., 1934, 1309) represents an alternative approximation of Poisson's general equation.

Theory of diffusion of electrolytes. K. SITTE (Z. Physik, 1935, 93, 698—701).—Sitte's approximation is more appropriate than Planck's. A. B. D. C.

Diffusion of magnesium and cadmium sulphates. L. W. ÖHOLM (Finska Kem. Medd., 1934, 43, 55—66).—Davies' measurements by the optical method (A., 1933, 347) disagree with those of other workers and may be vitiated by convection effects. CH. ABS. (*e*)

Influence of the concentration and nature of the solute on the compressions of aqueous solutions. R. E. GIBSON (J. Amer. Chem. Soc., 1935, 57, 284—293).—The compressions (to 1000 bars) of various solutions of 16 salts (mainly of K) and of AcOH have been determined over a wide concn. range. The effects of the different salts on the compression of H_2O increase with the charge on the solute ions and decrease with the ionic radius, but other factors also probably operate. The effective pressure of the salts in solution $\propto [H_2O][\text{salt}]$. The equation for the vol. of a solution as a function of the pressure gives vals. for the compressibility of solutions at 1 bar which are in accord with those obtained from sound velocity measurements, even when the effective pressure is determined at 1000 bars. The bulk compression–concn. curve for AcOH solutions passes through a min. The apparent compression of H_2O in AcOH solutions is a linear function of $\sqrt{(\text{concn.})}$ only at the H_2O end. The relative departures from the simple law of mixtures of the compressions of aq. AcOH and aq. salts vary linearly with the product $[H_2O][\text{salt}]$ in the solutions. E. S. H.

Mixture rule for viscosity of aqueous solutions of strong electrolytes, empirical determination of specific ionic viscosities, and repression of hydrolysis by a neutral salt. H. TOLLERT (Z. physikal. Chem., 1935, **172**, 129—142).—From measurements of the viscosity, η_M, of binary aq. solutions of strong electrolytes it is found empirically that $\eta_M=\sqrt{(\eta_1\eta_2)}[1+A'\sqrt{(\gamma_1\gamma_2)}]$, where η_1 and η_2 are the viscosities and γ_1 and γ_2 the concns. of the components and A' is a const. At high dilutions this becomes Falkenhagen's limiting law. The solubilities of K_2SO_4 in N-HCl and of $KHSO_4$ in N-KCl have been measured at 20°. Sp. ionic viscosities have been calc. The repression of the hydrolysis of $AlCl_3$ by KCl has been determined. R. C.

Molecular arrangement and *X*-ray diffraction in ionic solutions. J. A. PRINS (J. Chem. Physics, 1935, 3, 72—80; cf. A., 1931, 1218).—*X*-Ray diffraction patterns of saturated aq. $Th(NO_3)_4$ and $UO_2(NO_3)_2$ indicate a more or less regular arrangement of heavy ions in the liquid. The arrangement becomes less regular with dilution. Solutions containing Ag, Pb, or Ba show a " gaseous " distribution which is attributed to the existence of a large proportion of undissociated mols. A third group comprises the alkali halides, the patterns of which are best explained by interference between scattering from the heavy ion and that from the H_2O mols. around it. F. L. U.

Spectral property of electrolytes in solution. F. Vlès (Compt. rend., 1935, 200, 545—547).—It is shown that the dissociation const. and the oxidation–reduction const. of electrolytes in solution (p_K) are related to the λλ of absorption bands of these compounds by $\lambda=21{\cdot}2/p_K\mu$. The relation is confirmed for $15N$-NH_3, N-NaOAc, $Na_2B_4O_7$, N-$CuSO_4$, and NH_4Cl, all in aq. solution, and H_2O. J. W. S.

Optical absorption and association of cadmium, zinc, and copper halides in aqueous solution. E. Doehlemann and H. Fromherz (Z. physikal. Chem., 1934, 171, 353—378).—Absorption curves (I) have been determined in the visible and ultra-violet regions. The tendency to form MX_4'' ions increases in the order $Zn < Cd < Hg$ and $Cl < Br < I$. $CuCl_2$ and $CuBr_2$ in aq. solution and in presence of an excess of alkali halide up to $[X']=2M$ exhibit absorption bands which must be ascribed to CuX_4''. With $[X'] > 2M$ there is evidence of the formation of larger, polynuclear complexes. Mixed solutions of Cu^I, Cu^{II}, and alkali halides exhibit in the ultraviolet only the bands of the corresponding Cu^{II}– and Cu^I–halogen complexes, but there is increased absorption in the green, which causes the dark brown colour of the mixed solutions. R. C.

Colour and molecular state of telluric acid and alkali tellurates in aqueous solutions of various $[H^{\cdot}]$. C. Stüber, A. Braida, and G. Jander (Z. physikal. Chem., 1934, 171, 320—330).—The optical absorption of pure aq. solutions of H_6TeO_6 and solutions containing $HClO_4$ is shifted further into the ultra-violet compared with that of $KHTeO_4$ and K_2TeO_4 solutions, yet diffusivity measurements show that both the acid and these salts are present in solution as single mols. at p_H 0—14. The effect of $[H^{\cdot}]$ on the absorption is probably due to intramol. change, such as $Te(OH)_6 \rightleftharpoons H_2TeO_4,aq. \rightleftharpoons H^{\cdot} + (HTeO_4,aq.)'$, after the manner of an indicator. R. C.

Relation between heat-conductivity and structure in silica aërogel. S. S. Kistler (J. Physical Chem., 1935, 39, 79—85).—The heat-conductivity of SiO_2 aërogel of d 0·184, filled with air, CO_2, or CCl_2F_2 at different pressures, has been measured. From these data, and the mean free path of the gas mols., the average distance separating the elements of structure is calc. to be $5{\cdot}0 \times 10^{-6}$ cm. M. S. B.

Coagulation in smokes. R. Whytlaw-Gray (J.C.S., 1935, 268—280).—Liversidge lecture. Smokes, as distinct from sols, undergo spontaneous coagulation (I). The mechanism of (I) is described and methods for the determination of n, the no. of particles per c.c., are compared. The $1/n$–time curve is linear, but very fine smokes have higher (I) velocities. The theory of (I) is given and the influence of temp. and pressure discussed. R. S.

Sedimentation equilibrium measurements with low-molecular substances in the ultracentrifuge. K. O. Pedersen (Nature, 1935, 135, 304—305).—Using the improved Svedberg ultracentrifuge working at 120,000 r.p.m. changes in concn. of solutions of NaCl, LiCl, and glycine have been obtained; these are measured optically. The mol. wts. calc. from these data are in fair agreement with known vals. L. S. T.

Viscosity and plasticity of disperse systems. I. Determination of constants of plastic flow of clay suspensions. M. P. Volarovitsch and D. M. Tolstoi (Kolloid-Z., 1935, 70, 165—174).—Apparatus and procedure for determining the consts. of Bingham's equation for plastic flow are described. Experiments with clay suspensions show that the results are independent of the rate of deformation and the dimensions of the apparatus. E. S. H.

Diffusion of colloids. R. O. Herzog (Z. physikal. Chem., 1935, 172, 239—241).—With lyophilic sols normal diffusion may be accompanied by pseudo-diffusion due, not to free motion of the particles, but to swelling. This is probably one of the principal causes of anomalous diffusion (cf. this vol., 25). R. C.

Colloidal gallium. E. Einecke (Naturwiss., 1935, 23, 131).—The a.c. dispersion method at high voltages (about 50,000 volts) yields oxide-containing aqua- and Et_2O-sols, but with lower voltages (about 220 volts) sols containing 75% Ga are formed which are deep brown in colour by reflected and transmitted light. A. J. M.

Reversal of charge of highly purified ferric oxide sols by multivalent electrolytes. W. Pauli and H. Neurath (Kolloid-Z., 1935, 70, 135—149).—The charge of the sols can be reversed by neutral salts with quadrivalent anions, and by alkali solutions or salts which hydrolyse to give alkali, but not by tervalent anions, such as $Fe(CN)_6'''$. Sols reversed by quadrivalent anions are not flocculated by CO_2; their flocculation by acids depends on the $H^{\cdot}$ activity. Sols reversed by alkali are flocculated by CO_2 and by equiv. amounts of acids of different strengths. E. S. H.

Influence of the electric field on the viscosity of colloid solutions. I. External electro-viscous effect in benzene solutions of smoked sheet caoutchouc. A. Passynski (Kolloid-Z., 1935, 70, 180—188).—The change of dielectric and mechanical properties of 1—3% caoutchouc solutions in C_6H_6 by the action of a static electric field on the streaming liquid has been determined. The influence of field strength, streaming velocity of the liquid, concn., temp., and the action of an a.-c. field has been investigated. The results can be explained in terms of the elastic deformation of the colloid structure under the influence of the electric field. E. S. H.

Coagulation of colloidal cadmium sulphide. W. Białek (Rocz. Chem., 1934, 14, 1499—1525).—H_2S acts as a peptiser of CdS, yielding negatively-charged particles; the stability of the sol varies exponentially with the $[H_2S]$. The coagulating power of cations increases in the series $Li < Na < K < NH_4 < Rb < Cs$, and $Ca < Sr < Ba$; anions are without action.

The process of coagulation by electrolytes proceeds autocatalytically; the temp. coeff. is 2·05 per 10°. The velocity of coagulation is given by $dx/dt = kx(1-x)$, where x is the relative turbidity. R. T.

Liesegang phenomenon applied to banded malachite. R. J. Hartman, E. W. Kanning, and F. G. Klee (J. Chem. Educ., 1934, **11**, 346—349).—Liesegang bands closely resembling banded malachite are formed when 0·5—0·8*N*-$CuCl_2$ or -$Cu(NO_3)_2$ diffuses downwards into a solution made by mixing equal vols. of aq. Na silicate, *d* 1·06, and 0·5*N*-$(NH_4)_2CO_3$, or by bubbling CO_2 through aq. Na silicate, *d* 1·03. Ch. Abs.

Emulsions. III. Lipin-containing substances as emulsifiers. R. M. Woodman (J.S.C.I., 1935, **54**, 70—72T; cf. A., 1934, 597).—Aq. dispersions of lipins from various sources and of various ages yield dual emulsions on shaking by hand with fat solvents. For oil-rich phase vol. ratios, both types of emulsions appear to be simultaneously present (possibly as complex emulsion systems), as far as can be judged by drop tests. This may be due to the presence in the lipins of opposite-type emulsifiers, which act independently of each other.

Peptisation of barium sulphate crystals. D. Balarev (Z. physikal. Chem., 1935, **B**, **28**, 78—80).—Unit crystallites of $BaSO_4$ of colloidal dimensions but less sol. than macro-crystals have been obtained. It must therefore be supposed that interfacial tension rises in the region of colloidal dimensions (cf. this vol., 16). R. C.

Electric double layer of colloids. V. Supplementary investigation of peptisation by isomorphous ions. VI. Peptisation by foreign ions. H. R. Kruyt and H. A. Cysouw (Z. physikal. Chem., 1935, **172**, 49—55, 56—63; cf. A., 1934, 253).—V. AgI sols may be peptised by Cl′. If an AgI sol is formed from equiv. amounts of $AgNO_3$ and KI in presence of much Na phosphate or C_2O_4'' the latter has a temporary peptising action because some Ag phosphate or $Ag_2C_2O_4$ is formed, leaving KI free to peptise. Halogen-substituted org. ions do not peptise. Pptd. AgI is directly peptised only by I′.

VI. The possibility of peptising sols by ions which can replace isomorphously the lattice anions has been demonstrated with HgS, AgS, and $Cu_3[Co(CN)_6]_2$ sols. $Cu_3[Fe(CN)_6]_2$ and $Cu_3[Co(CN)_6]_2$ are peptised by KCN because CN′ is here a potential-determining ion. Szilard's "peptoid" sols (A., 1908, ii, 197) are peptised by their own ions derived from acid formed by hydrolysis. Instances of sol formation on mixing reactants in stoicheiometrical proportions are detailed and explained. R. C.

Osmotic pressure of cellulose nitrate solutions. (Mme.) A. Dobry (J. Chim. phys., 1935, **32**, 50—57).—Details are given of results already noted (A., 1934, 958). The data are inconsistent with the solvation and swelling pressure hypotheses. J. G. A. G.

Dielectric investigations of cellulose derivatives in organic liquids. III, IV. S. Lee and I. Sakurada (J. Soc. Chem. Ind. Japan, 1935, **38**, 18B).—III. The dielectric const. and the polarisation of solutions of cellulose dextrin acetate and of cellulose triacetate (I) in $CHCl_3$–C_6H_6 mixtures are unaffected by the thixotropic sol–gel transformation; there is thus no change in solvation or in ease of orientation or rotation.

IV. (I) when swollen in C_6H_6–$CHCl_3$ possesses orientation polarisation, but this is slightly < when dissolved; the mols. are thus easily deformed when in the swollen state. A. G.

Thixotropy of solutions of cellulose derivatives. I. Chloroform solutions of cellulose triacetates of different degrees of degradation after addition of non-solvents. M. Taniguti, S. Lee, and I. Sakurada (J. Soc. Chem. Ind. Japan, 1935, **38**, 16—18B).—For solidification to occur the concn. of the solute and the proportion of non-solvent must be higher for cellulose dextrin acetate than for the less degraded fibrous cellulose acetate. The gelatinising effects of C_6H_{14}, light petroleum, and PhMe are > those of C_6H_6, CS_2, CCl_4, and $COMe_2$, and the time required to set after shaking falls with increasing duration of keeping after the addition of the non-solvent. A. G.

Lyophilic colloids; their theory and application. III. M. H. Fischer and M. O. Hooker (Kolloid-Beih., 1935, **41**, 95—146; this vol., 163).—A review with particular reference to biology. E. S. H.

Application of the Kohlrausch–Weber theory of the moving boundary in mixed electrolytes and colloid solutions. W. Hacker (Kolloid-Beih., 1935, **41**, 147—238).—The moving boundary method and the difficulties of applying it to colloids are discussed. Experiments supporting the Kohlrausch–Weber theory are described. E. S. H.

Peptisation analysis of soil colloids. A. T. Tiulin (Kolloid-Z., 1935, **70**, 207—211).—Methods, applicable to CO_3''-free soils, for separating (*a*) electronegative and isoelectric gels, and (*b*) org. protective colloids from mineral suspensions, are described. E. S. H.

Benzoquinone–gelatin gels. J. Buchholcz (Kolloid-Z., 1935, **70**, 200—202).—Irreversible gels are formed at definite temp. and concn., probably through an oxidation process resembling tanning. The gelation time is shorter the higher is the temp. Quinol salts out gelatin. E. S. H.

Gelatin deformed in an electric field. (Mlle.) S. Veil (Compt. rend., 1935, **200**, 550—552; cf. A., 1933, 1005; 1934, 961, 1172; this vol., 178).—When the direction of the current is reversed after a gelatin film has undergone deformation in an electric field, the film recovers for a time its conducting properties, but finally the current decreases and the film again tends to become a dielectric. Repeated reversal of current leads to progressively less recovery of conductivity. Low-frequency a.c. slowly yields alkaline electrode areas, which exude H_2O and correspond with the cathodic areas of d.c. The effect is the less marked the higher is the frequency. J. W. S.

Colloid chemical hydrolysis of albumins. II. S. I. Dijatschkovski and V. A. Livanskaja (Kolloid-Z., 1935, **70**, 202—207; A., 1934, 488).—Certain components of ovalbumin have the power to emulsify Et_2O. The Et_2O extracts a fraction having polar properties, to an extent inversely ∝ the concn. of the albumin. E. S. H.

Complex coacervation of amylophosphoric acid and proteins and its probable bearing on the problem of amylopectin. P. Koets (Proc. K. Akad. Wetensch. Amsterdam, 1935, 38, 63—74).—Amylose in solution does not form coacervates with positively-charged proteins, probably owing to the smallness of its negative charge. After esterification with H_3PO_4, however, the resulting amylophosphoric acid exhibits appreciable anodic migration, and, from its behaviour with gelatin and potato albumin, apparently forms coacervates with proteins. It is suggested that the behaviour of amylopectin is best explained on the assumption that it is a flocculated coacervate of amylophosphoric acid and one or more proteins. M. S. B.

Elementary displacements in homogeneous chemical equilibria. Variations of concentration. Constant-volume reactions. P. Montagne (Compt. rend., 1935, 200, 452—454; cf. this vol., 301).—Mathematical. N. M. B.

Thermodynamic equilibria. E. Justi and M. von Laue (Physikal. Z., 1935, 36, 146).—Eucken's statement (this vol., 155) that the sp. heat–temp. curve must have two max. in the neighbourhood of an equilibrium of the third kind is unacceptable. There is only one max. A. J. M.

[Thermodynamic equilibria.] A. Eucken (Physikal. Z., 1935, 36, 147).—A reply to the above. A. J. M.

Thermodynamic problem. A. Skrabal (Z. Elektrochem., 1935, 41, 147—149).—An explanation is offered (cf. this vol., 301). E. S. H.

Chemical equilibria in low-pressure gas discharges in the neighbourhood of the cathode and in the positive column. P. Jolibois (Compt. rend., 1935, 200, 651—652; cf. A., 1934, 975).—The equilibria for $2CO_2+O_2$ and $2H_2+O_2$ mixtures passed through the positive column of a discharge tube correspond with temp. > those for mixtures passed through the cathode region. The apparent temp. falls in each case at low pressure, this being attributed to loss of kinetic energy by the electrons and positive ions on collision with the walls of the tube. J. W. S.

Dissociation of sulphur monochloride vapour. R. C. Barton and D. M. Yost (J. Amer. Chem. Soc., 1935, 57, 307—310).—The v.d. of S_2Cl_2 has been measured at 1 atm. and 272—528°. Decomp. does not occur below 300°/1 atm. The dissociation of S_2Cl_2 vapour at lower pressures and under equilibrium conditions has been investigated at 160—800°. Excess of Cl_2 represses the dissociation. The results indicate that the reaction is S_2Cl_2 (gas)$=S_2$ (gas)$+$ Cl_2 (gas), but the calc. heat of reaction does not agree with independent thermal data. E. S. H.

A thermodynamical theory of solutions. F. Michaud (J. Chim. phys., 1935, 32, 66—90).—Mathematical. The theory is developed from the concepts of v.p. and the semipermeable membrane. The true mol. wt. of a solute is that which corresponds with the *d* of the vapour of the solute in equilibrium with the solution. When the interpretation of data for dil. solutions by the classical theory leads to anomalous results, the present theory permits the true mol. wt. to be deduced. J. G. A. G.

Specific thermodynamic properties of aqueous solutions of strong electrolytes. E. A. Guggenheim (Phil. Mag., 1935, [vii], 19, 588—643; cf. A., 1932, 338).—Limitations of the Debye–Hückel theory are discussed. A modified theory is developed and applied to data for strong electrolytes. H. J. E.

Isotopic exchange equilibria. H. C. Urey and L. J. Grieff (J. Amer. Chem. Soc., 1935, 57, 321—327).—With the aid of spectroscopic data the equilibrium consts. and enrichment factors of several exchange reactions involving isotopes of the lighter elements have been calc. The results show that there is a theoretical limit to the precision of at. wt. determinations, which has already been reached for several lighter elements. Reactions for the separation of isotopes are suggested. E. S. H.

Spectrographic method for the study of unstable compounds in equilibrium. R. Tsuchida (Bull. Chem. Soc. Japan, 1935, 10, 27—40).—A general method is described for studying equilibria of the type $mA+nB \rightleftharpoons A_mB_n$ in solution by light absorption measurements when (*a*) A and B do and do not absorb in the same region as A_mB_n, and (*b*) the absorption of A or B overlaps that of A_mB_n. KI and I give at 23—25° a max. absorption at wave no. 20×10^3 cm.$^{-1}$ due to I_2, and at 28 and $34·5\times10^3$ cm.$^{-1}$ due to the compound. At 22×10^3 cm.$^{-1}$ all solutions have the same absorption. For KI_3, the equilibrium const. is approx. $5·6\times10^3$. The calc. absorption of KI_3 shows two max. and two min. R. S. B.

Dissociation constants of some aliphatic arsinic acids. H. J. Backer and C. C. Bolt (Rec. trav. chim., 1935, 54, 186—194).—The dissociation consts. of the following alkylarsinic acids (I), prepared (*a*) from the alkyl halide or sulphate and Na_3AsO_3 or (*b*) by oxidation of $RAsCl_2$ (Gibson *et al.*, A., 1931, 1434) with 10% H_2O_2, have been determined by the use of a Pt or glass electrode. The vals. of $k_1\times10^4$ and $k_2\times10^9$, respectively, are given in parentheses: methane- (2·46, 5·69), ethane- (1·28, 4·47), *n*-propane-α- (0·611, 0·808), *n*-butane-α- (0·587, 1·22), n-*pentane-α-*, m.p. 162° (0·723, 0·859), and n-*hexane-α-arsinic acid*, m.p. 166° (0·693, 0·642) [prepared by (*b*) through n-*hexyldihydrophenarsazine*, m.p. 89°, and n-*hexyldichloroarsine*, b.p. 106—107°/13 mm.]. (I) are stronger acids than the corresponding CO_2H acids, but are weaker than the chloroalkylarsinic acids (this vol., 333), the dissociation consts. of which are β-chloroethane- (2·08, 4·23), β- (II) (1·73, 4·05) and γ-chloropropane- (2·36, 2·96), γ-chloro-*n*-butane- (1·13, 1·43), -*n*-pentane- (1·93, 1·71), and -*n*-hexane- (3·06, 4·88), -α-arsinic acid. Δ^{β}-Propene-α-arsinic acid is as strong as (II). J. W. B.

Behaviour of thallium halides in iodine solutions. R. Lydén (Finska Kem. Medd., 1934, 43, 67—85).—The effect of I on the solubility of TlCl and TlBr in MeOH, EtOH, PrOH, and EtOH–Et_2O was studied. Complexes are formed by TlCl and TlBr in the I–alcohol mixtures. LiI with TlI forms the solid phases $LiTlI_4$, TlI_3, and Tl_3I_4. Ch. Abs. (*e*)

Activity coefficients of water in the solution: sodium hydroxide ($m=0\sim0{\cdot}9$)–water. Y. Kobayashi and H. Wang (J. Sci. Hiroshima Univ., 1934, **5**, 71—82).—The e.m.f. (E) of the cell Hg|HgO,NaOH(m)|H_2(Pt), for $m=0{\cdot}05$—$0{\cdot}9$, is given by $E=E^\circ+am+bm^2$ mv., where $a=0{\cdot}07692$, $0{\cdot}05792$, and $0{\cdot}04286$, and $b=0{\cdot}35236$, $0{\cdot}36421$, and $0{\cdot}37217$, respectively, at 22·5°, 25·0°, and 27·5°. The differential free energy and energy of dilution have been calc. $RT \log f$, where f=activity coeff. of H_2O, rises to a max. at m=approx. 0·60. The bearing of these results on vals. of f for the solution NaOH–MeOH–H_2O is discussed (cf. following abstract). R. S. B.

Activity coefficients of water in the solution: sodium hydroxide–methyl alcohol–water. Y. Kobayashi, N. Akai, and S. Furukawa (J. Sci. Hiroshima Univ., 1934, **5**, 57—70).—The activity coeffs. of H_2O in mixtures containing about 10% MeOH and 0·05—0·5 molal NaOH have been determined at 25° by e.m.f. measurements on the cell Hg|HgO,NaOH(m),MeOH–H_2O|H_2(Pt). Vals. of the partial pressure of H_2O calc. from e.m.f. data agree with experiment. R. S. B.

Vapour pressure in a system with ground-up crystals. D. Balarev (Z. physikal. Chem., 1934, **171**, 466—468; cf. this vol., 16).—Theory and experiment show that the grinding up of crystals raises the v.p. for dehydration but lowers it for rehydration. This effect disappears with time and its disappearance is attributed to ageing (cf. A., 1933, 346). R. C.

Transition point of sodium sulphate decadeuterate. H. S. Taylor (J. Amer. Chem. Soc., 1934, **56**, 2643).—The transition point of $Na_2SO_4,10H^2O$ is 34·48°. E. S. H.

Investigation of hydrate dehydration by emanation method. R. Mumbrauer (Z. physikal. Chem., 1935, **172**, 64—76; cf. this vol., 32).—The emanation method clearly shows the two stages in the isothermal dehydration of $BaCl_2,2H_2O$ and $BaBr_2,2H_2O$ to the anhyd. salts. Dehydration causes a loosening of the crystal structure and the development of a large internal surface. There is evidence of decrease of the internal surface at 400°. R. C.

Effect of pressure on phase equilibria of sodium tungstate and related thermodynamic properties. R. W. Goranson and F. C. Kracek (J. Chem. Physics, 1935, **3**, 87—92; cf. A., 1932, 697).—The following equilibrium temp. (1 atm.) have been determined for Na_2WO_4 (I, II, and III): I $\rightleftharpoons$ II, 588·8°; II $\rightleftharpoons$ III, 587·6°; I $\rightleftharpoons$ liquid, 695·5°. The effects of pressure on the III $\rightleftharpoons$ I and II $\rightleftharpoons$ III transitions are given by $t=588{\cdot}8+0{\cdot}025(p-40)$ and $t=587{\cdot}6+0{\cdot}029p$, respectively, p being in bars. III has d^{20} 5·13±0·01. The melting curve is given by $t=695{\cdot}5+0{\cdot}0219p-1{\cdot}18\times10^{-6}p^2$. Heats of fusion and transformation are given, and other quantities are calc. F. L. U.

Thermal dissociation of lithium hydride. C. B. Hurd and G. A. Moore, jun. (J. Amer. Chem. Soc., 1935, **57**, 332).—Dissociation pressures have been measured between 782° and 926°. Assuming the reaction to be $2LiH=2Li+H_2$, the heat change is 44,000±2000 g.-cal. E. S. H.

Systems $NaOH–NaNO_3$ and $KOH–KNO_3$. N. M. Retortillo and E. Moles (Anal. Fís. Quím., 1933, **31**, 830—839).—The m.-p. diagrams indicate the existence of the compounds $2NaOH,NaNO_3$, $NaOH,NaNO_3$, and $2KOH,KNO_3$, which may be formulated as salts of H_3NO_4. H. F. G.

Thermal decomposition of rhodichlorides. G. Gire and F. Puche (Compt. rend., 1935, **200**, 670—672).—The dissociation pressures of $Ba_3(RhCl_6)_2$ are < those of RhCl (A., 1926, 138). The log p–$1/T$ lines cut at 963°, about the m.p. of $BaCl_2$. The heats of dissociation calc. from these are 32·9 and 42·5 g.-cal. corresponding with −9·6 g.-cal. per mol. as the heat of fusion of $BaCl_2$. J. W. S.

Compounds of sulphur dioxide with various amines. A. E. Hill and T. B. Fitzgerald (J. Amer. Chem. Soc., 1935, **57**, 250—254).—V.-p. measurements of the binary systems of SO_2 with *o*-, *m*-, *p*-toluidine, quinoline, *n*-amyl- and *n*-heptyl-amine have been made. The compounds formed show variations in the ratio SO_2 : amine from 1 : 2 to 2 : 1, the 1 : 1 ratio predominating. The approx. heats of formation of the compounds have been calc. E. S. H.

Phase diagrams of low-melting mixtures. I. The system methane–ethylene. M. Ruheman and A. Likhter (Physikal. Z. Sovietunion, 1934, **6**, 139—149).—Equilibrium data and sp. heats are recorded for the complete concn. range. There is a eutectic at 84·55° abs. (12·2% of C_2H_4). Ch. Abs. (*e*)

Effect of pressure on eutectic mixtures. H. A. C. McKay and B. Higman (Phil. Mag., 1935, [vii], **19**, 367—375).—Equations connecting pressure, eutectic temp., and eutectic composition are deduced and are applied to available data for the systems $NHPh_2$–, C_6H_6–, and $C_{10}H_8$–urethane and $C_{10}H_8$–*p*-toluidine. N. M. B.

Thermodynamic constants of iodine trichloride. N. P. Nies and D. M. Yost (J. Amer. Chem. Soc., 1935, **57**, 306—307).—The pressure and composition of the vapour in equilibrium with solid ICl_3 and a liquid phase have been determined at 25° and 35°. The vals. of $K=P_{ICl}P_{Cl_2}$ are $1{\cdot}09\times10^{-3}$ and $4{\cdot}36\times10^{-3}$, respectively, when P is in atm. The free energy and heat content of solid ICl_3 at 25° are −5410 and −21,150 g.-cal., respectively. The standard virtual entropy is 41·1 g.-cal. per degree. E. S. H.

System MgO–FeO–SiO_2. N. L. Bowen and J. F. Schairer (Amer. J. Sci., 1935, [v], **29**, 151—217; cf. A., 1932, 997; 1933, 1120).—The system has been studied by thermal, chemical, and microscopical analysis in the way previously described. MgO+FeO and $Mg_2SiO_4+Fe_2SiO_4$ form complete series of solid solutions, and $MgSiO_3+FeSiO_3$ forms a series with $\not>$ 90 mol.-% of $FeSiO_3$. Low liquidus temp. all lie on the $FeO-SiO_2$ side of the triangular equilibrium diagram. The m.p. of the olivine series lie between 1890° (Mg) and 1205° (Fe). The metasilicate series is complicated by the occurrence of incongruent melting at the Mg end with separation of olivine and at the Fe end with separation of SiO_2, and by the formation of two series of mixed crystals, monoclinic stable at high and orthorhombic at low temp. The courses of crystallisation are discussed with reference to natural magmas. The calc. heat of fusion for both Mg and Fe olivines is 14 kg.-cal. per mol. Optical properties of the several phases are given. Application of the results to slags and refractories is indicated. F. L. U.

Quaternary system $CaO-Al_2O_3-SiO_2-Fe_2O_3$: quaternary system $CaO-2CaO,SiO_2-5CaO,3Al_2O_3-4CaO,Al_2O_3,Fe_2O_3$. F. M. Lea and T. W. Parker (Phil. Trans., 1934, A., 234, 1—41).—Phase relations in the following systems have been determined: $2CaO,SiO_2$ (*A*)–$4CaO,Al_2O_3,Fe_2O_3$ (*B*); CaO–*A*–*B*; *A*–*B*–$5CaO,3Al_2O_3$ (*C*); CaO–*A*–*B*–*C*. No new compounds were observed. The compound $3CaO,SiO_2$ (*D*) is stable only between 1900° and 1250°, the latter being a definite transition temp. for $D \rightleftharpoons CaO + A$. Temp. relations and crystallisation paths in quaternary systems are discussed. F. L. U.

System lime–potash–alumina. L. T. Brownmiller (Amer. J. Sci., 1935, [v], 29, 260—277).—The system has been studied for small % K_2O by means of thermal, optical, and *X*-ray methods. The system $CaO-K_2O$ forms no compound; $K_2O-Al_2O_3$ forms a hygroscopic compound K_2O,Al_2O_3 (I), stable at 1650°, crystallising in the isometric system with $n=1{\cdot}603\pm0{\cdot}005$ for white light. In the ternary system (I), $3CaO,Al_2O_3$ (II), $5CaO,3Al_2O_3$ (III), CaO,Al_2O_3 (IV), $3CaO,5Al_2O_3$ (V), and the pure components may be in equilibrium with liquid. The quintuple points are: the eutectic for (I), (II), and (III) ($+K_2O$) at 48% CaO, 4·8% K_2O, and 47·2% Al_2O_3, in equilibrium with liquid and vapour at 1425±5°; the eutectic for (I), (III) ($+K_2O$), and (IV), at 39% CaO, 5% K_2O, and 56% Al_2O_3, 1430±5°; and at 48% CaO, 6·5% K_2O, and 44·7% Al_2O_3, when (I), (II), and CaO coexist with liquid and vapour at 1475±5°. β-Al_2O_3 and corundum crystallise from Al_2O_3+3·5% K_2O heated to 1550°. Data are given for the regions of stability of the system (II)–(III) and portions of the fields of (I)–CaO. R. S. B.

Action of water vapour on copper fluoride. L. Domange (Compt. rend., 1935, 200, 239—241).—The equilibrium $CuF_2+H_2O \rightleftharpoons CuO+2HF$ has been studied at 200—450° by passing H_2O over heated CuF_2, analysing the resultant vapour, and extrapolating to zero streaming velocity. The heat of reaction, calc. from the temp. variation of the equilibrium const., is −25,200 g.-cal. R. S. B.

Metamorphism in the reciprocal salt pair (Na^+, K^+)–(Cl^-, IO_3^-). T. G. Sahlstein (Bull. comm. geol. Finlande, 1934, No. 104, 104—110).—From 27° to 37° the salts $NaIO_3,H_2O$ and KCl represent the stable pair in contact with aq. solution. From 39·5° to 50° KIO_3 and NaCl are the stable pair. Ch. Abs. (*e*)

The system diphenyl–dibenzyl–naphthalene. Nearly ideal binary and ternary systems. H. H. Lee and J. C. Warner (J. Amer. Chem. Soc., 1935, 57, 318—321).—The system Ph_2 (I)–$(CH_2Ph)_2$ (II) has a simple eutectic at 44·3 mol.-% Ph_2 and 29·5°; the system (I)–$C_{10}H_8$ (III) at 55·6 mol.-% (I) and 39·4°; (II)–(III) at 38·6 mol.-% (III) and 32·7°. The system (I)–(II)–(III) has a simple ternary eutectic at 33·8 mol.-% (I), 39·2 mol.-% (II) and 17·4°. The solubilities, eutectic temp., and eutectic compositions of these systems are in agreement with those calc. for ideal solutions. E. S. H.

Crystallisation in a ternary system exhibiting a peritectic and a eutectic. System antipyrine–carbamide–urethane. K. Hrynakowski and F. Adamanis (Z. physikal. Chem., 1935, 172, 33—48).—The system shows a peritectic at 59° with 32·5% urethane and 15·0% $CO(NH_2)_2$, and a eutectic at 31·0° with 60·0% urethane and 2·5% $CO(NH_2)_2$. The theory of crystallisation in such systems is developed. R. C.

Thermal equilibria in ternary systems. II. Phenacetin–antipyrine–quinine. K. Krynakowski and F. Adamanis [with K. Kawecki and Z. Polubiński] (Rocz. Chem., 1934, 14, 1488—1498).—The system has one eutectic at 640°, antipyrine 47, quinine 25, and phenacetin 28%. R. T.

(A) **Equilibria in the system $NaCl-KCl-MgCl_2-H_2O$.** N. A. Osokoreva, M. A. Opuikhtina, D. N. Shoĭkhet, E. F. Plaksina, and A. I. Zaslavski. (B) **Calculation of the equilibrium in water at high temperatures.** E. I. Akhumov and B. B. Vasiliev (Trans. State Inst. Appl. Chem. U.S.S.R., 1932, No. 16, 24—47, 48—59).—Isotherms and polytherms have been determined at 10—110° for $NaCl-KCl-MgCl_2-H_2O$, $NaCl-MgCl_2-H_2O$, $KCl-MgCl_2-H_2O$, and NaCl–KCl. Ch. Abs. (*e*)

Anomalous heat effects of certain minerals and compounds. II. Ice calorimeter measurements. W. Swientosławski, A. Zmaczyński, I. Złotowski, J. Usakiewicz, and J. Salcewicz (Rocz. Chem., 1934, 14, 1474—1478).—The heat production of monazite and As_2S_3, alone, or with salts of La, Y, and Sc, is $\ngtr 5 \times 10^{-5}$ g.-cal. per kg. per hr.; the anomalous heat effects reported by Dorabialska (A., 1932, 927) are not confirmed. R. T.

Energies of hydrocarbon molecules. R. Serber (J. Chem. Physics, 1935, 3, 81—86).—Energies of formation of 12 hydrocarbons, including saturated, unsaturated, open-chain, and cyclic, have been calc. by applying the Heitler–London–Pauling–Slater theory. The vals. agree with those observed. The validity of a bond additivity rule appears to be fortuitous. F. L. U.

Heat of formation and stability of chain compounds. H. G. Grimm and H. Wolff (Angew. Chem., 1935, 48, 133—137).—The heat of formation from the elements in the normal state (*H*) of the chain compounds C_mH_{2m+2}, Si_mH_{2m+2}, N_mH_{m+2}, O_mH_2, S_mH_2, has been calc. assuming additivity. *H* increases with *m* for the C series, but decreases in all the other series. The equilibrium consts. at room temp. for the formation of chain compounds have been calc-using Nernst's theorem. All members of the series are thermodynamically unstable with respect to the first member. *H* for glucose, cellulose, and $OH\cdot CH_2\cdot[O\cdot CH_2]_x\cdot O\cdot CH_2\cdot OH$ has been calc. for formation from the elements and from CH_2O. R. S. B.

Heats of combustion and refractivity data for chloro-substituted fatty acids and esters. Connexion between chemical constitution, heat of combustion, and molecular refraction. E. Schjånberg (Z. physikal. Chem., 1935, **172**, 197—233).—For both Cl-substituted and unsubstituted esters the heat of combustion, the mol. refraction, R_L, and the mol. dispersion are not the same as for the *iso*-esters. The energy of breaking, *E*, of the C·Cl linking is greatest when the Cl is in the α-position to the CO_2H group and smallest when it is in the γ-position. It falls on ascending a homologous series of esters of a given acid but tends to a limit, and the fall is the slower the more remote is the Cl from the CO_2H. The refraction and dispersion of the C·Cl linking on the whole run parallel with *E*, but remain const. in a homologous series. A bomb lined with AgBr is not suitable for determining heats of combustion of Cl-substituted compounds (cf. Roth, B., 1922, 350). In Berthelot and Matignon's method (A., 1891, 1311) a correction must be applied for Cl in the gas phase. The best method is the quartz-wool method (A., 1931, 1262). R. C.

Specific conductance of dilute solutions at 0° and 25°. C. R. Johnson and G. A. Hulett (J. Amer. Chem. Soc., 1935, 57, 256—258).—Results obtained with several aq. sparingly sol. salts show that saturated solutions of such salts are useful for calibrating conductance cells. E. S. H.

Effect of the surface on moving processes in dilute strong electrolytes. S. Oka (Proc. Phys.-Math. Soc. Japan, 1934, **16**, 332—339).—The surface effect (I) and relaxation force are calc. on the Debye–Falkenhagen theory. (I) tends to lower the ionic mobility. Ch. Abs. (*e*)

Low-frequency conductivity of mixtures of aqueous solutions of electrolytes. A. Deubner and A. Dobenzig (Physikal. Z., 1935, **36**, 139—142).—Increase in the conductivity (I) occurs when 0·01*N* solutions of the sulphates of Cu, Zn, Mn, Mg, Co, Ni, Ca, and Cd are mixed with solutions of NaCl of the same (I). Other mixtures [*e.g.*, $K_4Fe(CN)_6$+NaCl] show a decrease in (I). An explanation, based on alteration of the mobility of the ions in NaCl solution, is put forward, but this fails to cover all cases. A. J. M.

Measurement of the conductance of electrolytes. VI. Galvanic polarisation by alternating current. VII. Platinisation. G. Jones and S. M. Christian (J. Amer. Chem. Soc., 1935, **57**, 272—280, 280—284; cf. A., 1933, 676).—VI. A cell for measuring the resistance (I) and capacitance (II) due to galvanic polarisation with alternating current is described. Results are given, using Ag, Ni, and Pt electrodes. Polarisation (I) is inversely ∝ (frequency)$^{\frac{1}{2}}$. Polarisation causes a (II) in series with (I), which decreases with increasing frequency. Polarisation (I) and polarisation (II) depend on the electrode metal, the electrolyte, and temp., but are independent of c.d. and the separation of the electrodes, and uninfluenced by another superimposed current of a different frequency.

VII. A criterion of the sufficiency of platinisation to eliminate errors due to polarisation is the variation of the apparent or measured resistance with frequency. Addition of $Pb(OAc)_2$ to the platinising solution is beneficial. E. S. H.

Physico-chemical studies of complex formation involving weak acids. XIII. Reactions of malonic acid with typical metallic bases. H. T. S. Britton and M. E. D. Jarrett (J.C.S., 1935, 168—175; cf. A., 1925, ii, 977).—Conductivity data are given for the titration of malonic acid (I) with NaOH, $Mg(OH)_2$, $Zn(OH)_2$, $Cr(OH)_3$, $Be(OH)_2$, $Al(OH)_3$, and $Cu(OH)_2$. The reaction of the first 0·5 equiv. of $Mg(OH)_2$ and $Zn(OH)_2$ with (I) is normal, but the p_H is reduced on further addition of base, owing to complex formation. In the case of the weaker bases, the conductivity is due chiefly to the hydrolysed (I), and it is suggested that the feebly ionised products of combination are pseudo-colloidal. R. S.

Conductivity of complex compounds of palladium. A. A. Grinberg, V. M. Schulman, and S. I. Chorunshenkov (Ann. Inst. Platine, 1935, **12**, 119—132).—Measurements of the conductivity of solutions of salts of the types K_2PdX_4, $[Pd(NH_3)_4]X_2$, *cis-* and *trans*-$Pd(NH_3)_2X_2$ and -$Pd(NH_3)_2C_2O_4$ (X= Cl, Br) give results in accordance with Tscherniaev's *trans*-influence theory for the corresponding Pt salts. The stability of Pd is < that of Pt salts. R. T.

Electrochemical study of the system $AlBr_3$–CuBr in ethyl bromide. V. A. Plotnikov and E. J. Gorenbein (J. Gen. Chem. Russ., 1934, 4, 1042—1046).—The sp. conductance varies directly with [CuBr] and inversely with the dilution; Cu is deposited at the cathode. The results obtained with EtBr are analogous to those obtained with C_6H_6. R. T.

Potential of metals in solutions of other ions. O. Essin and M. Lotzmanova (J. Gen. Chem. Russ., 1934, 4, 1138—1146).—The e.m.f. of Au electrodes in aq. $CuSO_4$, $Cu(NO_3)_2$, and $AgNO_3$ is given by $E_{Au/MX}=a+bE_{M/MX}$, where MX is one of the above salts. R. T.

Process of mutual displacement of metals. N. Isgarischev and I. Mirkin (Korros. Metallschutz, 1934, **10**, 109—112; Chem. Zentr., 1934, ii, 2188).—In the displacement of Cu, Cd, Pb, Ni, Fe, and Co by Zn, differences between the order of replacement and the electropotential series are due to the varying overvoltage of H liberated on the metallic couple formed. J. S. A.

Effect of the composition of glass on the interfacial potential: glass–aqueous solutions of electrolytes. K. S. Evstropiev and N. V. Suikovskaja (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 421—428).—The potential of the glass electrode (I) in contact with solutions of electrolytes has been studied with glasses of different composition, limited, however, to three components. In the titration of 0·025*N*-HCl with 0·1*N*-NaOH a Na_2O–SiO_2 glass with 80 mol.-% SiO_2 gave a curve agreeing with that obtained with the Pt–H_2 electrode. Three-component glasses fall into two groups: (1) those containing CaO, MgO, BaO, or PbO, and (2) those containing Al_2O_3, ZnO, or B_2O_3. A glass containing BaO behaves in a solution of $Ba^{\cdot\cdot}$ as a Ba electrode. A. J. M.

Electrokinetics. XV. Use of inert electrodes in measuring streaming potential. H. B. Bull (J. Amer. Chem. Soc., 1935, **57**, 259—260; cf. A., 1934, 143).—The use of a Pt or Au electrode in place of the calomel half cell is recommended. E. S. H.

Over-potential of the hydrogen isotopes. F. P. Bowden and H. F. Kenyon (Nature, 1935, **135**, 105).—The same linear relation between c.d. and over-potential holds for both isotopes and the slope of the line is approx. the same. The irreversible potential of H^2 is about 0·13 volt more negative than that of H, and under optimum conditions about $14H_2$ for $1H^2_2$ should be liberated at the cathode. The temp. coeff. of the H^2_2 over-potential is > that for H_2. L. S. T.

Concept of normal acidity potential. G. Schwarzenbach (Z. physikal. Chem., 1935, **172**, 234—236).—Polemical against Wiberg (this vol., 38). R. C.

Concept of normal acidity potential. E. Wiberg (Z. physikal. Chem., 1935, **172**, 237—238).—A reply to Schwarzenbach (cf. preceding abstract). R. C.

Potentiometric titration of non-aqueous solutions applied to amino-acids. A. G. Ogston and J. F. Brown (Trans. Faraday Soc., 1935, **31**, 574—585).—Dissociation consts. of NH_4OH, $CH_2Cl{\cdot}CO_2H$, *o*-$NH_2{\cdot}C_6H_4{\cdot}CO_2H$, and tyrosine have been determined by titration in MeOH solution, and those of tyrosine and glycine in H_2O and 80% and 95% EtOH. The results are in general agreement with those of Neuberger (A., 1934, 638) and support the zwitterion hypothesis. F. L. U.

Mercuric cyanide and mercuric oxycyanide electrodes. O. Tomíček and R. Přibil (Coll. Czech. Chem. Comm., 1935, **7**, 10—24; cf. A., 1931, 450).—Reproducible vals. of potential for varying $[H^{\cdot}]$ are obtained with the electrodes $Hg|Hg(CN)_2$ and $Hg|Hg(CN)_2,HgO$, when $[Hg(CN)_2]$ and [HCN] are const. in acid solutions, and $[Hg(CN)_2,HgO]$ is const. in alkaline solutions. The equiv. point is marked by a single max. of inflexion of the titration curve in the case of weak acids and by the first of two in the case of strong acids. R. S.

Relative oxidation potentials of nitric acid solutions. R. G. Monk and H. J. T. Ellingham (J.C.S., 1935, 125—130; cf. A., 1932, 705).—The potential *e* of the electrode system $Pt|HNO_3,HNO_2 = e_0' - 0{\cdot}0296 \log [HNO_2]$ for a given $[HNO_3]$ in solutions up to 12*M*-HNO_3 and 0·1*M*-HNO_2. When $[HNO_2] > 0{\cdot}1M$, the *e*—log $[HNO_2]$ curve deviates from linearity. The relative oxidation potential e_0' is taken as a measure of the oxidising tendency of a given HNO_3 solution. The results are in agreement with the view that *e* is controlled by the equilibrium $HNO_3 + 2H^{\cdot} + 2\ominus \rightleftharpoons HNO_2 + H_2O$. HNO_2 was determined by interaction with PbO_2 in excess of HNO_3. R. S.

Oxidation potential of the alkaline permanganate–manganese dioxide electrode. L. V. Andrews and D. J. Brown (J. Amer. Chem. Soc., 1935, **57**, 254—256).—The val. 0·489±0·001 volt has been determined for the half cell $MnO_4' + 2H_2O + 3e \rightleftharpoons MnO_2(s) + 4OH'$. The oxidation potentials of related electrodes and the corresponding free energies have been calc. E. S. H.

Oxidation–reduction equilibria of oxypurines. (Mlle.) S. Filitti (J. Chim. phys., 1935, **32**, 1—45).—Earlier work (A., 1934, 32, 367) has been extended. The data refer to systems of ionic strength, μ, 0·03—1·14 at p_H 6·7—8·5 and 25° and 38°. The normal oxidation–reduction potential, *E*, corr. for activity, for the system hypoxanthine$+2H_2O \rightleftharpoons$ uric acid$+2H_2$ (I) is 0·068±0·003 volt at 38° and $\mu = 1{\cdot}0421$, leading to $\Delta F = +6300 \pm 300$ g.-cal., and the corresponding vals. for the system xanthine$+H_2O \rightleftharpoons$ uric acid$+H_2$ (II) are *E* 0·123±0·003, ΔF 5700±150, from which the vals. for hypoxanthine$+H_2O \rightleftharpoons$ xanthine$+H_2$ are ΔF 600 and *E* 0·013. From the temp. coeff., the heats of reaction at const. pressure are: (I) 13,600 at p_H 7·36 and μ 1·1376 and (II) 6500 at p_H 7·7 and μ 0·1359. J. G. A. G.

Reduction of dinitrophenols by redox indicators and enzymes.—See this vol., 401.

Oxidation–reduction potentials of toxoflavin. See this vol., 407.

Electrolytic growth of metal crystals. I. Growth of silver crystals in aqueous solutions. T. Erdey-Grúz (Z. physikal. Chem., 1935, **172**, 157—187).—The growth of a spherical single crystal of Ag in solutions containing Ag as complex cation or complex anion has been studied. The substances present in solution, independent of their concn. or the c.d., *I*, determine what faces appear on the growing crystal. In some cases some of the faces predicted by the Kossel–Stranski theory are not developed; in others faces not predicted appear. This discrepancy is attributed to adsorption of dissolved mols. or ions. For solutions of AgI+KI and $Ag_2O + NH_3$, $1/\eta$, where η is the overvoltage, is a linear function of log *I*, indicating that the rate of the two-dimensional formation of nuclei determines the rate of metal deposition, *v* (cf. A., 1932, 24). With solutions of $AgBr + NH_3$ and $AgCl + NH_3$ log *I* is a linear function of η, showing that *v* is determined by the rate at which the ions lose their charge. For solutions of AgCN+KCN and others *I* is a linear function of η, indicating that the rate of supply of ions to the growing points determines *v*. R. C.

Overvoltage theory and simultaneous discharge of several ionic species. O. Essin (Z. physikal. Chem., 1934, **171**, 341—347; cf. A., 1933, 468).—On the basis of Volmer's overvoltage theory equations have been derived for the partition of the current between ionic species which are being discharged simultaneously. They agree with existing experimental data and with new data for the discharge of $Ni^{\cdot\cdot}$ and $H^{\cdot}$, and $Cd^{\cdot\cdot}$ and $H^{\cdot}$. R. C.

Cathodic passivity. K. M. Gorbunova and A. T. Vagramjan (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 443—453).—Study of the electro-deposition of metals has shown that the formation of nuclei takes place at lower potentials when the surfaces of the electrodes have not been previously exposed to air. A. J. M.

Mechanism of explosions and combustion. W. Jost (Z. Elektrochem., 1935, **41**, 183—194).—A review.

Spectra and latent energy in flame gases. S. Steele (Nature, 1935, **135**, 268; cf. A., 1934, 1288).—The emission of infra-red radiation during the explosive reactions occurring in a combustion engine suggests that some metastable H_2O and CO_2 mols. may be formed. Knocking may be connected with the proportion of metastable mols. formed during combustion. L. S. T.

Theory of combustion. III. N. Semenov (Z. physikal. Chem., 1935, **B**, **28**, 43—53; cf. A., 1928, 847; 1931, 436).—The chain reaction theory of the inflammation limits (I) in gaseous oxidation reactions requires that the position of the limits shall be independent of the no. of initial centres, *n*, starting the chains. Experiment shows, however, that if *n* is increased, photochemically, by ionisation, or by admixture of H or O atoms, the lower limit falls and the upper limit rises (A., 1933, 572; this vol., 47). O atoms are particularly effective, and combustion of the mixture $2H_2+O_2$ below a certain pressure may occur at room temp. in presence of a sufficiently high [O], the temp. not rising above 150°. These observations may be accounted for by assuming that when two active centres collide the probability of chain branching increases. The theory that spark ignition is due to the heating effect of the spark is unsatisfactory, since in some cases dilution with an inert gas facilitates inflammation. At the point of sparking a very high concn. of initial centres results, with consequent widening of (I). Le Chatelier's theory of flame propagation is not universally valid; the propagation of a cold flame has been observed, which may be accounted for by diffusion of active centres from the combustion zone into the adjoining region, there interacting to produce an initial concn. sufficient for cold inflammation. R. C.

Theory of degenerate explosions. N. Semenov (Z. physikal. Chem., 1935, **B**, **28**, 54—64; cf. A., 1931, 436).—The symmetrical S-shaped curves typical of the kinetics of many processes of the non-stationary class may be derived by the theory of degenerate explosions (I) assuming that the probabilities of chain branching and breaking do not depend on the reactant concns. Taking account of interaction of the chains (cf. preceding abstract), however, a different type of curve results. Reaction now is the more rapid and occurs at a lower temp. the more initial centres are present. The shape of the kinetic curve depends on the probability of branching on interaction of the chains, and may approach that of a zero or first order reaction. This modified theory of (I) explains existing data for numerous homogeneous gas reactions in which after a short period of induction the velocity assumes a const. val. approx. $\propto$ the initial pressure of reactants. Probably many unimol. reactions are non-stationary processes of the (I) type. R. C.

Correlation of ionisation and radiation in carbon monoxide–oxygen explosions. W. A. Kirkby (J.C.S., 1935, 165—168).—"Dry" and "moist" $2CO+O_2$ mixtures in a glass sphere were ignited at the centre by a spark, and synchronous records were made of visible (0·4—0·63 μ) and infra-red (0·74—1·2 μ) radiation emitted and the ionisation current across a central electrode gap. The max. of visible and infra-red emission were slightly later than the three coincident max. of temp., pressure, and ionisation current, and the shapes of the decay portions of the radiation and ionisation curves were markedly different, showing that the "afterglow" in these explosions was due chiefly to some cause other than the recombination of ions, although this cause is operative during approx. the same period as that of ionic recombination. J. G. A. G.

Correlation of flame movement and ionisation current during explosions. W. A. Kirkby (J.C.S., 1935, 160—165).—Synchronised records of flame movement and development of ionisation current were obtained with $2CO+O_2$ mixtures (I) in a cylindrical glass explosion vessel (II) fitted along its length with five equidistant pairs of electrodes (III); at each (III), an ionisation current was recorded as soon as the flame front arrived, and after this had passed, the conductivity $\propto$ the temp. and pressure at the (III). The ionisation persisted for a period which corresponded, approx., with the duration of the "afterglow" at the corresponding positions. The explosions of "moist" (I) were vibratory and those of "dry" (I) were non-vibratory and of lower velocity. The duration of afterglow and persistence of ionisation in "dry" (I) were $>$ in "moist" (I). With a similarly constructed phosphor-bronze cylinder, the corresponding explosion velocities and vals. of the degree of ionisation were $<$ in (II). The "afterglow" is attributed partly to recombination of ions and partly to emission by thermally excited mols. J. G. A. G.

Intensive drying. A. Smits (Z. physikal. Chem., 1935, **B**, **28**, 31—42).—The difficulties of intensive drying (I) experiments are detailed. Bodenstein's theory of the effect of (I) on gas reactions (A., 1933, 575) is rejected. It seems possible that activated mols. can react with other mols. only when the former are in the field of force of, or in some way combined with, H_2O mols. R. C.

Oxidation of silane. H. J. Emeléus and K. Stewart (Nature, 1935, **135**, 397).—When mixed with O_2 pure SiH_4 is not explosive at 1 atm. At lower pressures ignition occurs at a well-defined limit which is the higher the higher is the temp. In small concn. $CHCl_3$ and EtI lower the upper limit and in larger amounts prevent ignition, an effect which can be counteracted by a rise in temp. A mixture containing the higher hydrides of Si can also be rendered non-inflammable by small amounts of these inhibitors.

The lower crit. oxidation pressure of mixtures of SiH_4 and O_2 directly $\propto$ a power of the vessel diameter slightly $>$ 1. The oxidation of SiH_4 resembles that of PH_3 rather than that of CH_4. L. S. T.

Explosion of azomethane. A. O. Allen and O. K. Rice (J. Amer. Chem. Soc., 1935, 57, 310—317).—The crit. pressures at which explosion of gaseous Me_2N_2 occurs at temp. between 340° and 390° have been determined. The crit. pressure is raised by mixing with He (N_2 has no effect) and by decreasing the size of the reaction vessel. The Semenov theory of thermal explosions, according to which the heat of reaction leads under certain conditions to an explosion, is applicable to the data. E. S. H.

Kinetics of thermal *cis–trans* isomerisation. IV. G. B. Kistiakowsky and W. R. Smith (J. Amer. Chem. Soc., 1935, 57, 269—271; cf. A., 1934, 493).—The rate of isomerisation of *cis*-Me cinnamate has been studied at 5—500 mm. and 563—660° abs. The rate is independent of pressure between 70 and 500 mm., but appears to fall at 5 mm. The reaction appears to be homogeneous. The activation energy is 41,600±2000 g.-cal. The rate at higher pressures is given by $k=3{\cdot}5\times10^{10}e^{-41,600/RT}$. The mechanism of reaction is discussed. E. S. H.

Decomposition of ozone in aqueous solution. III. F. Kawamura (J. Chem. Soc. Japan, 1934, 55, 849—857).—The rate of decomp. (I) is the same in aq. $KClO_3$ and Na_2SO_4 as in H_2O. In H_2SO_4, H_3PO_4, and H_3BO_3, (I) is $<$ in H_2O, especially with a high acid concn. In aq. Na_2HPO_4, $NaHCO_3$, Na_2CO_3, and $Na_2B_4O_7$ (I) is much $>$ in H_2O, especially with a high salt concn. The reaction is $2O_3=2O_2+2O$. Ch. Abs. (*e*)

Mechanism of ionic reactions. R. A. Ogg, jun., and M. Polanyi (Trans. Faraday Soc., 1935, 31, 604—620; cf. A., 1934, 1185).—A theory of uni- and bi-mol. ionic reactions involving a homopolar mol. is developed from a consideration of potential energy as a function of nuclear separation. The factors contributing to the activation energy of electrolytic dissociation of a homopolar mol. are discussed. Activation energies of reactions between halogen ions and Me halides are calc. and compared with experimental vals. for some chemically related reactions. The results of the comparison support the essential validity of the theory. F. L. U.

Origin of bromine liberated as bromide ion in the interaction of bromoacetic ions with bromoacetic molecules. H. M. Dawson (Proc. Leeds Phil. Soc., 1935, 3, 22—25; cf. A., 1933, 1125).—The origin of Br′ produced in the hydrolysis of $CH_2Br{\cdot}CO_2Na$ by the interaction of $CH_2Br{\cdot}CO_2H$ and $CH_2Br{\cdot}CO_2'$ has been investigated by comparing the velocities of the reactions (1) $CH_2Br{\cdot}CO_2Et+AcO'$ and (2) $CH_2Br{\cdot}CO_2'+EtOAc$, in which no acid–base equilibrium subsists. The greatly increased velocity of (1) indicates that the Br′ is derived from the mol. rather than the ion. The facts as a whole suggest that Br is liberated from both ions and mols. when they collide with other ions or mols. which are basic. F. L. U.

Reduction velocity of chloric and bromic acids. A. Skrabal and H. Schreiner (Monatsh., 1935, 35, 213—231).—The velocity of reduction of ClO_3' and BrO_3' by Cl′, Br′, and I′ in acid solution has been determined for dil. solutions. The products were allowed to oxidise As_2O_3. The reaction $\propto$ the concn. of halide ion, ClO_3' or BrO_3', and $[H^{\cdot}]^2$. For the Br'–BrO_3' reaction at higher concn. a secondary reaction, in which the velocity $\propto$ $[Br']^2$, takes place. The mechanism of the reaction is discussed. M. S. B.

Inversion of sodium nitrite with nitrogen oxides. A. G. Zhivotovski (Khimstroi, 1934, 6, 380—384).—The rate is independent of the decreasing $[NaNO_2]$ and the increasing $[NaNO_3]$ in the solution. The optimum temp. is 20—40°. The inversion ceases at an acidity of 0·2—0·3 mol. per litre. Ch. Abs. (*e*)

Conversion of dissolved sodium chromate into dichromate by carbon dioxide under pressure. G. Agde and K. E. Vetter (Angew. Chem., 1935, 48, 92—95).—The influence of reaction time, temp., $[Na_2CrO_4]$, and pressure of CO_2 has been studied. E. S. H.

Mechanism of substitution at a saturated carbon atom. III. Kinetics of the degradations of sulphonium compounds. J. L. Gleave, E. D. Hughes, and C. K. Ingold. **IV. Constitutional and solvent effects on the mechanism, kinetics, velocity, and orientation of substitution.** E. D. Hughes and C. K. Ingold. **V. Hydrolysis of *tert*.-butyl chloride.** E. D. Hughes (J.C.S., 1935, 236—244, 244—255, 255—258).—III. The reaction $Y'+{}^{+}SAlkR_2\longrightarrow AlkY+SR_2$ in H_2O, aq. EtOH, and abs. EtOH is, in general, accompanied by the formation of olefines (cf. A., 1934, 152), and follows either a bimol. substitution process (I) formulated $\overset{\curvearrowright}{Y}\ \text{Alk}-\overset{\curvearrowright}{X}\longrightarrow \text{Y}-\text{Alk}+\text{X}$ or a unimol. process (II) formulated (i) $\text{Alk}-\overset{\curvearrowright}{X}\longrightarrow \overset{+}{\text{Alk}}+\text{X}$ and (ii) $\overset{\curvearrowright}{Y}\ \overset{+}{\text{Alk}}\longrightarrow \text{Y}-\text{Alk}$, where (ii) is a relatively instantaneous change. As Alk ascends the series (III) Me, Et, Pr^{β}, and Bu^{γ}, and as Y′ ascends the series (IV) OH′, OPh′, CO_3'', Br′, and Cl′, the mechanism changes from (I) to (II), a transition point lying between OPh′ and CO_3''. In series (III), the abs. velocity coeff., *k*, passes through a min., signifying transition from mechanism (I) to (II) between Et and Pr^{β}, and in series (IV) *k* decreases with decreasing basicity of Y to a const. val., since Y is excluded from the slow stage of (II). The position of the point of transition and the vals. of *k* vary with solvent and concn. in a manner consistent with the theory.

IV. The theory (A., 1933, 701) is elaborated. The published data for a wide variety of reactions, classified according to the state of electrification of X and Y, are consistent with processes (I) and (II), above, process (II) being favoured by (i) large electron-release from Alk, (ii) strong electron affinity in group X, (iii) sufficiently low nucleophilic activity in reagent Y, and (iv) high ionising capacity of the solvent. Electrophilic substitutions are also considered and the bearing on Walden inversions is discussed.

V. The hydrolysis of $Bu^{\gamma}Cl$ has been investigated in aq. EtOH and aq. $COMe_2$ at 8—45°. No olefine was formed; the reaction is unimol. and independent of [KOH]. The mechanism conforms to type (II), above, and the activation energy, 23 kg.-cal., calc. from the temp. coeff. is that of the ionisation of the halide. J. G. A. G.

Interaction of alkyl iodides and sodium *m*-4-xylyloxide in ethyl alcohol. P. J. HARDWICK (J.C.S., 1935, 141—144).—The rates of reaction of MeI, EtI, $Pr^{\alpha}I$, $Pr^{\beta}I$, $Bu^{\alpha}I$, $Bu^{\beta}I$, and n-$C_5H_{11}I$ with 1 : 3 : 4-$C_6H_3Me_2$·ONa (I) in EtOH have been determined at 28—66°. The bimol. velocity coeffs., k, increase with decreasing initial concn. Determinations of the degree of dissociation, α, of (I) show that the observed velocities are due almost entirely to xylyloxide ions, and coeffs, k_i, independent of dilution, are given by $k=\alpha k_i$. The reactivities of the n-alkyl iodides decrease to a limiting val. with increase of mol. wt. and the reaction velocities are of the same order as those calc. by means of the simple theory of activation by collision. The heats of activation derived from the temp. coeff. are between 19·5 and 23·4 kg.-cal. J. G. A. G.

Influence of variations in structure on the reactivity of an alcohol with hydrobromic acid. G. M. BENNETT and F. M. REYNOLDS (J C.S., 1935, 131—141).—The rates of reaction and the occurrence of subsidiary reactions have been investigated in PhOH at 76—97°. The velocity coeffs., k, of the n-aliphatic alcohols fall on a smooth curve, the vals. diminishing from MeOH to a const. val. with $Pr^{\alpha}OH$ and higher members. The activation energy is 26·6 kg.-cal. for MeOH and approx. 30·5 for the other members of the series. The reactivities are: *tert.*-alcohol > $Bu^{\beta}OH$ > $Pr^{\beta}OH$ > primary alcohol > CH_2Pr^{β}·OH and OH·$[CH_2]_3$·NO_2 > OH·$[CH_2]_2$·NO_2, and the importance of polar effects as compared with steric hindrance in esterification is emphasised. The retarding effect of an electron-attracting group and the accelerating influence of an electron-repelling group is shown in the series C_6H_4X·O·$[CH_2]_2$·OH, where the reactivities are: X=p-Me>o-Me>m-Me>H>p-Cl and in the series Ar·S·$[CH_2]_2$·OH where Ar=p-C_6H_4·OMe > Ph > p-C_6H_4Br > p-C_6H_4·NO_2 and s-$C_6H_2Cl_3$ > 2 : 4-$C_6H_3(NO_2)_2$. The reactivity of the OH of the glycols rises to a max. as the no. of C atoms is increased from 2 to 4 and thereafter decreases to the const. val. of the OH of cetyl alcohol. The reactivities of the series OPh·$[CH_2]_n$·OH and OH·$[CH_2]_n$Cl increase with rising vals. of n. The results, in conjunction with those previously obtained (A., 1932, 26) with analogous thio-compounds, are consistent with theory. J. G. A. G.

Course of reaction of halogenoacetic acids with cysteine and with thioglycollic acid. H. VON EULER and J. HAGEN (Z. physikal. Chem., 1934, 171, 379—384).—The rate of reaction of SH·CH_2·CO_2H (I) with CH_2I·CO_2H (II) or CH_2Br·CO_2H (III) in aq. solution at p_H 7·5 is not materially affected by a small amount of $CuSO_4$. An equation for the reaction velocity of cysteine (IV) with (II) and (III) at const. p_H has been derived and confirmed experimentally; $CuSO_4$ has little effect. The velocity coeffs. of the reaction of (IV) with (II) and (III) are 10—15 times those of the reactions of (I). R. C.

Emission wave theory of periodic reactions. V. Study of periodic reactions by methods of physico-chemical analysis. P. F. MICHALEV and F. M. SCHEMJAKIN (J. Gen. Chem. Russ., 1934, 4, 1117—1127).—The equation $\lambda v=hN/M$ (λ=distance between bands, v=velocity of propagation, N= concn. of the external electrolyte, and M its mol. wt.) is verified for a no. of Liesegang systems, and is found to hold the more closely the smaller is the concn. of gelatin. The phenomenon of Liesegang ring formation is analogous to that of emission of stationary waves on the surface of a flowing liquid. R. T.

Decomposition velocity of [calcium] carbide with water. A. S. FALIKEVICH (Khimstroi, 1934, 6, 442—445).—Between 5° and 50° the reaction rate of coarsely granulated CaC_2 with H_2O increases 1% per 1° rise in temp. CH. ABS. (*e*)

Kinetics of the thermal decomposition of calcium azide. K. K. ANDREEV (Physikal. Z. Sovietunion, 1934, 6, 121—138).—There is an induction period during which reaction nuclei are destroyed by impurities. This is followed by a period when the velocity $\propto p^{2/3}$. The last stage of the reaction is of the first order. The crit. increment for nuclei growth increases from 20 g.-cal. at 70° to 34 g.-cal. at 135°. At low temp. CaN or Ca_2N_2 is formed. On rapid heating at high temp. Ca is an additional product. The detonation temp. in vac. and air are 110° and 142°, respectively. CH. ABS. (*e*)

Action of chlorine on ferric oxide and other oxides. C. DEL FRESNO and J. F. F. MOYANO (Anal. Fís. Quím., 1934, 32, 128—133).—The rate of reaction (I) of Cl_2 with Fe_2O_3 (*e.g.*, Fe ores) is highly dependent on the particle size. Amongst oxides of any one group of the periodic system, (I) decreases on passing from lower to higher periods. J. S. A.

Reactivity of carbon. H. L. RILEY and H. E. BLAYDEN (Nature, 1935, 135, 397—398).—Graphite and highly graphitised forms of C are oxidised approx. 20—25 times more rapidly than sugar charcoal by excess of CrO_3–H_3PO_4 at 100°. Hard metallurgical coke is oxidised more rapidly than gas and low-temp. cokes. L. S. T.

"Probability" of corrosion. R. B. MEARS and U. R. EVANS (Trans. Faraday Soc., 1935, 31, 527—542; cf. A., 1934, 1181).—The influence of sixteen external factors on the probability (I) and the conditional velocity of corrosion of different kinds of Fe in contact with aq. KCl solutions has been determined. (I) is depressed by increase of $[O_2]$, by K_2CO_3, by the proximity of other corroding points, and by increase in the temp. of pre-exposure to O_2, and is increased by rise in the temp. of the experiment, by SO_2 (but not CO_2) present in the gas phase, and by increase of [KCl]. In general both the primary air-formed oxide film and the secondary film of corrosion products contribute to protect the metal. The film-substance is porous, and becomes protective when the pores are small enough to be blocked with corrosion products. F. L. U.

Velocity of dissolution of metals in aqueous salt solutions. IV. Dissolution of tin in aqueous ferric chloride. E. Bekier, W. Łukaszewicz, and F. Wejcówna (Rocz. Chem., 1934, **14**, 1479—1487).—The dissolution of Sn in aq. $FeCl_3$ containing HCl involves the reactions: $Sn+2FeCl_3 \longrightarrow SnCl_2+2FeCl_2$; $SnCl_2+2FeCl_3 \longrightarrow SnCl_4+2FeCl_2$; $Sn+SnCl_4 \longrightarrow 2SnCl_2$. The velocity of dissolution is given by $-v \, . \, dx/dt=s[k_1(a-x)+k_2x]$, where v is the vol. of the solution, s the Sn surface (sq. cm.), a the initial $[FeCl_3]$, and x the fraction of $FeCl_3$ reduced at time t. The temp. coeff. of the const. k_1 is 1·24. R. T.

Action of heat on some metallic camphorcarboxylates. M. Picon (Compt. rend., 1935, **200**, 397—399).—The velocity of liberation of CO_2 from Mg, Ca, Na, Mn, Zn, Ce^{III}, UO_2^{II}, Cu^{II}, Bi, Pb, Ag, Hg^{II}, Tl^{I}, and Tl^{III} camphorcarboxylates at 100° generally increases with increasing equiv. wt. of the metal. At higher temp. hydrocarbons and H_2 are formed, of composition depending on the metal. C_2H_2 is not formed in detectable amounts, but ethylenic hydrocarbons are produced, especially at high temp. and from the Ca and Na salts. On maintaining $C_{10}H_{15}O{\cdot}CO_2Na$ in a vac. at 175° it yields $C_{10}H_{14}(ONa){\cdot}CO_2Na$, a white compound, sol. in MeOH and EtOH and with HCl regenerating the acid in theoretical quantity. J. W. S.

Specificity of oxidising agents: comparison of the oxidising action of lead tetra-acetate and periodic acid on polyhydroxy-compounds. R. Criegee (Sitzungsber. Ges. Beförd. ges. Naturwiss. Marburg, 1934, **69**, 25—47; Chem. Zentr., 1934, ii, 2515).—Largely a discussion of work already reported (A., 1933, 1272). H_5IO_6 (I) effects oxidative fission of glycols in the same manner as $Pb(OAc)_4$ (II). There is no direct relationship between the speeds of the two oxidations, except in the case of stereoisomerides. With α-OH-acids and $H_2C_2O_4$, (I) and (II) react in completely different ways. These differences are discussed theoretically, in relation to the mechanism previously advanced, and attributed chiefly to differences in the polar nature of (I) and (II) and to structural differences in the compounds undergoing oxidation. The kinetics of many such oxidations are described in detail. H. N. R.

Theories of catalysis. D. Porret (Ann. Guébhard-Séverine, 1934, **10**, 392—400).—A lecture.

Catalytic effect of hydrogen on the carbon monoxide flame. W. E. Garner and F. H. Pollard (J.C.S., 1935, 144—151).—The discontinuity in the radiation–pressure curves of CO flames containing H_2 is interpreted as the pressure, given by $p_s=k_2/(p_{H_2}+k_1)$, at which two independent mechanisms producing flames operate at equal speeds. The nature of these mechanisms is discussed. The process which is stable at the higher pressures of H_2, p_{H_2}, depends mainly on the rate at which H atoms are produced by collision of H_2 with newly formed CO_2 mols. p_s is raised by CO_2, Br, and CCl_4 (cf. A., 1932, 234), but with Cl_2 the discontinuity becomes less well defined. 4—5% of Cl_2 and Br extinguish the flame. Other sp. effects are recorded and the results are interpreted in terms of the deactivation of the H atoms by which the reaction chains are propagated. J. G. A. G.

Catalysis of hydrogen peroxide decomposition by ferrous sulphate and sodium tungstate. B. A. Konovalova (Z. anorg. Chem., 1935, **222**, 81—91).—Na_2WO_4 alone has no effect on the decomp. of H_2O_2 in acid solution, but it has a marked accelerating effect on the catalysis of H_2O_2 decomp. by $FeSO_4$. This behaviour is due to the formation of Na_2WO_8, which is normally stable in acid solution, but is decomposed in presence of $FeSO_4$ with evolution of O_2 at a rate > that with $FeSO_4$ alone. M. S. B.

Electron transfer processes in the mechanism of oxidation–reduction reactions in solution. J. Weiss (Naturwiss., 1935, **23**, 64—69).—The conditions affecting the velocity of reactions between ions are reviewed. The mechanisms of the heterogeneous and homogeneous catalytic decomp. of H_2O_2, the oxidation of $Fe^{\cdot\cdot}$ salts by mol. O_2, and other oxidation reactions are considered. A. J. M.

Aluminium chloride as a catalyst of hydrogen interchange. J. Kenner, M. Polanyi, and P. Szego (Nature, 1935, **135**, 267—268).—$AlCl_3$ catalyses the interchange between C_6H_6 and HCl. With ordinary C_6H_6 and HCl containing 13·4% of H^2 > 90% of the H^2 passes to the C_6H_6. L. S. T.

Factors in the autoxidation of ether. M. Landon (Bull. Soc. chim., 1935, [v], **2**, 53—57).—Peroxide formation, which is much slower in the dark than in light, is strongly catalysed by traces of MeCHO, but is retarded by H_2O and acids. NaOH prevents the appearance of the oxidation products, and distillation from NaOH is probably the simplest way of removing peroxide and preparing pure Et_2O. J. G. A. G.

Oxidation of iodoform [and carbon tetra-iodide] solutions. R. Dubrisay and G. Emschwiller (Bull. Soc. chim., 1935, [v], **2**, 127—141; cf. A., 1932, 1215; 1934, 261).—Details are given of work previously noted and the results are compared with photochemical data. The "dark" oxidation of CHI_3 is inhibited by the same substances in pure CCl_4 as in C_6H_6. The temp. coeff. of the "dark" reaction in CCl_4 is 1·7, corresponding with an activation energy of 9500 g.-cal. Added I and acid catalyse the reaction by suppressing retarding agents, since in pure solvents I retards the oxidation and acid has no effect. The photochemical and "dark" oxidation of CI_4 is very rapid in PhMe, Et_2O, CS_2, and $CHCl_3$, but, unlike that of CHI_3, is least rapid in CCl_4 and C_6H_6, unless the last be highly purified. HCl opposes the catalytic effect of I. J. G. A. G.

Catalytic action of inorganic halides. Racemisation by complex formation. K. Bodendorf and H. Böhme (Annalen, 1935, **516**, 1—29).—The catalytic action of certain inorg. halides in the reactions of org. halogeno-compounds has been ascribed to complex formation with consequent increased tendency towards ionisation: $RCl+MCl \rightleftharpoons R[MCl_2] \rightleftharpoons R^++[MCl_2]^-$. This hypothesis is examined by consideration of the case in which the org. halide is optically active and has the halogen attached to the asymmetric C atom. The carbonium ions would therefore be configuratively labile, since only 3 valencies are saturated and the postulates of the tetrahedron model are absent. Racemisation is therefore to be expected, since in reunion of the ions both antipodes are equally favoured. Racemisation of CHPhMeCl has been observed in the presence of a variety of complex-forming chlorides. The effect cannot be ascribed to Cl′, since $HgCl_2$ under equiv. conditions has a very much more marked action than HCl, LiCl, or NMe_4Cl, which are quantitatively equal to one another. Further, the racemising action of $ZnCl_2$ is completely nullified by LiCl owing to the production of $Li[ZnCl_3]$. In presence of $HgCl_2$ in $COMe_2$ racemisation of CHPhMeCl follows the unimol. law and is 50 times slower than in $MeNO_2$ and $>$ 1000 times slower than in Et_2O. There is thus an approx. parallelism between rate of racemisation and dielectric const. of the solvent; in extension of this view it is found that CHPhMeCl is very rapidly racemised in the absence of catalyst in HCO_2H and that addition of $HgCl_2$ has no influence on the rate of change. In EtOH an inversion of sign is observed, due to the production of optically non-homogeneous CHPhMe·OEt. With $ZnCl_2$ the rate of reaction depends very greatly on the concn. of catalyst; in $PhNO_2$ and $MeNO_2$ the activity of the catalyst gradually diminishes. BCl_3 in C_6H_6 or $PhNO_2$ is more active than $HgCl_2$ or $ZnCl_2$ and the dependence of rate on concn. of catalyst is considerably more pronounced. $SiCl_4$ in C_6H_6 or $PhNO_2$ is inactive. With $TiCl_4$ in $CHCl_3$ the dependence of rate on concn. of catalyst is more marked than with any other chloride. With $SnCl_4$ racemisation is about 10 times as rapid in C_6H_6 as in $PhNO_2$, a reversal of the usual relationship between rate and dielectric const. of medium. $AsCl_3$ in C_6H_6 or $PhNO_2$ is inactive. The activity of $SbCl_5$ is so great that the experiments are not exactly reproducible owing to the influence of minute traces of impurity. $SbCl_3$ has comparatively little effect, and the reaction does not follow the unimol. law. The temp. coeff. of the reaction varies between 2 and 4. H. W.

Enzymic esterification.—See this vol., 403.

Effect of electric waves on heterogeneous catalysis in solutions. E. Wilke and H. Ganser (Kolloid-Z., 1934, 70, 132—135).—Electric waves (50—200 m.) influence the catalytic action of diastase on starch solutions, and of Ag sol and Pt sol, but not I′, on H_2O_2. The effect seems to be on the catalyst, not the reaction. E. S. H.

Catalytic combustion at high temperatures. W. Davies (Phil. Mag., 1935, [vii], **19**, 309—325).—The catalytic combustion with air of various proportions of CO and H_2 on Pt and Pd surfaces was investigated up to approx. 1600°. Action, for CO, is entirely suppressed at about 1200°, but at higher temp. the wires recover their activity and action proceeds, at a diminishing rate, up to nearly the m.p. of the wires. The discontinuity is not observed with H_2 except when the wires have been previously used in CO mixtures or have been exposed to air for a long period; in such cases there is a partial or complete discontinuity at about 1200° for a first heating. N. M. B.

Thermal decomposition of hydrogen peroxide in presence of glass wool and copper sulphate. K. C. Bailey (Sci. Proc. Roy. Dublin Soc., 1935, **21**, 153—164).—The decomp. has been re-investigated at 35° using inhibitor-free H_2O_2 solution which underwent only very slow spontaneous decomp. after being specially filtered. The rate of decomp. in the presence of purified glass wool and small [NaOH] is given by $v=k_2[H_2O_2][OH']+k_1[H_2O_2]$. The p_H of the solution increased during the first 3—10 hr. and then remained const. or fell slowly. v is little affected by the wt. of glass wool, but the negligible reaction in the absence of suitable solid surfaces suggests that both first and second order reactions are heterogeneous. Glass wool with Cu adsorbed from solution catalyses the reaction markedly. The decomp. is of zero order; the velocity coeff. $\propto$ the wt. of Cu adsorbed and falls only at low $[H_2O_2]$. $Cu^{\cdot\cdot}$ in solution has little effect, and the decomp. probably proceeds by way of a Cu peroxide. J. G. A. G.

Influence of solvent on heterogeneous catalysis. Catalysis of hydrogen peroxide in different solvents. I. L. V. Pisarshevski and T. S. Glikman (Bull. Acad. Sci. U.R.S.S., 1934, 1281—1290).—The reaction has been studied in H_2O (I), Et_2O (II), and in (I)–(II) mixtures. The velocity is greatest in (I)–(II), and least in dry (II), but rapidly increases with small additions of (I). It is suggested that the solvent effect is connected with reaction chains in solution. R. S.

***X*-Ray examination of certain mixed catalysts.** G. Wagner, G. M. Schwab, and R. Staeger (Z. physikal. Chem., 1934, **B, 27**, 439—451; cf. A., 1934, 850).—Where kinetic measurements indicate that the second component increases the activity by preventing structural changes in the active component at high temp. (CuO–ZnO) or by forming a new kind of active centre (CuO–MgO), the *X*-ray diagram shows the unchanged lattices of both components. Where the second component has a poisoning action (CuO–Cr_2O_3) or the mixture has considerably increased activity despite increased heat of activation (CuO–Al_2O_3), the *X*-ray diagram points to compound formation. The increase in the activity of Ni by Cu dissolved in it (*ibid.*, 607) may be due to the distension of the Ni lattice, or to the co-existence of several mixed crystal lattices distended to differing extents, " active lines " occurring at the interfaces. R. C.

Synthesis of ammonia at very high pressures greater than 1000 kg. per sq. cm. and the chemistry of very high pressures. J. Basset (Bull. Soc. chim., 1935, [v], **2**, 108—119).—Full details are given of the apparatus and results already noted (A., 1934, 1082). J. G. A. G.

Catalytic action of Japanese acid earth. X. Mechanisms of the promotion and poisoning of the catalytic action. K. Ishimura (Bull. Chem. Soc. Japan, 1935, **10**, 1—5).—The promotive power of Al_2O_3–SiO_2 catalyst (I) on $C_{10}H_8$ is a function of the H_2O retained by (I) at 120°. NH_3, RNH_2, RCN, and $C_5H_{11}·NO_2$ are strong, HCl and AcOH are weak, poisons. The catalytic activity of (I) is restored after poisoning with NH_3 by heating at 500°/4 mm. The adsorption of $C_{10}H_8$ on (I) is independent of the presence of poison or promoter, and hence the latter affect only the active spots. The surface area of (I) is $1{\cdot}11 \times 10^5$ sq. cm. per g., of which approx. 20% is catalytically active. R. S. B.

Oxidation of ether in presence of active carbon. I. Demougin and Landon. **II. Reactions and determination of oxidised ether.** Landon (Bull. Soc. chim., 1935, [v], **2**, 27—34, 34—53).—I. The catalysis, by metallic salts and oxides, of Et_2O_2 (I) formation from Et_2O and subsequent decomp. to H_2O_2, etc., in presence of air and sunlight has been investigated. Mg^{II} and Zn^{II} afford the highest yields of (I); Fe^{III}, Ni^{II}, Cu^{II}, Co^{II}, SiO_2, and Al_2O_3 catalyse both processes, whilst active C, in addition, decomposes the H_2O_2. Cr^{III} gives H_2O_2, whilst Mn^{II} and PbO inhibit formation of (I). A steam-activated C containing Mn^{II} is recommended for recovering Et_2O from vapours.

II. The pink colour produced by adding KCNS to Et_2O is not due to Fe^{III}, but is probably referable to nitrite content. Titration of Et_2O with $KMnO_4$ in presence of H_2SO_4 determines the total H_2O_2 but does not distinguish between free H_2O_2 and H_2O_2 present as (I), and includes nitrite. By continuously agitating KI with Et_2O, the I liberated passes through a max. (II). The observed phenomena are attributed to the absorption of I by Et_2O and the equilibrium $MeCHO + I_2 \rightleftharpoons CH_2I{\cdot}CHO + HI$. When peroxide is present chiefly as free H_2O_2, (II) is rapidly attained (*e.g.*, after 5 min.), but when much (I) is present, (II) is reached only after shaking for longer periods (*e.g.*, 20 min.). J. G. A. G.

Catalytic conversion of cyanamide into carbamide. O. T. Rotini (Chimica e l'Ind., 1935, **17**, 14—20).—The relative efficiencies of various catalysts are approx. as follows: hydrated MnO_2 100, $Fe(OH)_3$ 3, $Al(OH)_3$ 0·3, $Co(OH)_2$ 4, $Ni(OH)_2$ 1, various soils 2—10 (depending mainly on their MnO_2 content, but much > would be expected from their composition). $Fe(OH)_2$, $Mn(OH)_2$, pyrolusite, TiO_2, SiO_2, and humic acids are without catalytic activity. The reaction velocity passes through a max. at p_H 9·0 with MnO_2,xH_2O and at p_H 8·6 with $Fe(OH)_3$. In all cases the log. of the velocity coeff. increases linearly with rise of temp. It is deduced that cyanamide probably has the structure HN:C:NH and not N:C·NH_2. D. R. D.

Action of some catalytic poisons on the hydrogenation of benzene in a liquid medium at room temperature. R. Truffault (Bull. Soc. chim., 1935, [v], **2**, 244—253).—The catalytic action of Ni-black on the hydrogenation of C_6H_6 at room temp. is less affected by the poisoning action of thiophen (I) or halogen derivatives of C_6H_6 than Pt-black. 0·1 g. of (I) is necessary to inhibit the action of 3 g. of Ni. Much greater quantities of (I) are necessary to prevent the hydrogenation of *cyclo*hexene by Ni. H_2O has also a retarding action. Vulcanised rubber has an inhibiting action, but natural rubber, containing no S, has not. The best method for the purification of C_6H_6 from (I) is by Haller and Michel's method of treatment with $AlCl_3$. M. S. B.

Electrolytic separation of diplogen. W. W. Sawyer (Proc. Camb. Phil. Soc., 1935, **31**, 116—118).—The theory of Bell and Wolfenden (A., 1934, 154) for H^2 concn. by electrolysis depends on the assumption of a const. val. of γ, where $\gamma = 1 - (dN/dr_0)/(dE_0/dr_0)$, N being the min. possible energy for a neutral atom at distance r from the origin and E_0 the least energy which a nucleus, moving in a steady state at r from the origin, can have. Theoretically γ is const. and independent of the mass of the isotope. W. R. A.

Electrolysis of solutions of zinc chloride in mixtures of water and ethyl alcohol. C. Charmetant (Compt. rend., 1935, **200**, 380—381).—H_2O-EtOH solutions of $ZnCl_2$ (30—40 g. per litre) containing > 300 g. of EtOH per litre yield no free Cl_2 on electrolysis, HCl and MeCHO being formed. The yield of MeCHO is $\not>$ 50—60% theoretical. With low [EtOH] a little Cl_2 is evolved. Except with very high [EtOH] the yield of Zn at a c.d. of 2 amp. per sq. cm. is about 96% after 1 hr. and decreases with time. The yield increases with decreasing c.d. The deposit is the purer, but the less adherent, the higher is the c.d., and the adherence also diminishes with increasing [EtOH]. J. W. S.

Polarographic studies with the dropping mercury cathode. XLV. Electro-reduction of selenites and tellurites. L. Schwaer and K. Suchý (Coll. Czech. Chem. Comm., 1935, **7**, 25—32; cf. A., 1934, 1177).—Polarograms of the reduction of selenites (I) and tellurites (II) show three waves due to the steps $TeO_2 \longrightarrow TeO \longrightarrow Te \longrightarrow TeH_2$. In presence of 0·1*N*-$NH_4Cl$ and 0·1*N*-NH_3 (I) are reduced at −1·43 volts and (II) at −0·65 volt (from Hg_2Cl_2 zero) in one step. Cu, Bi, (I), and (II) may be determined separately in presence of Na K tartrate. A sharp max. which increases linearly with $[TeO_2]$ appears in the polarogram at the limiting current due to electrodeposition of Te. R. S.

Isolation of gadolinium. F. Trombe (Compt. rend., 1935, **200**, 459—461).—The Gd is obtained as a fusible alloy with 6% Cd by electrolysis with Cd in a C crucible. Separation is then effected by fractional distillation in a Mo crucible under 0·001 mm. pressure at 1230—1240°. Gd 98·4% pure is obtained; it does not decompose boiling H_2O, and oxidises only slowly in air. N. M. B.

Electrolysis of metals during the simultaneous scraping of the anode and cathode by means of a diamond. J. Gillis and J. Swenden (Rec. trav. chim., 1935, **54**, 219—234).—Electrolysis with continously scraped electrodes of Cu, Ni, and Cd, and between two dropping Hg electrodes, in solutions of the corresponding salts at < certain concns., gives linear current–p.d. curves. With Ni solutions > 0·1*M* and Cu solutions > 1*M* the curves are logarithmic, but Cd gives linear curves at 0·0001—1*M* and at relatively high c.d. and p.d. Unscraped Ni gives a logarithmic curve $\log r = a + b \log c$, where r=polarographic resistance (of the cell during electrolysis), c=concn., and a and b are consts. Similarly $\log r' = a + b \log c$ (r'=resistance in absence of electrolysis). $f = r/r'$ depends on the anion according to $CNS' > NO_3' > SO_4''$, but the anion does not influence the concn. at which $f=1$ for the same metal. The addition of gelatin, C_5H_5N, and tartaric acid changes r at 16° and 27° according to $\log r=A+B\log c$, where c=concn. of added substance, and A and B are consts., a relation of the same form as the Freundlich adsorption isotherm. Unless both electrodes are scraped the added substance has no influence. f increases with the degree of polarisation of the electrode, in the order Cd Cu$<$Ni. On adding gelatin etc. to Cu solutions f rises to approx. the same val. as for Ni. The results can be interpreted according to the theory of Hoekstra (cf. A., 1934, 372). R. S. B.

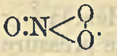
Use of a modified Haring cell in detecting electrode reactions. J. E. Stareck and R. Taft (Trans. Electrochem. Soc., 1935, 67, 97—114).—The application of a modified transparent Haring cell to the study of the deposition of Ag from $AgNO_3$ and from cyanide solutions is described. Using Pt for the main and reference electrodes, the anode and cathode current–voltage curves were determined from very low c.d. upwards and the discontinuities therein are discussed. The anode products are Ag peroxide and O_2. At the cathode cryst. Ag, H_2, and AgH are detected. In the system Pt|$AgNO_3$|Pt a pronounced break in the cathode curve is attributed to the formation of AgH, further evidence for the existence of which is advanced. The system Pt|KCN|Pt is also examined and the nature of the electrode reactions discussed. The character of the deposits, particularly as regards colour effects and the stability of the coloration, is also discussed. J. W. C.

Voltaic couples and corrosion.—See B., 1935, 231.

Motor-electrolytic current as a factor in corrosion.—See B., 1935, 231.

Rhenium plating.—See B., 1935, 233.

Electrolysis in the glow discharge. V. Special behaviour of polar hydrogen and oxygen in electrolysis of aqueous sulphuric acid. A. Klemenc and T. Kantor (Z. physikal. Chem., 1934, B, 27, 359—375; cf. A., 1934, 39).—H_2O_2 and $H_2S_2O_8$ produced in the glow discharge electrolysis (I) of aq. H_2SO_4 are formed principally by either polar or apolar at. H produced by decomp. of H_2O vapour in the anode or cathode fall: $2H_2SO_4+2H=2H_2+H_2S_2O_8$, $2H_2O+2H=2H_2+H_2O_2$. H_2SO_5 is produced by $H_2S_2O_8+H_2O=H_2SO_5+H_2SO_4$. H liberated on a solid cathode does not so react, possibly because it dissolves in the electrode. Polar O does not oxidise in (I), therefore oxidation effected by O produced on an electrode must be catalysed by the latter. In (I) of sulphate solutions no $H_2S_2O_8$ is produced, but H_2O_2 is formed, apparently by $2OH=H_2O_2$ occurring in the solution. Under the influence of the glow zone, which is near the surface of the solution, H_2O mols. decompose: $H_2O=OH+H$, $H_2O=H_2+O$ (cf. A., 1929, 1146). At a solid anode the only reaction of OH is $2OH=H_2O+O$. R. C.

Nitrogen peroxide, NO_3. R. Schwarz and H. Achenbach (Ber., 1935, 68, [*B*], 343—349).—Passage of the glow discharge through a mixture of NO_2 and O_2 (1 : 20) at 1 mm. and cooling of the products in liquid air in the apparatus described (A., 1934, 1183) gives a pale blue condensate, apparently a mixture of N_2O_3 and higher oxides. If the condensing tube forms part of the discharge tube a colourless deposit of *nitrogen trioxide*, NO_3, is obtained. It is stable at $<$ −142°, above which it slowly decomposes into NO_2 and O_2. In aq. media it is relatively stable. The very low temp. of condensation, the spectroscopic behaviour, and the co-ordinatively unsaturated character of the compound indicate the monomeric form and therefore the structure  Hydrolysis in H_2O is not accompanied by production of H_2O_2, thus excluding the constitution $NO_2{\cdot}O{\cdot}O{\cdot}NO_2$ and identity with the dimeric oxide N_2O_6. In presence of H_2O it is decomposed into O_2 and NO_2, which yields NO_2' and NO_3', and hence it does not function as an acid anhydride. H. W.

Influence of light on the combination of hydrogen and oxygen and of hydrogen and nitrogen at various temperatures. M. Miyanishi (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1935, 26, 70—76).—The mixtures $2H_2+O_2$ (I), $5H_2+2NO$ (II), and $3H_2+N_2$ (III) have been exposed to ultra-violet light from condensed Al and Co sparks at $\ngtr$ 460°. (III) does not react. (I) gives H_2O and H_2O_2, whilst (II) gives H_2O and NH_3 or N_2H_4. The influence of temp. and λ has been studied. R. S.

Exchange reactions of deuterium and methane under the influence of excited mercury. H. S. Taylor, K. Morikawa, and W. S. Benedict (J. Amer. Chem. Soc., 1935, 57, 383).—CH_4 and H_2^2 react at 40—300° in the presence of Hg vapour when illuminated by resonance radiation, the activation energy being about 5 kg.-cal. R. S. C.

Photochemical formation of carbonyl chloride. VIII. Simultaneous formation of carbonyl chloride and hydrogen chloride. M. Bodenstein, W. Brenschede, and H. J. Schumacher (Z. physikal. Chem., 1935, B, 28, 81—94; cf. A., 1931, 1137).—Rollefson's data (A., 1934, 496), supposed to show the chain carrier to be Cl_3, agree equally well with the assumption that it is COCl, as postulated by the authors. Repetition of Rollefson's experiments on the photochemical reaction of Cl_2, CO, and H_2 using more exact methods and over a wider concn. range supports the authors' mechanism. At low $[Cl_2]$ there is appreciable breaking, by $H+COCl_2=HCl+COCl$ on the wall, of the chains giving HCl. The formation of $COCl_2$ may be accelerated by the simultaneous formation of HCl by $HCO+Cl_2=COCl_2+H$ acting as a chain reaction. R. C.

Coloration of calcium sulphide phosphors by light. S. Rothschild (Z. physikal. Chem., 1935, 172, 188—196).—By ignition of mixtures of S, $Ca(OH)_2$, and Na_2CO_3 or K_2CO_3 brownish-violet phosphors are obtained which, without previously being subjected to one-sided compression, deepen in colour in light, the effect being intensified if Bi is present. Addition of NaCl yields a product originally almost white. The tendency to coloration in light does not depend on the phosphorescing power; the deciding factor is the mechanism whereby the atom groupings, characteristic of the phosphor and formed by ignition, store up the energy of absorbed radiation. R. C.

Oxidation of $Fe^{\cdot\cdot}$ to $Fe^{\cdot\cdot\cdot}$ by irradiation with *X*-rays of solutions of ferrous sulphate in sulphuric acid. H. Fricke and E. J. Hart (J. Chem. Physics, 1935, **3**, 60—61; cf. A., 1929, 408).—The reactions taking place are (1) $Fe^{\cdot\cdot}+H^{\cdot}=Fe^{\cdot\cdot\cdot}+\frac{1}{2}H_2$; (2) $Fe^{\cdot\cdot}+H^{\cdot}+\frac{1}{4}O_2=Fe^{\cdot\cdot\cdot}+\frac{1}{2}H_2O$; (3) $Fe^{\cdot\cdot}+\frac{1}{4}O_2+\frac{1}{2}H_2O=Fe^{\cdot\cdot\cdot}+OH'$. The quantity of $Fe^{\cdot\cdot}$ oxidised per unit dosage of radiation increases with decreasing p_H and is independent of $[FeSO_4]$ and of the pressure of O_2 when this is present. F. L. U.

Light reaction of alkaline bases on mercuric iodide. E. Montignie (Bull. Soc. chim., 1935, [v], **2**, 290—291).—For concns. of alkali below 6*M* the final product is HgO. Below 1·5*M* there is a transitory formation of HgI_2,HgO (I) and the reaction is uninfluenced by light. Above 2*M* the tendency to form the white $3HgI_2,HgO,3KOH$ from (I) increases with increasing proportion of HgI_2; this compound is then decomposed by the action of light, giving HgO and K_2HgI_4. Above 7*M*-KOH the white compound formed, HgI_2,2 or $3HgO,xKOH$, is practically stable to light while still moist, but turns brown when dry. M. S. B.

Blackening of photographic plates by ultrasonic waves. N. Marinesco and M. Reggiani (Compt. rend., 1935, **200**, 548—550; cf. A., 1933, 473).—When ultrasonic waves are passed for 8 min. to 1 hr. through a bath of dil. developer containing an unexposed photographic plate, the latter is blackened in the form of stationary waves. This is attributed to activation by collision between the mols. of Ag salt, in accordance with Perrin's theory. J. W. S.

Electrolytic development of photographic layers. E. Kellner and K. Bennewitz (Z. wiss. Phot., 1935, **33**, 212—224, 225—233).—Anodic bromination of a Ag electrode gave two kinds of AgBr, one being grey and adherent (formed by reaction of Br' on giving up its charge) and the other yellow and non-adherent (formed by interaction of $Ag^{\cdot}$, from anodic polarisation, with neighbouring KBr); the yellow form is more light-sensitive. The formation of Ag nuclei in a photographic emulsion is considered as the result of absorption of a light quantum in places in the AgBr crystal having a natural strain in the crystal lattice; the Ag nuclei form new centres of strain for commencement of development. By wrapping gelatin emulsions on a paper base in close contact with a Zn cathode, or in contact with Hg as cathode, development is obtained on electrolysis of the solution in which it is placed; considerable fogging is always found, due probably to at. H. The effects of varying time of exposure, development, composition of the electrolyte, voltage, c.d., etc. have been determined. The results are compared with those of chemical development. J. L.

Theory of the ideal colour-sensitivity of photographic negative material. III. J. E. de Langhe (Z. wiss. Phot., 1935, **33**, 205—211; cf. A., 1934, 610).—The outward form of the equation for the characteristic curve is unchanged, but I_0 is made dependent on λ. The theory of Arens and Eggert is not in agreement with the results derived mathematically. J. L.

Distribution of nuclei with solarisation and their removal. Lüppo-Cramer (Z. wiss. Phot., 1935, **33**, 201—204).—Polemical against Arens. The coagulation theory does not afford an explanation of solarisation (cf. A., 1934, 1184; 1933, 577). J. L.

Primary process of photochemical decomposition of formaldehyde. II. T. Löcker and F. Patat (Z. physikal. Chem., 1934, B, **27**, 431—438; cf. A., 1934, 740).—In the decomp. in the predissociation region no free H atoms are formed. Decomp. in the fine structure and predissociation regions may occur either by the H atom initially released reacting before it can leave the mol. with the HCO radical to give H_2 and CO (cf. A., 1930, 702), or, more probably, by the vibrating mol. contributing part of the energy of separation by attractive forces between the H atoms helping to break the C–H linking when the mol. is extended to a certain extent. On photodecomp. polymerised CH_2O yields CO and H_2 in the same proportions as normal CH_2O. R. C.

Biocolorescence of aromatic compounds of the benzene series. W. Kaetel (Standesztg. deut. Apothek., 1934, **3**, 30; Chem. Zentr., 1934, ii, 2367—2368).—Solutions of a camphor derivative or synthetic adrenaline coloured by light were decolorised by the presence of photographic layers, the latter being changed. H. J. E.

Photodecomposition of chlorophyll.—See this vol., 421.

Three new phototropic compounds.—See this vol., 497.

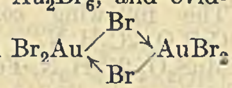
Reciprocal interchange of the hydrogen atoms of the co-ordination space of a complex salt and of water. O. Bankowski (Monatsh., 1935, **65**, 262—266).—The following complex salts have been dissolved in H_2O containing 10·8% of H^2_2O: $[Co(NH_3)_4(H_2O)_2]Cl_3$ (I), $[Co(NH_3)_4(CO_3)]Cl$ (II), and $[Cu(NH_3)_4]SO_4,H_2O$ (III). The H_2O was subsequently removed and the determination of *d* indicated a fall in H^2_2O content. The no. of H^1 atoms in the salt replaced by H^2 could be calc. The change is complete in 5 min. One atom is exchanged in (I), in agreement with Brönsted's view that the cation is a monobasic acid (A., 1928, 1326). Three atoms are exchanged in (II), probably giving one NH^2_3 group, and five in (III) giving NH^2_3 and H^2_2O of crystallisation. This agrees with the view that, in this case, the H_2O is outside the co-ordination sphere. M. S. B.

Isotopic fractionation of water by distillation. M. Harada and T. Titani (Bull. Chem. Soc. Japan, 1935, **10**, 39—40).—Purity was checked by determination of electrical conductivity, and *d* of samples was studied by means of a SiO_2 buoyancy balance. In a distillation at 1 atm. the most and least volatile fractions differed by 6·3 p.p.m. R. S. B.

Isotopic fractionation of water due to evaporation and distillation. T. Titani and M. Harada (Bull. Chem. Soc. Japan, 1935, **10**, 41—42).—H_2O

from the mother-liquor of salt obtained by the slow evaporation of sea-H_2O is 5·4 p.p.m., and H_2O from sugar-cane molasses is 2·8 p.p.m., heavier than normal H_2O. R. S. B.

Tribromogold. A. Burawoy and C. S. Gibson (J.C.S., 1935, 217—218).—The mol. wt. in boiling Br corresponds with the formula Au_2Br_6, and evidence in favour of the constitution



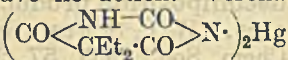
$$Br_2Au\begin{matrix}\diagup Br \searrow \\ \nwarrow Br \diagup\end{matrix}AuBr_2$$

is adduced, the Au^{III} being 4-covalent as in the analogous org. derivatives (cf. A., 1934, 877). There was no evidence of an OEt-derivative of Au when Au_2Br_6 in Et_2O was mixed with KOEt in EtOH, but the filtrate afforded *monopyridinomonobromogold* (decomp. > 120°) with C_5H_5N. J. G. A. G.

Separation of calcium from rare earths by hydrolysis. G. P. Alexandrov (Redk. Met., 1934, 3, No. 4, 52—53).—H_2O vapour was passed over a mixture of chlorides of the rare earths (I) and of Ca and Sr at 500—600°, converting (I) into oxychlorides. The product was digested with hot H_2O, hydroxides of (I) being pptd., whilst the Sr and Ca dissolve. One further pptn. with $H_2C_2O_4$ then suffices to eliminate Ca. The method is applicable with large amounts of Ca. Ch. Abs. (e)

Action of alkaline-earth bases and silver oxide on mercuric iodide. E. Montignie (Bull. Soc. chim., 1935, [v], 2, 220—222).—On account of its slight solubility $Ca(OH)_2$ has not much action on HgI_2, but a small quantity of HgO is formed. $Ba(OH)_2$ and $Sr(OH)_2$ give HgO in the cold, but when hot, at concns. of base above *M*, white *oxy-iodides* of the probable composition HgI_2,2 or $3HgO,xBa(OH)_2$ [or $Sr(OH)_2$] are formed. These are sensitive to light, sol. in aq. KI, $Na_2S_2O_3$, or KCN, and easily decomposed by H_2O and acids. When HgI_2 and H_2O are shaken together with increasing quantities of Ag_2O for 24 hr. AgI alone is first formed. As the proportion of Ag_2O is increased $HgI_2,2AgI$ is obtained in increasing quantity. M. S. B.

Reactions of mercuric iodide. E. Montignie (Bull. Soc. chim., 1935, [v], 2, 373—375).—Hg_2I_2 is formed from HgI_2 by reaction with Na_2SO_3, $SnCl_2$, and boiling HCO_2Na; Hg is pptd. by NH_2OH,HCl in presence of KOH, Na hypophosphite in HCl, NHPh·NH_2 or Zn in aq. KOH, glucose, fructose, arabinose, and xylose in KOH. Sucrose, mannitol, and inositol give a brown compound which is a mixture of Hg_2I_2 and HgI_2. Double decomp. takes place with $AgNO_3$, alkali and alkaline-earth chlorides, and chlorides of org. bases. $FeCl_3$ gives FeI_2, $HgCl_2$, and I. $Na_2S_2O_3$ dissolves HgI_2 in the cold and ppts. HgS when hot, especially in acid solution. K_2TeO_4 gives a pale yellow $HgTeO_4,2HgO$, but K_2SeO_3 and K_2SeO_4 have no action. Veronal forms white *crystals* of



$$\left(CO{<}\begin{matrix}NH-CO \\ CEt_2\cdot CO\end{matrix}{>}N\cdot\right)_2Hg.$$

Gardenal and phenylethylbarbituric acid give the same reaction. M. S. B.

Action of cyanogen compounds on HgI_2. E. Montignie (Bull. Soc. chim., 1935, [v], 2, 296—297).—The following compounds have been prepared from HgI_2 with: KCN, $Hg(CN)_2,2KCN$; $K_4Fe(CN)_6$ and concn. of the solution, $K_4Fe(CN)_6,HgI_2,2H_2O$, easily decomposed by dil. acids giving HgI_2; $K_3Fe(CN)_6$, a dark green solution but no complex; NH_4CNS, white crystals of $NH_4CNS,HgI_2,6H_2O$, readily decomposed by H_2O; KCNSe, $KCNSe,HgI_2,2H_2O$, very unstable; KCNO, fine white needles of $5KCNO,HgI_2,4H_2O$, easily decomposed by acids. $Na_2Fe(NO)(CN)_5,2H_2O$ has no action on HgI_2. M. S. B.

Preparation and mode of formation of boron hydrides. III. Action of anhydrous sodium formate on boron, boron oxide, and boron nitride. E. Wiberg and W. Sütterlin (Ber., 1935, 68, [*B*], 296—299; cf. this vol., 50).—Contrary to Vournasos (A., 1910, ii, 549, 948), traces of B hydrides are not formed by the action of HCO_2Na on B, B_2O_3, or BN. The observed reducing action of the gaseous products of the change is attributed to substances (? CO) derived from HCO_2Na and the green colour of the burning gases to traces of solid B compounds carried over. H. W.

Action of substituents on boron halides. IV. Action of hydrogen and alkyl halides on boron halides. E. Wiberg and U. Heubaum (Z. anorg. Chem., 1935, 222, 98—106; cf. A., 1932, 258).—Br is replaced by Cl, to a very small extent only, when BBr_3 and HCl are kept together for several hr. in a vac. at room temp. MeF and EtCl have no action on BCl_3 at temp. from −60° to 300°. CPh_3Cl reacts immediately with BCl_3 in vac. at room temp. or below 0° and forms an equimol. yellow additive *compound*, insol. in CCl_4 and decomposed by MeOH, EtOH, and H_2O. It is decolorised by long exposure to air. When heated to 200° it darkens but does not melt. It is decomposed by distilling in vac. at 80°. CPh_3F also forms a deep yellow additive *compound*. M. S. B.

Compounds of the type $BCl_{3-n}(OR)_n$. II. Decomposition [into two compounds of the same series] in the compound $BCl_{3-n}(OMe)_n$. E. Wiberg and W. Sütterlin (Z. anorg. Chem., 1935, 222, 92—97).—The compounds $BCl_{3-n}(OMe)_n$ are stable and show no inclination, when pure, for division into two compounds of the same series containing more and less Cl, respectively. In the presence of a base, however, this division takes place. NMe_3 with $BCl(OMe)_2$ forms an additive compound which, on warming at 100° for 4 hr., gives $BCl_2\cdot OMe,NMe_3$ and $B(OMe)_3$. With $BCl_2\cdot OMe$ the behaviour is similar, but requires a temp. of 180° and gives BCl_3,NMe_3 and $B(OMe)_3$. NMe_3 has no action on $B(OMe)_3$. Its action on BCl_3 has been previously described (cf. A., 1932, 258). M. S. B.

Light from [burning] aluminium and aluminium-magnesium [alloy]. J. A. M. van Liempt and J. A. de Vriend (Rec. trav. chim., 1935, 54, 239—244).—Al burns more slowly in O_2 than does Mg, giving a spectrum very similar to that obtained with the latter. The light yield with 0·3 μ Al foil is 26 lumens per watt per mg. Al. The flashing time decreases with increasing Mg content for Mg–Al alloys, and the light yield increases, becoming > for the pure components with 5—10% Mg. The spectrum from the alloy is similar to that obtained with the components. With Mg–Al wire wound as a coil and heated with an explosive powder the flash time decreases and the light yield increases considerably as the radius of the coil increases. R. S. B.

Preparation of iron-free solutions of titanic sulphate and titanous sulphate. R. Roseman and W. M. Thornton, jun. (J. Amer. Chem. Soc., 1935, **57**, 328—329).—The purification of $K_2TiO(C_2O_4)_2,2H_2O$ is described. $Ti(SO_4)_2$ is prepared therefrom by treatment with H_2SO_4, and $Ti_2(SO_4)_3$ by electro-reduction of $Ti(SO_4)_2$. E. S. H.

Potentiometric investigation of hydroxide precipitation. E. Hayek (Monatsh., 1935, **65**, 233—238).—In presence of an alkali salt with the same anion basic salts of definite composition may be pptd. by NaOH from a metal salt solution. This pptn. may be followed potentiometrically. Using an Al electrode the titration (*a*) of $PbCl_2$ with NaOH indicates the existence of $PbCl_2,Pb(OH)_2$ and $3PbCl_2,Pb(OH)_2$, and (*b*) of $Pb(NO_3)_2$ indicates $3Pb(NO_3)_2,Pb(OH)_2$. Pb may be determined in presence of Cd, Zn, Mg, Ca, or Ba by titration of $Pb(SCN)_2$, giving an end-point at $Pb(SCN)_2,Pb(OH)_2$ with an error of approx. 5%. M. S. B.

Compounds obtained by dehydration of the double iodide of lead and potassium $PbI_2,KI,2H_2O$. P. Baffie (Ann. Chim., 1935, [xi], **3**, 130—141).—The dehydration (I) has been followed gravimetrically and by *X*-rays. (I) begins at 30° and continues to 60°, when a stage of const. composition $PbI_2,KI,0{\cdot}5H_2O$ is attained. (I) is renewed above 67° giving PbI_2,KI (II) at 96—97°. *X*-Ray diagrams show that (II) is not a mixture of PbI_2 and KI. R. S.

Explosibility of molten ammonium nitrate. R. Kaiser (Angew. Chem., 1935, **48**, 149—150).—Experiments show that the explosion which may occur at elevated temp. is due to the gaseous products of decomp. E. S. H.

Peroxidation of nitrogen oxides in presence of ozone. E. Briner, E. Rokakis, and B. Susz (Helv. Chim. Acta, 1935, **18**, 230—234; cf. A., 1932, 1095).—O_3 exercises no catalytic action on the oxidation of NO by O_2, and itself reacts thus: $O_3+NO=NO_2+O_2$. F. L. U.

Oxidation of phosphorus with water at high temperature and pressure in the presence of alkali. Production of phosphorous acid. V. N. Ipatiev and P. V. Usachev (J. Amer. Chem. Soc., 1935, **57**, 300—302).—H_3PO_3 or H_3PO_2 is formed at $< 225°$, depending on the amount of NaOH present. H_3PO_4 is formed at $> 250°$. E. S. H.

Preparation of protoactinium. A. von Grosse (Ber., 1935, **68**, [*B*], 307—309).—Criticisms of the work of Graue *et al.* (A., 1934, 1186). H. W.

Salts of hyposulphurous acid. R. Scholder and G. Denk (Z. anorg. Chem., 1935, **222**, 41—47).—*$SrS_2O_4,4{\cdot}5H_2O$* has been prepared, by double decomp. of aq. $SrCl_2$ with $Na_2S_2O_4$, as colourless, micro-cryst., hexagonal plates readily decomposed on exposure to air and giving off SO_2. *BaS_2O_4,aq.*, similarly prepared, is still more unstable. PbS_2O_4,aq., prepared by the action of aq. $Na_2S_2O_4$ on aq. $Pb(OAc)_2$, is also unstable, forming PbS and $PbSO_3$ when wet and $PbSO_3$ and PbS_2O_3 when dry. Hyposulphites, too unstable to be formed in the ordinary way, may be stabilised by the formation of addition compounds with C_5H_5N. The following *compounds* have been obtained: $CoS_2O_4,2C_5H_5N$, ZnS_2O_4,C_5H_5N, CdS_2O_4,C_5H_5N, $MnS_2O_4,2C_5H_5N$, $FeS_2O_4,2C_5H_5N$. M. S. B.

Decomposition of hyposulphurous acid and its salts. R. Scholden and G. Denk (Z. anorg. Chem., 1935, **222**, 48—55).—The behaviour of $Na_2S_2O_2$ in the presence of strong acids appears to indicate that the reaction $2H_2S_2O_4=3SO_2+2H_2O+S$ involves the intermediate formation of H_2SO_2 and H_2SO_3. BaS_2O_4 (cf. preceding abstract) decomposes, after a day under the mother-liquor, into $BaSO_3$ and BaS_2O_3. In aq. $Ba(OH)_2$, under an atm. of N_2, it forms $BaSO_3$ and BaS. SrS_2O_4 in aq. $Sr(OH)_2$ decomposes similarly, but much more slowly. At 50°, however, the reaction is complete in 1 hr. As_2S_2 is produced by the action of "rongalite" on As_2O_3 in strongly acid solution. M. S. B.

Sulphur. II. Sulphur fluorides and oxyfluorides. M. Trautz and K. Ehrmann (J. pr. Chem., 1935, [ii], **142**, 79—124; cf. A., 1929, 525).—The v.-p. curve of SO_2F_2, m.p. $-121{\cdot}4\pm0{\cdot}5°$ (lit. $-121°$), b.p. $-49{\cdot}7\pm0{\cdot}3°/748{\cdot}5$ mm. (lit. $-52°/1$ atm.) (improved prep.), has been determined. SO_2F_2 reacts with aq. KOH more rapidly than is stated in the lit. Its solubility in H_2O is unaffected by $KMnO_4$, and that in various org. solvents is given. Moissan's statement (A., 1901, ii, 233) concerning its thermal stability is confirmed. S_2F_2 could not be obtained free from SF_2. Thermal decomp. of S_2F_2 begins at 90° and is fast at 200—250°. Decomp. by heat or electric spark results in vol. contraction and pptn. of S. The gaseous products are partly SF_2 and a small amount of a *substance,* b.p. about 30°, which probably is a polythiofluoride; SF_4 and SF_6 are not formed. An electric spark passed through a mixture of SiF_4 and S_2F_2 produced a little S and some SF_2. Similarly a mixture of S_2F_2 and SO_2 gave SOF_2 and SO_2, but no SO_2F_2, whilst S_2F_2 and O_2 gave SO_2, SO_3, and SOF_2, but no SO_2F_2. When S_2F_2 and H_2 are sparked, H_2F_2 and H_2S are slowly produced. S_2F_2 is considered to have the structure $S{:}SF_2$. V.-p. curves of S_2F_2–SF_2 mixtures indicate that solid S_2F_2 has a transition point between $-140°$ and $-150°$. The v.-p. curve for S_2Br_2, m.p. $-47{\cdot}14°$ (lit. $-46{\cdot}0°$), has been determined and the instability of S_2Br_2 above about $-85°$ and 50 mm. pressure confirmed. The curve shows that decomp. starts below this temp. and pressure. H. G. M.

Reactions of thionyl chloride and of its thermal decomposition products with oxalates and formates. W. C. Schumb and C. H. Hamblet (J. Amer. Chem. Soc., 1935, **57**, 260—266).—The reactions of $SOCl_2$, S_2Cl_2, SCl_2, and Cl_2 with PbC_2O_4, and of $SOCl_2$ and S_2Cl_2 with $(HCO_2)_2Pb$ have been investigated quantitatively at 60°. SO_2 does not react with the Pb salts at 60°. A method of determining $SOCl_2$ in presence of its thermal decomp. products with a precision of 0·2% is based on the above reactions. $SOCl_2$ has m.p. −101·4°. E. S. H.

Chromium carbides. S. L. Tzinberg (Zavod. Lab., 1934, 3, 1128).—The *carbide* $3Fe_3C,7Cr_4C$ was isolated from Cr–Ni steel preheated at 950° for $>$ 4000 hr. R. T.

Reaction of fluorine with water and with hydroxides. G. H. Cady (J. Amer. Chem. Soc., 1935, 57, 246—249).—The product of reaction of F_2 with cold H_2O or solid NaOH, KOH, or $Ca(OH)_2$ is OF_2. The production of O_3 is doubtful. Cold aq. solutions give powerful oxidising agents, which vary with [H˙]. E. S. H.

Direct oxidation of iodine, iodides, and chlorates at ultra-pressures. M. Dodé and J. Basset (Bull. Soc. chim., 1935, [v], 2, 344—354).—At pressures of O_2 of $>$ 1000 kg. per sq. cm., the approx. quant. transformation of iodides into iodates is possible but slow. For rapid transformation 8000 atm. at 500° would be necessary. The limits of sensitivity of the different reactions for IO_3' have been determined. It has not been found possible to oxidise ClO_3' directly to ClO_4'. M. S. B.

Formation of complexes of ferric ion with carboxylic acids. W. D. Treadwell and E. Wettstein (Helv. Chim. Acta, 1935, 18, 200—210).—Aq. $FeCl_3$ can be titrated electrometrically with Na salts of many org. acids at p_H 3—5 so as to give sharp end-points, and the method can be used for the determination of tartaric, malic, malonic, citric, benzoic, cinnamic, and anisic acids. The 31 acids studied are divisible into eight groups, based on the stoicheiometric ratio Fe˙˙˙ : acid and on the nature of the complex formed. Cationic complexes, usually containing OH, are formed with monobasic acids, and anionic with others. The complexes are sol. in H_2O, excepting those with BzOH, $CHPh{:}CH{\cdot}CO_2H$, $OMe{\cdot}C_6H_4{\cdot}CO_2H$, $o\text{-}NO_2{\cdot}C_6H_4{\cdot}CO_2H$, succinic, fumaric, adipic, mucic, tricarballylic, and aconitic acids. F. L. U.

Basic salts. VIII. Chemistry and morphology of basic salts of bivalent metals. General. W. Feitknecht. **IX. Basic cobalt sulphates.** W. Feitknecht and G. Fischer (Helv. Chim. Acta, 1935, 18, 28—40, 40—60; cf. A., 1934, 1068).—VIII. The subject is discussed generally from chemical, physico-chemical, genetic, and structural points of view.

IX. $CoSO_4,3Co(OH)_2$ crystallises with difficulty in microscopic hexagonal leaflets. The lattice consists of alternate layers of hydroxide and normal salt. The amount of H_2O, which is held in a zeolitic form, varies with the method of prep., but is usually 4 mols. The compound, which is blue, is converted by conc. aq. $CoSO_4$ into a violet basic *salt* $2CoSO_4,3Co(OH)_2,5H_2O$, which may form either rhombic or monoclinic crystals. Its H_2O of crystallisation is also zeolitic. When $CoSO_4$ is hydrolysed by $CO(NH_2)_2$ basic salts in which the SO_4 is partly replaced by CO_3 are formed. F. L. U.

New decomposition of hyposulphite and cobalt sulphoxylate. R. Scholder and G. Denk (Z. anorg. Chem., 1935, 222, 17—40).—Aq. $CoCl_2$, with aq. $Na_2S_2O_4$ in presence of NH_3, $(CH_2{\cdot}NH_2)_2$, or C_5H_5N, gives a dark red solution. On dilution with H_2O a dark brown flocculent ppt. is obtained, which, after filtering and washing under N_2, was shown to be *Co sulphoxylate*, $CoSO_2,xH_2O$, probably in a polymerised form. It may also be pptd. by acid or $(CH_2{\cdot}NH_2)_2$. Instead of NH_3, NaOH or, preferably, $NaHCO_3$ may be added to the mixture of the two salts. Under suitable conditions the decomp. of $Na_2S_2O_4$ by a Co^{II} salt into $CoSO_2$ and SO_2 is quant. Co can be partly replaced by Cd or Ba in the NH_3 solution or aq. suspension. With Na_2S, CoS, $Na_2S_2O_3$, and NaOH are formed. Gaseous NH_3 at −15° gives a cryst. ammine. $CoSO_2$ dissolves appreciably in excess of H_2SO_3 and forms an unstable additive *compound*, $CoSO_2,SO_2$. The reduction val. may be determined by titration with aq. $Br'{-}BrO_3'$. This is the only salt of the hypothetical H_2SO_2 of which the existence has been definitely established. There are indications of a corresponding, but very unstable, Ni salt. M. S. B.

Dibasic cobalt arsenate. J. Burghelle (Bull. Soc. chim., 1935, [v], 2, 168).—The *salt* $Co_2H_2(AsO_4)_2,3{\cdot}5H_2O$ is pptd. by adding Et_2O to a 2 : 3 mixture of syrupy H_3AsO_4 and alcoholic $Co(NO_3)_2$. The salt readily loses H_2O. J. G. A. G.

Transition compound in the formation of complexes of tervalent cobalt. M. Châtelet (Compt. rend., 1935, 200, 461—464).—Oxidation of solutions of aq. NH_3–$CoCl_2$ in presence of NH_4Cl gave the *compounds* $CoCl_2(NH_3)_6$ in octahedra, and $Co_2(NH_3)_{10}OCl_4,3H_2O$, a brown powder. Properties and composition are discussed. N. M. B.

Compounds of (a) rhodium with ammonia, (b) rhodium with thiocarbamide, (c) rhodium with acetonitrile, (d) iridium with thiocarbamide. V. V. Lebedinski (Ann. Inst. Platine, 1935, 12, 67—77, 79—86, 87—92, 93—102).—(a) The instability and solubility of rhodammines are greater when the no. of basic groups is even than when odd. The prep. of $Rh(NH_3)_3Cl_3$ and $[Rh(NH_3)_4Cl_2]NO_3$ is described; that of $Rh(NH_3)_2Cl_4$ was unsuccessful.

(b) [with V. S. Volkov]. A study of the *compounds* $[RhR_3Cl_3]$, $[RhR_5Cl]Cl_2$, $[RhR_5Cl]C_2O_4$, and $[RhR_6]Cl(NO_3)_2$ $[R{=}CS(NH_2)_2]$ confirms the above rule. Attempts to prepare $[RhR_2Cl_4]$ and $[RhRCl_5]$ were unsuccessful.

(c) [with I. A. Fedorov]. Na_3RhCl_6, NH_4Cl, and MeCN afford *$(NH_4)_2[Rh(MeCN)Cl_5],H_2O$*; the corresponding Rb_2, Cs_2, Ag_2, and $[Pt4NH_3]$ *salts* are described. Attempts at introducing further MeCN mols. were unsuccessful.

(d) [with E. S. Schapiro and N. P. Kasatkina]. Na_3IrCl_6 and R afford the *salts* $[IrR_3Cl_3]$, $[IrR_4Cl_2]Cl$, $[IrR_5Cl]X_2$, and $[IrR_6]Cl_3$ $[X_2{=}Cl_2$, C_2O_4, $PtCl_4$, $(ClO_4)_2]$, indicating that Ir behaves similarly to Rh with respect to introduction of basic groups. R. T.

Stromholm's triamminesulphite. I. I. Tscherniaev and A. M. Rubinschtein (Ann. Inst. Platine, 1935, 12, 115—118).—$Pt(NH_3)_3SO_3$ (I) yields $Pt(NH_3)_2Cl_2$ and $Pt(NH_3)_2Cl_4$ with Cl_2, and

$Pt(NH_3)_2SO_4,nH_2O_2$ with H_2O_2. The solubility of (I) in aq. acids increases with $[H^{\cdot}]$. R. T.

Platinum oxides. P. Laffitte and P. Grandadam (Compt. rend., 1935, **200**, 456—458; cf. A., 1934, 856).—The effect of variation of pressure of O_2 in the oxidation of Pt-black to PtO and PtO_2 was investigated. PtO, obtained by the action of O_2 on Pt-black at 420—440°/8 atm., is a black powder, *d* 14·9—15·0, slightly sol. in HCl, the solubility increasing with the formation of $PtCl_4$. PtO causes instantaneous combustion of H_2. At 400°/1 atm. PtO_2 decomposes giving PtO and O_2, and at 560° PtO gives Pt and O_2. Both oxides, investigated for 4 org. reactions at various temp., are efficient hydrogenation catalysts. Pt-black, activated by heating to 150—180°/150 kg. per sq. cm., absorbs 2·3—3·4% O_2, giving a catalyst of efficiency approaching that of PtO_2. N. M. B.

Quantitative spectrum analysis of gas mixtures. J. Heyes (Z. physikal. Chem., 1935, **172**, 95—104).—The spectrum of a condensed spark has been used for the quant. analysis of mixtures of H_2, N_2, O_2, and He (cf. A., 1931, 143). With a high capacity in the secondary circuit small variations in the capacity and self-induction do not affect the relative intensities of the lines. The smallest amount of H_2 that can be detected in air by this method is $\sim$0·75%; the H_{α} line obtained with ordinary air is due to H_2O. The raies ultimes of various gases and lines of equal intensity are tabulated. R. C.

Thermal conductivity method for precise determination of heavy isotope of hydrogen. H. Sachsse and K. Bratzler (Z. physikal. Chem., 1934, **171**, 331—340; cf. A., 1934, 608).—A method permitting determination of the H^2_1 content of H_2 with a precision of 0·02% and requiring 0·5 c.c. of gas at 760 mm. is described. The apparatus is calibrated with mixtures of H_2 and Ne. R. C.

Adipic acid as a volumetric standard. A. H. Meyling (J.S. African Chem. Inst., 1935, **18**, 23).—Adipic acid is advocated as an acidimetric standard substance. J. S. A.

Indicator transformations of malachite-green in strongly alkaline solutions. V. N. Skvortzov (J. Gen. Chem. Russ., 1934, **4**, 1130—1137).—Malachite-green can be used as an indicator in the titration of $ZnSO_4$ by KOH; the results are increasingly divergent from theoretical with increasing $[ZnSO_4]$. At low temp. and $[ZnSO_4]$ the end-point corresponds with K_2ZnO_2 formation. R. T.

Combined indicators. S. Hähnel and B. Holmberg (Svensk Kem. Tidskr., 1935, **47**, 4—11).—A mixture of two indicators or an indicator and a dye often gives a sharper end-point than a single indicator. The following combinations were found specially suitable. For H_2O titration: Me_2-yellow (I) + methylene-blue (II) (5 : 3), p_H 3·8; Me-red + bromocresol-green (1 : 1), p_H 5·4; neutral-red (III) + (II) (5 : 2), p_H 7·1; (III) + tetrabromophenol-blue (IV) (5 : 2), p_H 8·0. For EtOH titration: (I) + (II), 5 : 4·5 (titration of NH_2OH in 30% EtOH); (III) + (IV), 5 : 3 (titration of KOH with HCl in 70% EtOH); phenol-red + bromothymolbenzein, 3 : 2 (determination of acids and esters in spirits, 70% EtOH); cresol-red + thymolbenzein, 3 : 1 (titration of KOH with K H phthalate in 70% EtOH). R. P. B.

Preparation of diphenylbenzidine and its use as an oxidation–reduction indicator. L. A. Sarver and J. H. Johnson (J. Amer. Chem. Soc., 1935, **57**, 329—330).—The method of prep. described gives a 60—65% yield. The indicator is prepared by mixing one drop of a 0·1% solution in H_2SO_4 with 10 c.c. of a 1 : 1 mixture of AcOH and H_3PO_4. E. S. H.

Water analysis. H. F. Kuisel (Helv. Chim. Acta, 1935, **18**, 178—200).—Methods of analysis used in other fields of work, particularly in biochemistry, have been adapted to the examination of H_2O from the Lake of Zürich. Detailed descriptions are given for the determination of total N, NH_3, NH_2-acids, and NO_3'. F. L. U.

Oxidisability in the analysis of mineral waters. V. Gazzi (Annali Chim. Appl., 1934, **24**, 613—614).—In the determination of org. matter in mineral waters containing Cl′ by oxidation with $KMnO_4$ erroneous results are obtained if the oxidation is effected in acid solution. O. J. W.

Identification of homœopathic triturations. E. Steinhausen (Apoth.-Ztg., 1934, **49**, 791—792; Chem. Zentr., 1934, ii, 2563).—A method of carrying out tests for certain common anions and cations on microscope slides is described. H. J. E.

Rapid determination of traces of active chlorine in water.—See B., 1935, 208.

Determination of available chlorine in hypochlorite solutions by direct titration with sodium thiosulphate.—See B., 1935, 225.

Detection of bromide and its application to the systematic analysis of mixtures of thiocyanate, iodide, bromide, and chloride. L. J. Curtman and H. Schneiderman (Rec. trav. chim., 1935, **54**, 158—161).—$\not<$ 0·5 mg. of Br′ may be detected after removing CNS′ by adding 3 c.c. of conc. HNO_3 to 3 c.c. of the solution, immersing in boiling H_2O for 2 min., cooling, and shaking with 1 c.c. of CCl_4, when yellow or brown in the CCl_4 indicates Br′. A systematic analysis (modification of Curtman's procedure) is described for CNS′, I′, Br′, and Cl′. The low sensitivity of the Br′ test in systematic analysis is due largely to the incomplete removal of Br from insol. bromides by Na_2CO_3. R. S. B.

Analysis of very dilute ozone. E. Briner and H. Paillard (Helv. Chim. Acta, 1935, **18**, 234—237).—The determination of O_3 in dil. mixtures by means of KI is not vitiated by catalytic oxidation by O_3. F. L. U.

[Detection of sulphurous acid and its salts and of tin.] F. Feigl and H. Leitmeier (Ber., 1935, **68**, [*B*], 354—356).—In reply to Freytag (A., 1934, 1321) the advantages of blue litmus-silk over the irradiated 2-benzylpyridine reagent are maintained. H. W.

Volumetric determination of sulphates. G. A. Ampt (J. Proc. Austral. Chem. Inst., 1935, **2**, 10—21).—A review of methods.

Determination of SO_4'' in soluble fluorides. A. A. Borkovski and N. A. Porfiriev (Zavod. Lab., 1934, **3**, 1089—1090).—1 g. of crude NaF is dissolved in 100 ml. of H_2O, the solution filtered, the filtrate diluted to 200 ml., 3 ml. of conc. HCl and 3 g. of H_3BO_3 are added, and SO_4'' is pptd. and determined as $BaSO_4$. Na_2SiF_6 is converted into NaF by heating at 600—650°, and SO_4'' is determined as above. R. T.

Chemical differentiation of related sulphosalts in a polished surface by the contact method. G. Gutzeit and F. Galopin (Arch. Sci. phys. nat., 1934, [v], **16**, Suppl., 53—61; cf. A., 1933, 1132).—The contact method has been applied to Fe, Co, and Ni minerals containing S. Details of the procedure in examining the specimens for Ni, Co, Fe, S, As, Sb, and Cu are given. F. L. U.

Colorimetric determination of ammonia in small quantities of substance. II. F. Alten and E. Hille (Angew. Chem., 1935, **48**, 137—139).—20—50 mg. of substance are mixed with a small crystal of K_2SO_4 and 3 c.c. of conc. H_2SO_4, and 1·5—2 c.c. of H_2O_2 are added dropwise; after heating over a small flame for 35—40 min. the brown colour disappears. The cooled liquid is diluted to 50 c.c. with H_2O, and to 2—5 c.c., 1 c.c. of thymolphthalein solution (saturated in 0·01N-NaOH) is added and the solution neutralised with 0·5N-NaOH. 20 c.c. of borate buffer of p_H 10·5 and 10 c.c. of 1% gum arabic solution are added, and after shaking the solution is diluted almost to 100 c.c. with H_2O. 2 c.c. of Nessler's reagent are added, the solution is made up to 100 c.c. and shaken, and after 0·5 hr. can be examined colorimetrically. Results agree with Kjeldahl's method. R. S. B.

Detection of nitrites with Magdala-red and detection of benzene by formation of resorufin. H. Eichler (Z. anal. Chem., 1935, **100**, 183—184).—Magdala-red dissolved in conc. AcOH or HCO_2H (cf. A., 1934, 269) shows a fluorescence extinguished by solid or dissolved NO_2' at room temp. The formation of a blue colour may be applied to a spot test on filter-paper. C_6H_6 may be converted into $PhNO_2$ and thus detected as resorufin (A., 1934, 286). J. S. A.

Detection of nitrites and nitrates.—See B., 1935, 225.

Determination of calcium dihydrogen phosphate by means of carbamide. C. W. Whittaker, F. O. Lundstrom, and W. L. Hill (J. Assoc. Off. Agric. Chem., 1935, **18**, 122—127).—The sample containing $Ca(H_2PO_4)_2$ (I) and $CaHPO_4$ (II) is shaken with aq. $CO(NH_2)_2$, filtered, and an aliquot part of the filtrate is treated with EtOH to ppt. (II). The P_2O_5 sol. in EtOH [= (I) originally present] is determined. Examples of the application of the method to commercial superphosphates (III) and double (III) are given. E. C. S.

Potentiometric determination of arsenates. P. Spacu (Z. anal. Chem., 1935, **100**, 187—190).—AsO_4''' is titrated against $Hg_2(NO_3)_2$ (in 24% aq. EtOH solution), using an amalgamated Pt indicator electrode. J. S. A.

Determination of krypton and xenon content of atmospheric air. G. Damköhler (Z. Elektrochem., 1935, **41**, 74—80).—Two different methods were tested using (*a*) atm. air, and (*b*) O_2 from an air fractionation apparatus, of known enrichment of inert gases. Gases (*a*) and (*b*) were analysed by fractionation from charcoal and by chemical purification, and both gave the same result, 1·08±0·10 p.p.m. of Kr and 0·08±0·03 p.p.m. of Xe by vol. (mean), in good agreement with Moureu and Lepape (cf. A., 1926, 933). R. S. B.

Electrolytic attack of opaque minerals and its application to the technique of "prints" of polished surfaces. P. Wenger, G. Gutzeit, and T. Hiller (Arch. Sci. phys. nat., 1934, [v], **16**, Suppl., 64—67; see above).—The method is described and examples of its use are given. F. L. U.

Determination of potassium in catalysts for ammonia synthesis.—See B., 1935, 225.

Spectrographic detection of cæsium, rubidium, and potassium, especially in mineral waters. Spectrographic analysis in the near infra-red. V. Gazzi (Annali Chim. Appl., 1934, **24**, 595—612).—The flame, arc, and spark spectra of the three elements have been examined in the near infra-red. The lines 8521 (Cs), 7947 and 7800 (Rb), 7699 and 7695 Å. (K) are very suitable for the spectrographic detection of these elements. O. J. W.

Determination of zinc. B. P. Zelenetzki (Zavod. Lab., 1934, **3**, 1081—1085).—The solution (free from Fe, Ni, and Mn) is made alkaline with aq. NH_3, acidified with AcOH, and H_2S is passed through the boiling solution to complete pptn. of ZnS; excess of H_2S is removed, aq. $AgNO_3$ added, and the ppt. of Ag_2S collected and weighed. Alternatively, standard aq. I is added to the suspension of ZnS, and excess of I titrated with standard aq. $Na_2S_2O_3$. R. T.

Elements detectable by arc spectrum analysis in lead minerals. S. Piña de Rubies and J. Doetsch (Z. anorg. Chem., 1935, **222**, 107—112).—By a method previously described (A., 1934, 58) a qual., and in some cases a quant., analysis of a large no. of Pb minerals has been made. M. S. B.

Quantitative spectrum analysis of elements. Tin–lead mixtures. H. Schubert and K. Cruse (Z. physikal. Chem., 1935, **172**, 143—155).—Experiments with Sn–Pb alloys have shown that the line intensity is not ∝ the Pb concn. The spectrum obtained from a given alloy under given conditions of excitation may vary considerably with the mode of prep. of the electrodes. A method of determining the properties of photographic plates is described. Sn, almost free from Pb, may be obtained by electrolysing $SnCl_4,2EtCN$. R. C.

Iodometric determination of thallic salts by potentiometric and visual titration. F. Čůta (Coll. Czech. Chem. Comm., 1935, **7**, 33—43; cf. A., 1934, 1323).—Titrations of I liberated from solutions containing 0·017—0·44 g. Tl per litre are 0·08% low using $Na_2S_2O_3$, and 0·24% low using Na_3AsO_3. The results of potentiometric and visual methods are identical. R. S.

Argentometric determination of copper. R. Biazzo and B. Tanteri (Annali Chim. Appl., 1935, **25**, 44—45).—The Cu is reduced, in solution containing

NH_3, to Cu^I by NH_2OH,HCl, excess of which is converted into acetoxime. The Cu_2O is then oxidised to CuO by NH_3–$AgNO_3$, the Ag thus pptd. being dissolved in HNO_3 and titrated by Volhard's method. T. H. P.

Determination of small amounts of mercury. S. I. Sinjakova (Z. anal. Chem., 1935, **100**, 190—193, and J. Gen. Chem. Russ, 1934, **4**, 1081—1087).—$2—10 \times 10^{-6}$ g. of Hg is determined nephelometrically by adding KI + strychnine sulphate (I) (cf. A., 1932, 923). Excess of KI interferes, causing rapid coagulation. Hg is absorbed from air by bubbling through aq.-alcoholic 1% I + $\not>$0·01 g. of KI. The solution is evaporated at 60—70°, 0·1 c.c. of saturated (I) added, and the vol. made up to 2 c.c. J. S. A.

Colorimetric determination of cerium and titanium by means of gallic acid. F. M. Schemjakin (Zavod. Lab., 1934, **3**, 1090—1091).—2·7 c.c. of 0·001*M*-gallic acid, sufficient solution to give a final concn. of $3—7 \times 10^{-5}$ g. Ce per c.c., 2 c.c. of Et_2O or PhMe, and 5·3 c.c. of 0·1*N*-NH_3 (containing 1 g. of cryst. Na_2SO_4 per 100 c.c.) are mixed in a stoppered vessel, the aq. layer is diluted to 10 c.c., and the coloration obtained compared with that given by standard aq. Ce solution. R. T.

Colorimetric determination of aluminium by the aid of alizarin *S*. A. P. Musakin (Zavod. Lab., 1934, **3**, 1085—1088).—5 c.c. of saturated aq. NaCl and 5 c.c. of 0·05% alizarin *S* are added to the neutral or feebly acid solution (containing 0·005—0·05 mg. of Al_2O_3), 5*N*-NH_3 is added to change of colour, and the solution is diluted to 50 c.c. Standard Al solution (0·5 mg.-% of Al_2O_3) is added to a second solution containing the same reagents as the first, to the attainment of an approx. identical coloration, when H_2O is added to 50 c.c., an identical excess of AcOH is added to both solutions, and the intensity of coloration compared. R. T.

Occurrence and determination of manganese in sea-water. T. G. Thompson and T. L. Wilson (J. Amer. Chem. Soc., 1935, **57**, 233—236).—A modification of the method of Willard and Greathouse (A., 1918, ii, 84) is sufficiently sensitive to detect variations of $0{\cdot}18 \times 10^{-4}$ mg.-atom of Mn. The Mn content of sea-H_2O is $0{\cdot}2 \times 10^{-4}—1{\cdot}8 \times 10^{-4}$ mg.-atom per kg. Dried muds from the sea bottom contained 0·05—0·30% of Mn. The ash of plankton contains about 0·07% of Mn, whilst H_2O rich in plankton contains less dissolved Mn. E. S. H.

Analytical chemistry of rhenium. XI. Volumetric determination of rhenium compounds. W. Geilmann and F. W. Wrigge (Z. anorg. Chem., 1935, **222**, 56—64).—In acid solution the valency of Re oxides may be determined by oxidation with $Fe_2(SO_4)_3$, $K_2Cr_2O_7$, or $Ce(SO_4)_2$, after gentle warming. $ReCl_3$ requires to be boiled for a short time, but K_2ReCl_6 can be quantitatively oxidised by long boiling with $Ce(SO_4)_2$ only. $KMnO_4$ can be used for titrating $ReCl_3$ under certain definite conditions. In alkaline solution $ReCl_3$ and K_2ReCl_6 can be completely oxidised by $K_2Cr_2O_7$. $KMnO_4$ is suitable for $ReCl_3$ but not for K_2ReCl_6. Under certain conditions $Fe_2(SO_4)_3$ may be used indirectly for the titration of alkaline solution, but it is not very satisfactory. M. S. B.

Permanganate micro-titration of iron. J. Knop and O. Kubelková (Z. anal. Chem., 1935, **100**, 161—183).—1 mg. of Fe may be accurately titrated with 0·005*N*-$KMnO_4$, using Cyanin B or Erioglaucin A as indicator, in presence of a large excess of Ni or Co. Using boiled-out solutions, titration in a CO_2 atm. is unnecessary. $K_4Fe(CN)_6$ is suitable for standardising 0·005*N*-$KMnO_4$, but must be titrated in diffused light to prevent photodecomp. Fe^{III} may be reduced with $SnCl_2$ (0·8% solution in HCl), subsequently adding $HgCl_2$, or, better, with electrolytic Cd in a micro-reductor (I), reduction being quant. in 30 sec. Reduction with Zn in (I) is slow and liable to variable error. J. S. A.

Determination of thorium with 8-hydroxyquinoline. F. Hecht and W. Ehrmann (Z. anal. Chem., 1935, **100**, 98—103).—$Th(NO_3)_4$ solution, free from other metals pptd. by 8-hydroxyquinoline (I), is exactly neutralised, and AcOH added to give a final concn. of 2—3%. Excess of (I) is added to the boiling solution, and the AcOH then buffered by addition of NH_4OAc. The ppt., of composition $Th(C_9H_6ON)_4,C_9H_7ON$ (cf. A., 1934, 82), is dried at room temp. The fifth mol. of (I) is lost by heating at 160—170°, or by extracting with warm 95% EtOH. J. S. A.

Determination of thorium with picrolonic acid. F. Hecht and W. Ehrmann (Z. anal. Chem., 1935, **100**, 87—98).—Excess of saturated picrolonic acid solution is added slowly to a boiling conc. solution of $Th(NO_3)_4$, free from mineral acid or NH_4 salts, but containing enough AcOH to give a final concn. of 2—3%. $Th(C_{10}H_7O_5N_4)_4,H_2O$ is pptd., and is collected after cooling to 0°. The ppt. is washed with the min. amount of cold H_2O, and dried at room temp. The method is applicable to macro- and micro-determinations. J. S. A.

Compounds of vanadium with 8-hydroxyquinoline, and their analytical applications. R. Montequi and M. Gallego (Anal. Fís. Quím., 1934, **32**, 134—145).—Vanadate solutions, in presence of 6% AcOH, give with 8-hydroxyquinoline a bluish-black ppt. (I) or coloration, extracted by $CHCl_3$ to a red solution: limiting concn. 1 : 670,000. (I) has the composition $(C_9H_6ON)_4V_2O_3$, being the anhydride of an acid $(C_9H_6ON)_2VO_2H$ (not isolated), of which the *Na* ($+7H_2O$), *K* ($+4H_2O$), and *NH_4* salts were prepared. (I) may be used for the gravimetric determination of V. J. S. A.

Specific reaction for antimony cations. G. Gutzeit, R. Weibel, and R. Duckert (Arch. Sci. phys. nat., 1934, [v], **16**, Suppl., 62—64).—A preliminary account of a reagent, of composition at present unknown, obtained during the hydrolysis of 1 : 2 : 4-$C_6H_3(OAc)_3$, which gives a red coloration or ppt. with $Sb^{\cdots}$. 4×10^{-6} g. of Sb can be detected in presence of a large excess of As or Sn. F. L. U.

Electro-titration of platinum and iridium. A. A. Grinberg and B. B. Ptitsin (Ann. Inst. Platine, 1935, **12**, 133—158).—Pt^{II} and Ir^{III} are determined by electro-titration with $KMnO_4$, Pt^{IV} by reduction to Pt^{II}, followed by $KMnO_4$ titration, Ir^{IV} by reduction with Mohr's salt (I) to Ir^{III}, and $KMnO_4$ titration, Ir^{IV} in presence of Pt^{IV} by titration with (I), and Ir in presence of Rh by direct $KMnO_4$ titration. R. T.

Thermometers and apparatus for the determination of the points of fusion and decomposition of organic substances. R. E. Steiger (Bull. Soc. chim., 1935, [v], **2**, 284—290).—An apparatus for m.-p. measurements and sets of thermometers which avoid the necessity for exposed stem correction are described. M. S. B.

Small vacuum metal vapour furnace. G. D. Robinson (Proc. Leeds Phil. Soc., 1935, **3**, 12—17).—A Pyrex furnace is described. The distribution of Zn vapour near an aperture, examined with a sooted Cu target, agrees with Knudsen's cosine law. F. L. U.

Micro-furnace and a micro-press for tablets. S. Secareanu (Bull. Soc. chim., 1935, [v], **2**, 79—80).—An externally heated two-piece bronze micro-furnace for the range 50—300° and holding $\not>$ 0·5 g. of substance is described. The micro-press is a glass tube of 1·5 mm. internal diameter with a well-fitting metal plunger which is pressed against a plane surface. J. G. A. G.

Air-bath. N. M. Shah (J. Chem. Educ., 1935, **12**, 16).—An inverted truncated galvanised Fe sheet cone approx. 6·5 in. high with serrated upper and lower edges is placed in a tripod and heated by a small flame. The air-bath can be used for quant. work. L. S. T.

Constant-temperature bath employing thermionic control. G. W. Thiessen and L. J. Frost (J. Chem. Educ., 1935, **12**, 72—73). L. S. T.

Sodium line-reversal method of determining flame temperatures. B. Lewis and G. von Elbe (Engineering, 1935, **139**, 168).—A criticism (cf. David, A., 1934, 1073). C. W. G.

Sodium line-reversal method of determining flame temperatures. W. T. David (Engineering, 1935, **139**, 195).—A reply (cf. preceding abstract). C. W. G.

Filling high-temperature mercury thermometers with a condensed gas. H. Moser (Physikal. Z., 1935, **36**, 153—157).—The thermometer is filled with A at the b.p. of liquid air, a sufficient quantity being condensed to give the necessary pressure when the temp. is raised. A. J. M.

Source of error in determining heats of combustion of organic substances by means of the bomb calorimeter. III. L. J. P. Keffler (J. Chim. phys., 1935, **32**, 91—100; cf. A., 1934, 860).—The apparent val. of the H_2O equiv., q, of the calorimetric bomb was depressed by approx. the calc. extent by 0·1% of H_2 in the O_2, but q passed through a max. as the pressure of gas in the supply cylinder decreased. The differences between the results of duplicate experiments were > with pure O_2. The interpretation of these and earlier results and the errors introduced by combustible impurities in bomb calorimetry are discussed. J. G. A. G.

Electrically-heated germinator with sterilisable plates, thermo-regulator for temperatures of 10—50°, and continuous constant water-flow. F. Lorenzola (Annali Chim. Appl., 1935, **25**, 42—43). T. H. P.

Adiabatic cooling of magnetic substances. W. J. de Haas and E. C. Wiersma (Physica, 1935, **2**, 81—86; cf. A., 1934, 1062).—With initial and final fields of 24,075 and 5·5 gauss, respectively, a final temp. of 0·0159° abs. was attained. H. J. E.

Improved differential ebullioscope. E. Plake (Z. physikal. Chem., 1935, **172**, 105—112).—With a modified form of Swientoslawski apparatus (cf. A., 1931, 928) the b.-p. elevation of solutions as dil. as 0·006M can be determined with a precision of 0·0001°. R. C.

Measurement of light absorption. II. Photo-electric spectrophotometer. Systematic errors of photo-electric spectrophotometry. R. Fonteyne (Natuurwetensch. Tijds., 1935, **17**, 10—25).—With the apparatus described, ϵ can be measured to an accuracy of 10^{-4}. Curves for camphorquinone and for $K_2Cr_2O_7$ reduced with varying quantities of glycerol are given. D. R. D.

A method in microspectrometry and its accuracy. H. Nagaoka and I. Machida (Proc. Imp. Acad. Tokyo, 1934, **10**, 629—631).—Improvements in the spectrographic detection of small amounts of elements are suggested. The accuracy is increased by reducing the amount of liquid lost by sputtering during the discharge and by increasing the amount of emitted light entering the spectrograph slit. The spectrogram is examined microphotometrically. O. J. W.

Use of photo-electric cells for determining oxides of nitrogen and ozone. C. H. Wakker (Arch. Sci. phys. nat., 1934, [v], **16**, Suppl., 145—147).—An Fe–Se–Au cell is used with an absorption tube 1 m. long for NO_2, 2 m. for O_3. F. L. U.

Photo-electric apparatus adapted to investigation of light counters. K. H. Reiss (Z. Physik, 1935, **93**, 411—415).—The apparatus described gives monochromatic light of any desired low intensity, and is used to measure the quantum efficiency of Cd light counters. A. B. D. C.

Discontinuities in the characteristics of photo-cells. F. M. Penning and J. Moubis (Physica, 1935, **2**, 55—61).—The glass window of a photo-cell emits both photo- and secondary electrons, and therefore acts as a third electrode connected to the cathode through a high resistance. This behaviour leads to the discontinuities observed in the voltage–current characteristics. J. W. S.

***X*-Ray investigation of transition processes. Application of Weissenberg *X*-ray goniometer to registration of transition processes.** J. Böhm and P. Feldman (Z. physikal. Chem., 1934, B, **27**, 425—430).—The film carrier of an *X*-ray goniometer is moved along during exposure of the film, thus giving a continuous record of the change in the *X*-ray diagram during transition. Results obtained for the recrystallisation of Pt-black are reproduced. The above device may be used in electron diffraction experiments. R. C.

Standardisation of Lovibond red glasses in combination with Lovibond 35 Yellow. K. S. Gibson and G. W. Haupt (Oil and Soap, 1934, **11**, 246—250, 257—260; cf. A., 1928, 609; 1934, 624).—The Priest–Gibson *N''* scale is satisfactory for grading Lovibond red glasses (used in conjunction with a 35 Y glass); the numerals are of approx. the same magnitude as the original Lovibond nos., and are additive within the tolerances regarded as satisfactory for the calibration of glasses intended for grading vegetable oils. The derivation of the *N''* scale and units from data for the spectral transmission (*T*) of the glasses is fully described. The same val. of *N''* is obtained whether a glass is graded by computation from *T*, or directly by comparison with standard glasses. E. L.

Apparatus for *X*-ray quantitative chemical analysis with the cathode-ray tube. W. P. Jesse (Rev. Sci. Instr., 1935, [ii], **6**, 47—50).—A compact oil-immersed apparatus is described. C. W. G.

Simple apparatus for objective fluorescence measurements using a selenium cell. F. H. Cohen (Rec. trav. chim., 1935, **54**, 133—138).—Fluorescence (intensity *f*) in solutions has been studied using a Hg-vapour lamp, a NiO filter, and a Se cell, for incident λ=366 μ. At p_H 8 for fluorescein (I) $f \propto$ concn. up to 10^{-5} g. per c.c., with an error of approx. 2%, and *f* then falls with increasing concn. *f* for lactoflavin (II) at a concn. 0·97 × 10^{-5} g. per c.c. is 1·8 × $f_{(I)}$ for the same concn. The decay in $f_{(II)}$ on continued illumination is small. R. S. B.

Light filters for the mercury arc. B. K. Vaidya (J. Univ. Bombay, 1934, **3**, No. 2, 141—148).—33 filter systems for the isolation of the Hg lines are described, and approx. measurements of the energy transmitted by 8 of them are recorded. D. R. D.

"Electrodeless" metal vapour lamp for production of resonance radiation. F. Fairbrother and J. L. Tuck (Trans. Faraday Soc., 1935, **31**, 520—526).—Two forms of lamp are described, in each of which Na vapour at 10^{-4}—10^{-5} mm. is excited by an "electrodeless" discharge at a frequency of 10^8 cycles. The *D* radiation is very intense and very narrow, and is almost completely absorbed by a few cm. of Na vapour of low *d*. The lamps can be operated at and above 160°, the intensity increasing with rise of temp. until the current becomes large enough to damp the exciting oscillations. F. L. U.

Laboratory apparatus for the electrolytic concentration of H^2. G. Champetier (Bull. Soc. chim., 1935, [v], **2**, 162—167).—Three types of apparatus for the successive stages of the process are described. J. G. A. G.

Continuous-reading titration apparatus. L. H. Baldinger (J. Amer. Pharm. Assoc., 1935, **24**, 6—9).—A simple apparatus is suggested for accurate continuous-reading electrometric titrations using graphite–Pt, W–Pt, and SiC–Pt electrodes with a vac. tube titration apparatus. The apparatus is tested and applied in the titration of certain Fe^{II} compounds. H. T.

High-intensity discharge tube. D. S. Stevens (Rev. Sci. Instr., 1935, [ii], **6**, 40—42).—A small constriction is placed in a d.-c. arc operating in the rare gases, O_2, N_2, or H_2, 5—10 amp. at 1500—2000 volts are required. C. W. G.

Rule to demonstrate the migration of ions. A. S. Fedorow (J. Chem. Educ., 1935, **12**, 93—94).—A wooden slide-rule device is used. L. S. T.

Counter of the Wynn-Williams type. S. Kikuchi and H. Aoki (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1935, **26**, 36—41).—A diagram of the instrument is given. Oscillograph deflexions produced by γ-rays are due to the accidental coincidence of many electrons. R. S.

Greinacher hydraulic counter for quanta and ionising particles. R. D. Summers (Rev. Sci. Instr., 1935, [ii], **6**, 39—40; cf. Helv. Phys. Acta, 1934, **7**, 360, 514).—The frequency range is extended by the use of an auxiliary ionisation gap. C. W. G.

New method for counting atmospheric ions and determining their mobilities. J. J. Nolan and P. J. Nolan (Proc. Roy. Irish Acad., 1935, **42**, A., 15—19).—Ions are collected on an inner charged electrode (I), the observing apparatus is maintained at the same potential (20 volts), and the change in the (I) potential determined with a sensitive electrometer. This can be used as a null instrument by applying a compensating potential to the outer cylinder of the ion counter. The measured distribution of mobilities of atm. ions is independent of their concn. R. S.

Determination of the dielectric constant of conducting solutions. W. M. Mazee (Physikal. Z., 1935, **36**, 177—180).—The principle of the method is the determination of the max. resonance in a circuit including a cell containing the solution. A. J. M.

Cleaning of glass vessels. P. I. Zabello (Zavod. Lab., 1934, **3**, 1132).—Burettes and pipettes are cleaned by EtOH–HNO_3 mixture. R. T.

Micro-burette. N. G. Heatley (Biochem. J., 1935, **29**, 626—630).—The titrating fluid is contained in a bottle fitted with a delivery tube and one connecting the bottle to the burette. Liquid paraffin is displaced from the burette to the bottle, from which an equal vol. of titrating fluid is delivered. H. D.

Reading device for burettes. W. P. White (J. Amer. Chem. Soc., 1935, **57**, 332). E. S. H.

Apparatus for determining carbon dioxide in the air. M. L. Jean (Bull. Soc. chim., 1935, [v], **2**, 283—284).—An apparatus with an efficient absorbing pipette, which avoids the risk of trapping gas in capillary spaces, is described. M. S. B.

Apparatus for determining very small osmotic pressures in colloidal solutions. (Mme.) A. Dobry (J. Chim. phys., 1935, **32**, 46—49).—The solution is in a collodion bladder (I) connected with a manometer (II) and surrounded by solvent in a glass vessel fitted with a manometer and a compensating tube which eliminates the effects of thermal expansion. In a second apparatus, which must be thermo-regulated, the (I) with (II) is immersed in the pure solvent so that the difference between the levels of the liquids represents the osmotic pressure (III). Evaporation losses are prevented and vals. of (III) equiv. to 1—5 mm. of H_2O are determined. J. G. A. G.

Thermal conductivity apparatus for continuous determination of the helium content of natural gas.—See B., 1935, 186.

High-speed oil diffusion pump. R. M. Zabel (Rev. Sci. Instr., 1935, [ii], **6**, 54—55).—Apiezon oil is boiled, and the vapour passes through a 4- or 7-nozzle jet. A fore vac. of 0·02 mm. is required. C. W. G.

Safety apparatus for water pump. G. Mingasson and H. Delarue (Bull. Soc. chim., 1935, [v], **2**, 281—282).—Either a modification of the Bunsen valve, or a float which closes the connexion between the pump and vessel to be evacuated, may be used. In either case there is no loss of vac. M. S. B.

Condensation-fractionation flask. J. Erdös (J. pr. Chem., 1935, [ii], **142**, 145—148).—There are described (*a*) a simple glass apparatus for effecting condensations involving loss of H_2O and (*b*) a more complicated apparatus for effecting also subsequent fractionation of the product. By (*b*) are obtained a 95% yield of glycerylphosphoric acid in 2—2·5 hr., 85% of NH_4 cinnamate from PhCHO, $CH_2(CO_2H)_2$, EtOH, and NH_3, and 150 g. of $Et_2C_2O_4$ and 40 g. of HCO_2Et from 150 g. of anhyd. $H_2C_2O_4$ in 3—3·5 hr. R. S. C.

Gear pump and hose as a collector of water samples for gas analysis. R. P. Cowles and C. Brambel (Science, 1935, **81**, 48—50).—An apparatus for the collection of H_2O samples from a depth of 25 m. or more without loss of gas is described. L. S. T.

Use of the centrifuge in determining the density of small crystals. J. D. Bernal and D. Crowfoot (Nature, 1935, **135**, 305; cf. this vol., 21).—Priority is acknowledged. L. S. T.

Dynamic method for investigation of surfaces of powders. (Motion of loose powders in revolving bulbs.) G. Schmidt (Z. physikal. Chem., 1934, **171**, 289—319).—A sample of the powder is contained in a bulb which is rotated about a horizontal axis by means of a string coiled about the axis and at its other end carrying a weight. The least wt., *W*, required to produce such rotation as causes the powder to form a ring around the periphery of the bulb is determined. This method has been used with CuO, ZnO, Cr_2O_3, V_2O_5, and mixtures of these in contact with various gases. In general, *W* increases with falling gas pressure, *p*, temp., and H_2O content of the powder. At room temp. and under ~1 atm. gases with a small viscosity, η, give a $W >$ those of larger η. Deviations from the above general behaviour, especially in respect of the variation of *W* with temp., indicate chemosorption (I), and occur with Cr_2O_3 in contact with O_2, with ZnO in absence of O_2, and with CuO and V_2O_5. (I) is always associated with high electrical conductivity. The greater is the adsorption, the less does *W* vary with change in *p*. R. C.

Cellophane and Cuprophane as membranes for dialysis and electrodialysis. H. Brintzinger and H. Osswald (Kolloid-Z., 1935, **70**, 198—200).—The advantages of Cuprophane are demonstrated. Membranes 10 μ thick are mechanically strong and more permeable than Cellophane or parchment. E. S. H.

New type of manometer. M. V. Ionescu (Bull. Soc. chim., 1935, [v], **2**, 125—126).—A compact ensemble of manometer and pressure vessel for vac. distillations is described. J. G. A. G.

Devices for ensuring constancy in the masses of precision weights. J. J. Manley (Phil. Mag., 1935, [vii], **19**, 243—251).—The most satisfactory method is to use a box which also contains highly absorptive charcoal. C. W. G.

Improved heated vacuum micro-desiccator. E. W. Blank (J. Chem. Educ., 1935, **12**, 43). L. S. T.

Hydrogen sulphide apparatus. R. Montequi (Anal. Fís. Quím., 1934, **32**, 146—148).—A simple form is described. J. S. A.

Apparatus for pressure measurements of spreading substances. E. Gorter and W. A. Seeder (J. Gen. Physiol., 1935, **18**, 427—431).—The apparatus described depends on torsion compensation (sensitive to 0·1 dyne per cm. per 1° of scale) of the movement of a floating barrier due to changes in σ. F. O. H.

New method of counting dust nuclei in air. G. R. Paranjpe and Y. G. Naik (J. Univ. Bombay, 1934, **3**, No. 2, 58—66).—The air is expanded (ratio $<$ 1·3) in a 10-litre flask, and the no. of drops calc. from the diameter of the diffraction ring from a monochromatic parallel beam. Errors due to nuclei escaping pptn., fusion of drops, and condensation without nuclei are shown to be absent. D. R. D.

Measurement of the moment of a couple by chronometric motor. Application to viscosity. A. Guillet (Compt. rend., 1935, **200**, 442—445).—Application of the principle of uniform angular velocity to a solid suspended in a liquid is discussed. N. M. B.

Liquid-type micro-cathetometer. F. Tesson (Compt. rend., 1935, **200**, 439—441).—An apparatus, sensitive to 1 μ, for measuring vertical movements of particles and thin films consists of a trough of H_2O regulated by a micro-burette and containing a horizontal oil film for which the capillary action with a point is observed. N. M. B.

Ring method for measuring surface tension. L. du Noüy (Nature, 1935, **135**, 397).—A discussion of the merits of the method. L. S. T.

Still for concentration under reduced pressure. C. J. O. R. Morris (Biochem. J., 1935, **29**, 567—568).—A still devoid of metal parts, capable of dealing with 1·5—2 litres of aq. extract per hr. at 56° and 12 mm., is described. Difficulties due to frothing are overcome by means of a modified air-leak. W. O. K.

Sintered glass plates. V. T. Ivanov and I. A. Ivanov (Zavod. Lab., 1934, **3**, 1133).—Directions for the prep. of sintered glass filter plates are given. R. T.

Lecture demonstration of the law of combining volumes. T. H. James (J. Chem. Educ., 1935, **12**, 87). L. S. T.

Geochemistry.

Krypton content of air. I. Brody and F. Körösy (Trans. Faraday Soc., 1935, **31**, 547—556).—By comparing the relative intensities of suitable spectral lines of A and Kr in a mixture obtained chemically from the atm. with those given by mixtures of A and Kr of known composition, the proportion by vol. of Kr in air has been found to be $1{\cdot}44 \pm 0{\cdot}16 \times 10^{-6}$. The essential feature of the method used is the avoidance of any attempt to concentrate the Kr by physical means whereby loss might occur. F. L. U.

Radioactivity of mountain air. H. Garrigue (Compt. rend., 1935, **200**, 414—415; cf. A., 1934, 386).—The Rn content of the air enclosed under the snow in the neighbourhood of the Pic-du-Midi varies with the direction of the wind. The Rn formed in the interior of the earth is shut in by the snowing up of the slopes and is liberated abundantly near the Pic when the wind is N.W.—N.E. J. W. S.

Haber's investigations on the occurrence of gold in sea-water. J. Jaenicke (Naturwiss., 1935, **23**, 57—63).—A review of the methods used by Haber and his collaborators for the determination of Au in sea-H_2O. A. J. M.

Mineral water of Očeslavci. S. Miholić (Bull. Soc. Chim. Yougoslav., 1934, **5**, 63—71).—Analytical data are given. R. T.

Mineral waters of Abbarghente (Romana-Sassari). A. Serra (Annali Chim. Appl., 1934, **24**, 631—638).—Physico-chemical and analytical data are given, and compared with those of waters from Ischia, Sardara, and Célestius. O. J. W.

Thermal water from Val Calaona (Padua). G. Bragagnolo (Annali Chim. Appl., 1934, **24**, 628—630).—Physico-chemical and analytical data are given. O. J. W.

Water from Asolo (Treviso). G. Bragagnolo (Annali Chim. Appl., 1934, **24**, 626—628).—Physico-chemical and analytical data are given. O. J. W.

Rainerian water. G. Bragagnolo and B. Longo (Annali Chim. Appl., 1935, **25**, 46—48).—This H_2O, from a spring at Battaglia, near Abano, contains H_2S and is used medicinally. T. H. P.

Water of the Motticella Baths (Calabria). B. Ricca and P. Meduri (Annali Chim. Appl., 1935, **25**, 18—38).—Chemical analysis and physical examination have been made. Solids, 4·8 g. (at 110°) per 100 c.c., are mainly NaCl, Na_2SO_4, and $NaHCO_3$; CO_2, H_2S, and N occur in solution. The H_2O exerts curative effects in cases of skin disease. T. H. P.

Particulate and dissolved organic matter in inland lakes. E. A. Birge and C. Juday (Ecol. Monog., 1934, 4. 440—474).—The protein, carbohydrate, and Et_2O extract of the centrifuge plankton and of dissolved org. matter is determined in lake waters. Ch. Abs. (*p*)

Transfer of silica by water vapour. F. V. Syromyatnikov (Econ. Geol., 1935, **30**, 89—92).—SiO_2 and Fe_2O_3 are transferred by superheated H_2O vapour. The reaction of serpentine formation may proceed by pneumatolysis. L. S. T.

Geyser basins and igneous emanations. E. T. Allen (Econ. Geol., 1935, **30**, 1—13).—The character of the magmatic emanations in the Yellowstone Park geyser basins and their function in hot-spring development are discussed. L. S. T.

Gwalior trap from Gwalior, India. M. P. Bajpai (J. Geol., 1935, **43**, 61—75).—The analyses given agree with Washington's average for the Deccan trap except for the fact that the latter is somewhat poorer in alkalis. The ratios MgO : FeO in the ferromagnesian minerals indicate that the pyroxene is richer in MgO than the corresponding rock, supporting the view that crystallisation enriches the Fe content of the magma. The He ratios for the rock give a min. age of 5×10^8 years. L. S. T.

Stromboli magnetites and determination of Ti_2O_3 therein. F. Scafile (Annali Chim. Appl., 1935, **25**, 11—18).—The magnetite of Stromboli sand differs from those of Etna mainly in its low content of Ti and FeO. Many Etna magnetites contain Mn = about 0·5% Mn_3O_4. In presence of FeO and Fe_2O_3, Ti_2O_3 may be determined by titrating rapidly with $KMnO_4$ to obtain the FeO end-point, subsequent reduction of $KMnO_4$ then giving another end-point corresponding with the Ti_2O_3; the latter reacts only after all the FeO has been oxidised. T. H. P.

Induced remanent magnetism of eruptive rocks. G. Jouravsky, P. Cherczenko, and G. Choubert (Compt. rend., 1935, **200**, 541—543).—Ilmenite (from the Antilles), biotite (from Tchebarcul), and allanite (from Arendal) show no induced magnetism. Epidote (from Oisans) and augite (from Puy de la Rodde) show a slight and monzonite and pyroxenolite (from Monzoni, Tyrol) a larger induced magnetism. This is partly, but not entirely, due to the presence of magnetite, as the effect is not eliminated entirely by removal of the portions of the mineral attracted by a magnet or by treatment with hot 20% H_2SO_4. J. W. S.

Water content and dehydration of sepiolites. G. Migeon (Compt. rend., 1935, **200**, 471—474).—Data for the variation with temp. of the H_2O content of 7 natural sepiolites indicate the composition $3SiO_2,2MgO,1{\cdot}5H_2O$ and $4SiO_2,3MgO,2H_2O$. N. M. B.

Fluorescence of Japanese hyalite in ultraviolet light. E. Iwase (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1935, **26**, 42—44).—Hyalite found in districts bearing radioactive minerals is fluorescent, owing to the adsorption of traces of uranyl salts. R. S.

Rare earths of certain minerals of Madagascar. A. Karl (Ann. Chim., 1935, [xi], **3**, 73—129).—Methods are described for the analysis of monazite, euxenite, and betafite, in which the rare earths (I) are separated quantitatively by fractional crystallisation. The composition relationships are discussed. Physical methods have been developed with which to follow the course of the separation. Reflexion spectra of a series of (I) salts are described, together with a process for the intensification of the photographs. The bands are characteristically displaced by the anion of the salt examined. Two tubes have been constructed for the study of cathodic phosphorescence (*a*) of a no. of specimens in rapid succession and (*b*) in the visible and ultra-violet. The operation and the sensitivity of the Curie–Chèneveau magnetic balance have been improved. R. S.

Stilpnochlorane from Gobitschau, Moravia. J. Holzner (Centr. Min. Geol., 1934, A, 250—256).—Stilpnochlorane differs from stilpnomelane in having a higher Ca and H_2O content and in containing only Fe^{III}. On treatment with Clerici solution most of the Ca and approx. half the $(Na,K)_2$ is replaced by Tl_2, and most of the H_2O is driven from the mol.

Ch. Abs. (*e*)

Thorium content of pitchblendes from Great Bear Lake, N.W.T., Canada. A. Merkel (Centr. Min. Geol., 1934, A, 312—315).—The pitchblende contained $< 0{\cdot}01\%$ Th, and hence the Pb^{208} content was $< 0{\cdot}00046\%$. The total Pb was 10·9—15·8%.

Ch. Abs. (*e*)

Dehydration of natural and of artificial lepidocrocite. A. Girard and G. Chaudron (Bull. Soc. chim., 1935, [v], 2, 119—125).—Thermomagnetic analysis shows that natural lepidocrocite (I) loses H_2O, partly in two stages, at $> 300°$ in air, and yields cubic Fe_2O_3 which at about 500° passes rapidly to rhombohedral Fe_2O_3. The equilibrium $3Fe_2O_3$ (cubic) $\rightleftharpoons 2Fe_3O_4+0{\cdot}5O_2$ is set up during dehydration in vac. Artificial lepidocrocite prepared from FeO is less stable than (I), and in vac. at 525° affords a solid solution of Fe_3O_4 and Fe_2O_3. The hydrate produced by hydrolysing Na ferrite loses its H_2O at $< 200°$, forming a stable cubic Fe_2O_3 which changes to rhombohedral Fe_2O_3 at 700°. J. G. A. G.

Occurrences of magnesite in Russia, Manchuria, Japan, Sweden, and Norway. L. Loch and K. A. Redlich (Z. pr. Geol., 1935, 43, 1—10).—The situations, nature of the deposits, and analyses are described. L. S. T.

Occurrence of schwatzite in British Columbia. H. V. Warren and C. S. Lord (Econ. Geol., 1935, 30, 67—71).—Schwatzite occurs in one of the samples of tetrahedrite from the N. Kootenay Mine of the Windermere district. The analysis corresponds with $3(Cu,Ag)_2S,(Hg,Zn)S,(As,Sb)_2S_3$. L. S. T.

Occurrence of enargite and wulfenite in ore deposits of Northern Arkansas. E. T. McKnight (Econ. Geol., 1935, 30, 61—66).—At the Govenor Eagle Mine, Marion County, Arkansas, enargite is associated with the sphalerite, a little chalcopyrite, and minor amounts of dolomite, calcite, and quartz gangue. Wulfenite occurs with cerussite as an oxidation product of galena at the Shiras Mine, Baxter County. No molybdenite was found in the galena.

L. S. T.

Tin deposits of Llallagua, Bolivia. I. F. S. Turneaure (Econ. Geol., 1935, 30, 14—60).—The geology of the district, the structural geology of the veins, the hydrothermal metamorphism which involved abundant deposition of low-Fe tourmaline, sericite, and quartz, the vein minerals, and their paragenesis are described. L. S. T.

Origin of the iron ores of Spanish Morocco. P. Geijer (Econ. Geol., 1935, 30, 92—94).—A discussion. L. S. T.

Origin of petroleum. G. A. Fester and J. Cruellas (Rev. Fac. Quim. Ind. Agric., 1934, 3; Chem. Zentr., 1934, ii, 2325).—The formation of asphalts and oils is attributed to the catalytic action of colloidal V derived from the surrounding rocks.

J. S. A.

New S. Dakota meteorite. C. C. O'Harra (Science, 1935, 81, 72).—The meteorite, designated as the Bennett County meteorite, contains Fe 94·26, Ni 5·25, Co 0·46, S 0·04% and some graphite. Small inclusions of triolite are present. L. S. T.

Organic Chemistry.

Electronic theory and organic chemistry. I.—See this vol., 431.

Functional groups and linkings in organic chemistry. E. Puxeddu (Gazzetta, 1934, 64, 957—968).—Theoretical. The properties of org. substances are considered as those of the reactive groups, the remainder of the mol. being inactive. E. W. W.

Organic molecular compounds. P. Pfeiffer (Chem.-Ztg., 1935, 59, 205—207).—A review.

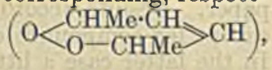
Microchemical determination of unsaturation by exposure to bromine vapour. J. Böeseken and P. Pols, jun. (Rec. trav. chim., 1935, 54, 162—166).—A modification of Rossmann's method (A., 1933, 142). A few mg. of the substance are placed in a small dish (I) under a Pétri dish together with a dish containing a few drops of Br. After ½—1 hr. excess of Br is removed by a stream of N_2 at 100°, and (I) is re-weighed. Light is excluded with black paper. Results accord with those of Wijs' method, except for compounds containing OH, *e.g.*, castor oil. In the latter case a little HBr is probably formed in presence of a trace of H_2O, followed by $\vdots C{\cdot}OH+HBr=\vdots CBr+H_2O$, $H_2O+Br_2=HBr+HOBr$. After bromination for 2·5 days ricinelaïdic acid takes up 2·4 atoms of Br per mol., in accordance with this view.

R. S. B.

Physical constants of the polymerisation products of unsaturated hydrocarbons. H. I. Waterman and J. J. Leendertse (Rec. trav. chim., 1935, 54, 139—148).—n_D^{20}, d_D^{20}, the NH_2Ph point, and mean mol. wt. have been determined for (*a*) the fractions of the Δ^{β}-*n*-pentene polymerides obtained at 0° with $AlCl_3$ as catalyst, and (*b*) the fractions of the *iso*butene polymerides obtained at $\ngtr 40°$ with a SiO gel–Al_2O_3 catalyst, the properties being determined in each

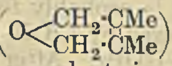
case before and after hydrogenation. d for (a) and (b) is a linear function of temp. at 20—80°. d decreases on hydrogenation by approx. the same amount for all temp. and fractions in the case of (a), but for (b) the decrease in d is dependent on the mol. wt., and decreases with rising temp. At 20°, 40°, and 60° Dunstan's formula $\log \eta = A + Bm$ holds (A and B consts., m mol. wt.), but there is a slight deviation at 80°. After hydrogenation (a) and (b) give similar results for η, but before hydrogenation vals. of $\eta_{(b)}$ are relatively high. The influence of T on η increases with increasing m; the nature of the raw material has approx. no influence, and the saturation of the polymerides has a small influence, on the η–T curve. $-\log \eta = K/T + a$, where K and a are consts., for the fractions of lower mol. wt. of (a) and (b), but there is a deviation in the fractions with higher mol. wt. A plot of η_T against η_{T-20} for (a) and (b) is approx. linear. It is inferred that the fractions (a) have a cyclic character and are not quite paraffinoid, whereas fractions (b) are completely paraffinoid.
R. S. B.

Additive reactions and polymerisation of βγ-dimethylbutadiene. P. N. KOGERMAN (Sitzungsber. Naturforsch. Ges. Tartu, 1934, **41**, reprint, 62 pp.).—The solid dibromide (80%), m.p. 47°, obtained from $(CH_2{:}CMe\cdot)_2$ (I) and Br–ligroin at −13° is the *trans*-αδ-dibromide (II). Fractional crystallisation of the liquid products (III) (shown by a cooling curve to be a mixture of additive and substitution products) affords the *cis-αδ-dibromide*, m.p. 4·0—4·1°, since, like (III), it gives $CH_2Br\cdot COMe$ on ozonolysis. Further addition of Br to (II) goes smoothly to give the Br_4-compound, but (III) gives a mixture of additive and substitution products. With AgOAc in EtOAc at < 25° (II) or (III) gives mainly *δ-hydroxy-βγ-dimethyl-Δ^β-butenyl acetate*, b.p. 91—92°/9 mm., and the Ac_2 derivative, b.p. 124·0—125·5°/9 mm., of *βγ-dimethyl-Δ^β-butene-αδ-diol*, b.p. 85·0—85·5°/8 mm., which is obtained by hydrolysis of either Ac derivative with NaOMe–MeOH at 40—50°. Oxidation $[Pb(OAc)_4]$ of the glycol from (II) and from (III) gives CH_2O corresponding, respectively, to 9% and 44·7% of the αβ-diol, but some isomerisation probably occurs during oxidation. In the autoxidation of $(CHMe{:}CH\cdot)_2$, (I), and $CMe_2{:}CH\cdot CH{:}CH_2$ the O_2 absorbed at 20—26° is, respectively, 46·55, 24·06, and 38·8% of the wt. of diene, corresponding, respectively, to absorption of 1 mol.

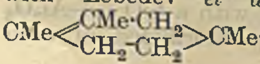


$\left(O\Big\langle\begin{array}{l}CHMe\cdot CH\\O-CHMe\end{array}\Big\rangle CH\right)$,

1 atom



$\left(O\Big\langle\begin{array}{l}CH_2\cdot CMe\\CH_2\cdot CMe\end{array}\right)$, and 1 mol. of O_2. The mol. wt. of the products is partly dependent on the solvent and concn. Under the same conditions diallyl (no conjugation) does not absorb O_2. The thermal polymerisation of (I) at 100°, 125°, 150°, 175°, and 200° for 3—18 hr. ∝ concn., and is affected by the presence of catalysts and by the nature of the glass. The ratio of dimeride (IV) to total polymeride increases with rise of temp. to a max. val. 1·9/1 at 175°. Ozonolysis of (IV) gives CH_2O, but no $(\cdot CH_2Ac)_2$, hence (IV) is not *cyclo*octatriene, but, in agreement with Lebedev *et al.* (A., 1913, i, 1287), is



$CMe\Big\langle\begin{array}{l}CMe\cdot CH_2\\CH_2-CH_2\end{array}\Big\rangle CMe\cdot CMe{:}CH_2$, since dehydrogenation with Se at 350° affords a mixture of ψ-cumene (oxidised by $KMnO_4$ to trimellitic acid) and some xylenes, and (IV) adds 2 mols. HBr. The heats of combustion of (I) and (IV) are, respectively, 909 and 1817 kg.-cal. per. mol.
J. W. B.

Physical constants of dimethylacetylene. G. B. HEISIG and H. M. DAVIS (J. Amer. Chem. Soc., 1935, **57**, 339—340).—Physical consts. are recorded for $({\vdots}CMe)_2$ (modified prep.), b.p. 27·2°, m.p. −32·8° to −32·5°.
R. S. C.

Synthesis of polychloro-compounds with aluminium chloride. I. Condensation of chloroform with tetrachloroethylene. H. J. PRINS (Rec. trav. chim., 1935, **54**, 249—252).—Details for the prep. of $CHCl_2\cdot CCl_2\cdot CCl_3$ from $CCl_2{:}CCl_2$ (I) and $CHCl_3$ in presence of traces of $AlCl_3$ (II) (cf. A., 1914, i, 648) are given, and the reversibility of the reaction is demonstrated. The ease of reaction makes it a suitable test for free (II). Long boiling of (I) with (II) gives only a little C_2Cl_6 and an oil of high, indefinite b.p. When heated with (II) in CCl_4, $CHCl(CCl_3)_2$ affords C_3Cl_6 (III) which forms an additive compound with (II) (cf. A., 1933, 47), and no free $AlCl_3$ could be detected (see above) when the mol. ratio (III)/(II) is >1.
J. W. B.

Oxidation of iodoform [and carbon tetraiodide] solutions.—See this vol., 454.

Aliphatic nitro-compounds. III. Reactions of nitromethane halides. N. N. MELNIKOV (J. Gen. Chem. Russ., 1934, **4**, 1061—1063).—The products of heating $CBr_3\cdot NO_2$ with 70% H_2SO_4 are $COBr_2$ and NOBr, whilst with 50% aq. KOH, N_2, CO, NO, K_2CO_3, KBr, $KBrO_3$, KNO_2, KNO_3, and $K_2C_2(NO_2)_4$ have been identified; the reactions whereby these products are formed are discussed.
R. T.

α-Methoxypentan-β-ol. A. SERVIA (Anal. Fís. Quím., 1934, **32**, 149—151).—The interaction (Grignard) of αβ-oxido-γ-methoxypropane and MgEtBr (cf. Ribas and Tapia, A., 1933, 487) gives *α-methoxypentan-β-ol* (I), b.p. 151—152° (*3 : 5-dinitrobenzoate*, m.p. 55°), not $OMe\cdot CH_2\cdot CHEt\cdot CH_2\cdot OH$, because (I) and $K_2Cr_2O_7$ in dil. aq. H_2SO_4 yield $COPr^{\alpha}\cdot CH_2\cdot OMe$, b.p. 146—148°/690 mm. identified by its semicarbazone (cf. Maruyama, *ibid.*, 260).
F. R. G.

Preparation of acetylenic and di-ethylenic alcohols in the C_5 and C_6 series. R. LESPIEAU and R. LOMBARD (Bull. Soc. chim., 1935, [v], **2**, 369—373).—A more detailed account of work previously summarised (A., 1934, 990). The Raman spectra of the various alcohols are described.
J. W. B.

Reaction of ethylene oxide with acetylenic Grignard reagents. G. B. BACHMAN (J. Amer. Chem. Soc., 1935, **57**, 382—383).—By this reaction is prepared Δ^{γ}-noninen-α-ol (52% yield), b.p. 130—130·5°/19 mm. (*urethane*, m.p. 64·5°), which with PBr_3 gives *α-bromo-Δ^γ-noninene*, b.p. 95°/9 mm., not formed from $C_5H_{11}\cdot C{:}C\cdot MgBr$ and *β-bromoethyl* p-*toluenesulphonate*, b.p. 203°/5 mm.
R. S. C.

Syntheses by the aid of vinylacetylene. J. SALKIND and V. PLETZ (J. Gen. Chem. Russ., 1934, **4**, 1088—1090).—*Dimethylvinylacetylenylcarbinol*, b.p. 64°/15 mm., 75°/25 mm., is obtained from MgEtBr

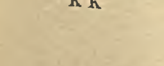
in Et_2O, $CH_2{:}CH\cdot C{:}CH$, and $COMe_2$; *methyldivinylacetylenylcarbinol*, b.p. 110°/8 mm., is obtained when EtOAc is substituted for $COMe_2$ in the above reaction.
R. T.

Oxidation of ether in presence of active carbon. I, II.—See this vol., 456.

Higher β-alkyl ethers of αγ-dibromopropane [ββ′-dibromo*iso*propyl ethers]. L. Sattler, M. Altamura, and S. Prener (J. Amer. Chem. Soc., 1935, **57**, 333—334).—$CH_2{:}CH\cdot CH_2Br$ and $Hg(OAc)_2$ in the appropriate alcohol give α-bromo-β-alkoxy-γ-acetoxymercuripropanes, which with Br–KBr give the following *ββ′-dibromo*iso*propyl alkyl ethers* in 20—32% yields: *Me*, b.p. 83·0°/13 mm., *Et*, b.p. 90·5°/17 mm., *Pr*$^{\alpha}$, b.p. 114·2°/27 mm., *Pr*$^{\beta}$, b.p. 108·6°/28·5 mm., *Bu*$^{\alpha}$, b.p. 119·0°/19·5 mm., *Bu*$^{\beta}$, b.p. 117·0°/22 mm., *amyl*, b.p. 137·9°/23 mm., and iso*amyl*, b.p. 137·5°/27 mm. These ethers are toxic and hypnotic.
R. S. C.

Thermal decomposition of organic compounds from the viewpoint of free radicals. XIII. Decomposition of ethyl nitrite. F. O. Rice and E. L. Rodovskas (J. Amer. Chem. Soc., 1935, **57**, 350—352; cf. this vol., 191).—When pure NO·OEt (I) is decomposed at 425°/about 1 mm., the vapours produced do not affect Te mirrors. 1% of (I) in CO_2, C_4H_{10}, or Et_2O, however, removes Te and Hg mirrors, forming $TeMe_2$ or $HgMe_2$. Hence (I) probably terminates the reaction chain, decomp. at low pressures occurring thus: (*a*) (I) $\longrightarrow NO+OEt^-$; (*b*) $OEt^- \longrightarrow CH_2O+Me^-$; (*c*) $Me^-+(I) \longrightarrow CH_4+NO\cdot OCHMe^-$; $NO\cdot OCHMe \longrightarrow NO+MeCHO$. 1% of (I) does not, however, prevent decomp. of C_4H_{10}, as might be expected if it terminates the chain, probably because of the rapid decomp. of (I) at the required temp. The activation energy of (*a*) at 400—500° is 34·3±3 kg.-cal.; that of (*b*) and of $OEt^- +(I) \longrightarrow EtOH+NO\cdot OCHMe^-$ are estimated at 500°/0·01 atm. to be 28—34 and 12—18 kg.-cal., respectively. $HgMe_2$ is determined by addition of $HgBr_2$ in EtOH, evaporation, steam-distillation, and collection of the volatile HgMeBr.
R. S. C.

Carbonic acid derivatives. VII. Interaction of water, ammonia, sodium hydroxide, and magnesium ethyl bromide with alkyl trichloromethyl carbonates. N. N. Melnikov (J. Gen. Chem. Russ., 1934, **4**, 1057—1060).—$CCl_3\cdot O\cdot CO_2R$ (I) (R=Ph, *o*- and *p*-C_6H_4Me, Me, Et, and *iso*-$C_5H_{11}\cdot$) reacts as follows with different reagents: $(I)+H_2O \longrightarrow CO_2+ROH+HCl+COCl_2$; $(I)+7NaOH \longrightarrow 3NaCl+2Na_2CO_3+ROH+3H_2O$; $(I)+6NH_3 \longrightarrow CO(NH_2)_2+3NH_4Cl+NH_2\cdot CO_2R$; $(I)+MgEtBr+H_2O \longrightarrow 2CEt_3\cdot OH+ROH+MgCl_2+MgBr_2$. $CCl_3\cdot OH$ is in all cases an intermediate product.
R. T.

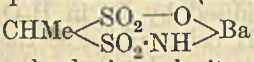
Mechanism of hydrolysis of di-esters of orthophosphoric acid. Migration of the phosphoric acid radical during the hydrolysis of two mixed di-esters, methyl α- and β-glycerophosphate. Interconversion of α- and β-glycerophosphates. O. Bailly and J. Gaumé (Bull. Soc. chim., 1935, [v], **2**, 354—369).—Interaction of Na_2MePO_4 with  $O\!\!<\!\!\begin{smallmatrix}CH_2\\CH\cdot CH_2Cl\end{smallmatrix}$ in H_2O at 60—70° affords (in solution) Na Me βγ-oxidopropylphosphate and MeOH (no Na_2MePO_4). Similar hydrolysis of either Na Me α- or β- (prep. from its pure Ca salt) -glycerophosphate gives a mixture of Na_2 α- and β-glycerophosphate with elimination of Me only. Thus in alkaline hydrolysis migration of the PO_4 from α to β and from β to α occurs, the former predominating. In acid hydrolysis of Me β-glycerophosphoric acid (dil. aq. solution) migration from β to α predominates (unimol. $k^{25}=0{\cdot}0051—0{\cdot}0058$). The mechanism of these migrations is discussed. Determination of the α- and β-glycerophosphates is effected by the methods of Fleury *et al.* (A., 1933, 696) and of Karrer *et al.* (A., 1926, 384; modified).
J. W. B.

Synthesis of the isomeric glyceric acid-phosphoric acids [phosphoglyceric acids]. W. Kiessling (Ber., 1935, **68**, [*B*], 243—248).—Na β-glycerylphosphate is oxidised by Br in H_2O containing $Ba(OAc)_2$, *N*-NaOH being added so that the solution is just acid to litmus, whereby α-phosphoglyceric acid (I) (*Ba* and *Ag* salts) is obtained. Similar oxidation of Ba α-glycerylphosphate leads less smoothly to β-phosphoglyceric acid (II) (*Ba* and *Ag* salts), oxidised by $KMnO_4$ to phosphoglycollic acid (*Ba* and *Ag* salts). (I) and (II) undergo carboxylatic fission by yeast extract at the same rate to the extent of 50%, the (−)-component of (II) and the (+)-component of (I) being removed so that the residual acids have $[\alpha]_D^{20}$ +14·5° and −23·5°, respectively. In dialysed yeast extract an equilibrium mixture is formed containing 80% of (II). Natural phosphoglyceric acid appears to be mainly a mixture of (+)-(I) and (−)-(II).
H. W.

γ-Trimethylene trisulphide perchlorate. II. O. Hinsberg (J. pr. Chem., 1935, [ii], **142**, 135—140; cf. A., 1933, 1303).—The compound, m.p. 37° (*loc. cit.*), has the formula $C_6H_{12}O_2S_3$ and is probably $AcS\cdot CH_2\cdot S\cdot CH_2\cdot S\cdot CH_2\cdot OMe$. The compound, m.p. 93° (*loc. cit.*), is $S(CH_2\cdot S\cdot CH_2\cdot SMe)_2$ (I) [oxidised (H_2O_2–Ac_2O) to a *sulphone*, $C_6H_{14}O_{10}S_5$, m.p. 257°], and is formed together with a mixture, m.p. about 50°, from trithian perchlorate (II), m.p. 138°. With H_2O_2–AcOH, (II) gives *γ-trimethylene disulphoxide sulphide perchlorate* (III), which explodes at about 150° and (unlike the α-compound) with aq. NH_3 forms a voluminous mass insol. in H_2O. (III) is converted by HI into the *γ-iodide*, $(C_3H_6S_3)_2I_5$, m.p. 112°, which with aq. $Na_2S_2O_3$ and aq. MeOH affords a *γ-compound*, $C_3H_6S_3,HI,MeOH$, m.p. 121° (decomp.) [converted into (II) by $HClO_4$; decomposes on heating to 100° to form a yellow insol. substance]. The MeOH is not removed by crystallisation from H_2O. (III) heated with MeOH affords the corresponding *α-compound* (IV), which explodes at about 150° and is reduced by conc. HI to β-trimethylene trisulphide (V), m.p. 247°. (IV) is converted by KOAc into *α-trimethylene disulphoxide sulphide*, $C_3H_6O_2S_3$, m.p. 255° (decomp.), which with HI gives (V) and with H_2O_2 gives trimethylene trisulphoxide, m.p. 270°.
H. G. M.

Tertiary pentanesulphonic acid. H. J. Backer (Rec. trav. chim., 1935, **54**, 215—218).—Interaction of CMe_2EtBr and $CS(NH_2)_2$ in hot H_2O and hydrolysis of the product affords tert.-*amyl mercaptan*, b.p.

97°, oxidised by 30% H_2O_2–AcOH at 45—50° to β-*methylbutane*-β-*sulphonic acid* $+H_2O$, m.p. 62—65° (*Na* $+1{\cdot}5H_2O$, *K* $+H_2O$, *Ba* $+2H_2O$, *Cu* $+5H_2O$, *Pb* $+3H_2O$, *NH_2Ph*, m.p. 214—217°, *strychnine* $+2H_2O$, and *brucine* salts). J. W. B.

Derivatives of methanedisulphonic acids. G. Klaver (Rec. trav. chim., 1935, 54, 208—215).—When heated with NH_2Bu^γ and C_6H_6 at 160°, $CH_2(SO_3Ph)_2$ (I) affords *methanedisulphon*-tert.-*butylamide*, m.p. 175°, NH_2Ph similarly giving the *Ph anilinosulphonmethanesulphonate*, m.p. 152°. The Na derivative of (I) with Me_2SO_4 gives the cryst. Ph ester, m.p. 52°, of ethane-αα-disulphonic acid (II) (*diamide*, m.p. 165°; *di*(tert.-*butylamide*), m.p. 152°; *dianilide*, m.p. 168; *di*(*ethylanilide*), m.p. 150°], similarly converted into the *Ph* ester, m.p. 69—70°, of ethane-αα-sulphonamic acid (*Ba* salt $+H_2O$, and *basic Ba* salt,  $CHMe{<}{\begin{smallmatrix}SO_2—O\\SO_2{\cdot}NH\end{smallmatrix}}{>}Ba$ $+3H_2O$), which could not be resolved through its brucine salt. By similar methods are obtained n-*propane*- [*Ba* salt $+3H_2O$; *Ph* ester, b.p. 200°/0·005 mm.; *diamide*, m.p. 169—170°; *Ph* ester, m.p. 104°, of the sulphonamic acid (*Ba* salt $+H_2O$); *di*(tert.-*butylamide*), m.p. 133°; *dianilide*, m.p. 152°; *di*(*ethylanilide*), m.p. 127—128°]; n-*butane*-, $+2H_2O$ [*Ba* salt $+2H_2O$; *Ph* ester (obtained only from $CHNa(SO_3Ph)_2$ and *p*-$C_6H_4Me{\cdot}SO_3Pr^\alpha$); *di*(*ethylanilide*), m.p. 124°], and n-*pentane*-, $+2H_2O$ [*Ba* salt $+2H_2O$; *Ph* ester; *di*(*ethylanilide*), m.p. 84°], -αα-*disulphonic acid*. J. W. B.

ββ′-Disulphodiethyl ether. H. J. Backer (Rec. trav. chim., 1935, 54, 205—207).—Oxidation of $(SH{\cdot}CH_2{\cdot}CH_2)_2O$ [obtained from $(CH_2Cl{\cdot}CH_2)_2O$ (I) and $CS(NH_2)_2$] with 30% H_2O_2–AcOH affords ββ′-*disulphodiethyl ether* (II) [*Ba* $+H_2O$, *Na*, *K* $+1{\cdot}5H_2O$, *Tl*, *Pb*, *Cu* $+4{\cdot}5H_2O$, and *NH_2Ph*, m.p. 232—233°, salts]. (II) is also obtained by the action of $(NH_4)_2SO_3$ on (I). J. W. B.

Replacement series of the alkyl groups as determined by alcoholysis of esters. P. R. Fehland and H. Adkins (J. Amer. Chem. Soc., 1935, 57, 193—195).—Equilibria of the reaction $ROH+AcOR' \rightleftharpoons R'OH+AcOR$ are determined in glass or steel (attained faster in the latter) at 200° for a series of esters. The data thus obtained lead to the following relative reactivities of the alcohols: Me 100, heptyl 90, dodecyl 84, γ-phenylpropyl 83, Et 81, Bu^α 80, Pr^α 79, *sec*.-octyl 68, Bu^γ 66, $CH_2Ph{\cdot}CH_2$ 65, allyl 62, CH_2Ph 59, Pr^β 55, *cyclo*hexyl 55, and Bu^β 53. R. S. C.

[Mechanism of ester condensations.] G. V. Tschelincev (Ber., 1935, 68, [*B*], 327—329; cf. A., 1934, 868).—Scheibler's assumption (A., 1934, 991) of the formation of "unstable mol. compounds" due to subsidiary valencies is unnecessary for the explanation of the reaction between PhCHO and EtOAc in presence of Na, which proceeds thus: $PhCHO+CH_2{:}C(ONa){\cdot}OEt \longrightarrow OH{\cdot}CHPh{\cdot}CH{:}C(ONa){\cdot}OEt \longrightarrow CHPh{:}CH{\cdot}CO_2Et$. The author's hypothesis is also in harmony with the established inability of esters $CHRR'{\cdot}CO_2Et$ to behave as second component in ester condensations. Reply is made to Bodendorf (A., 1934, 991). H. W.

Oxidising hydrolysis of ozonides from unsaturated acids. J. L. Riebsomer and R. C. Tallman (Proc. Indiana Acad. Sci., 1934, 43, 136—139).—Details are given for the oxidising hydrolysis of unsaturated fatty acids by H_2O_2 in AcOH (yield 62%). Ch. Abs. (*e*)

Oxidation of organic substances as a means of investigating their constitution. [Oxidation of acetic acid by hydrogen peroxide.] G. Giacomello (Gazzetta, 1934, 64, 968—984; cf. A., 1933, 1036; 1934, 653).—The action of H_2O_2 and H_2SO_4 on AcOH in H_2O at 95° yields CO_2, O_2, CO, H_2, CH_4, MeOH, $CHO{\cdot}CO_2H$, CH_2O, and a resin. MeOAc and NaOAc are oxidised to similar products, but HCO_2Me yields a gaseous product containing no CH_4, and a solution containing $CHO{\cdot}CO_2H$. No H_2 or CH_4 was found in the gas from AcOH in absence of H_2SO_4. The various results are considered as supporting the tautomerisms: $H{\cdot}C(O){\cdot}OMe \rightleftharpoons C(OH){\cdot}OMe \rightleftharpoons Me{\cdot}C(O){\cdot}OH \rightleftharpoons CH_2{:}C(OH)_2+H_2O_2 \longrightarrow OH{\cdot}CH_2{\cdot}C(OH)_3$. These and similar equilibria are held to be much more common than is usually supposed. Mechanisms for the above oxidations are suggested. E. W. W.

Decomposition of acetyl peroxide. O. J. Walker and G. L. E. Wild (J.C.S., 1935, 207—210; cf. A., 1928, 1114; 1918, i, 369).—When pure Ac_2O_2 (I) (cf. A., 1909, i, 910) is heated at various temp. between 30° and 90°, decomp. proceeds with evolution of a mixture of mainly CO_2 and CH_4, but also CO, C_2H_4, O_2, and C_2H_6. The yield of C_2H_6 decreases from 8·8% at 90° to 0·7% at 30°. The undecomposed peroxide contains no CH_2O, AcOH, or AcO_2H (cf. A., 1932, 929). The present work is discussed in relation to previous work on the decomp. of (I) and that in which (I) is assumed to be formed, and is contrary to the view that decomp. proceeds along the lines of the simple equation. J. L. D.

Stability of the acetyl radical. M. Barak and D. W. G. Style (Nature, 1935, 135, 307—308).—The chief products of the photo-decomp. of Et_2O_2 are EtOH and Ac_2. The non-gaseous products of the photo-decomp. of $COMe_2$ and COMeEt give derivatives of Ac_2 with dinitrophenylhydrazine. Ac is more stable than is generally assumed, and plays a significant rôle in the photo-decomp. of MeCHO and $COMe_2$ at room temp. L. S. T.

Origin of bromine liberated as bromide ion in the interaction of bromoacetic ions with bromoacetic molecules.—See this vol., 452.

Electrolysis of mixtures of propionates and nitrates. F. Fichter and W. Siegrist [with H. Buess] (Helv. Chim. Acta, 1935, 18, 18—25).—By electrolysing 4*N*-$EtCO_2Na$ containing 2*N*-$NaNO_3$ with c.d. 0·1 amp. per sq. cm. at the Pt anode, 6·63 c.c. of an oil were obtained during the passage of 16 amp.-hr. The oil consisted chiefly of $EtNO_3$, $Bu^\alpha NO_3$, $({\cdot}CH_2{\cdot}NO_3)_2$, and $NO_3{\cdot}[CH_2]_4{\cdot}NO_3$, with much smaller quantities of $EtCO_2Et$. The results are discussed. F. L. U.

Addition of carboxylic acids to vinylacetylene. J. H. Werntz (J. Amer. Chem. Soc., 1935, 57, 204—206).—Vinylacetylene and AcOH in presence of $HgSO_4$

or BF_3 or, best, $HgSO_4$–sulphoacetic acid (I) at 50° or, better, 5° gives *butadien-β-yl acetate* (II), b.p. 52—54°/40 mm., and much polymeride and resin. The corresponding *butyrate*, prep. by (I), has b.p. 59—60°/11 mm., and the *formate* and *chloroacetate*, prep. by $Hg_3(PO_4)_2$, b.p. 48—49°/51 mm. and 51—53°/2 mm., respectively. The monomeric nature of these esters is proved by the mol. wt. in C_6H_6 and the structure by conversion of (II) by hot 5% H_2SO_4 into $CH_2\vdots CH\cdot COMe$ and thence into 1-phenyl-3-methylpyrazoline and by condensation of (II) [stabilised by p-$C_6H_4(OH)_2$] with 1 : 4-naphthaquinone at 100° to *2-acetoxy-1 : 4 : 11 : 12-tetrahydroanthraquinone*, cryst., oxidised by air in dil. NaOH–EtOH to impure 2-acetoxyanthraquinone, whence 2-hydroxyanthraquinone was obtained by hot KOH–EtOH. The rate of polymerisation of (II) is intermediate between that of chloroprene and of isoprene, is catalysed positively by pressure, elevated temp., or emulsification, and negatively by p-$C_6H_4(OH)_2$ or pyrogallol; the product is rubber-like and slowly decomposes, liberating AcOH, as also does (II). R. S. C.

β-Chloroacrylic acids. H. J. BACKER and A. E. BEUTE (Rec. trav. chim., 1935, **54**, 167—170).—Dissolution of $CH\vdots C\cdot CO_2H$ (prep. in 52% yield by the action of CO_2 on $CH\vdots CNa$ described) in conc. HCl at 60° affords the less sol. *trans*-β-chloroacrylic acid, m.p. 85·5—86°, $k^{18}=2{\cdot}22\times10^{-4}$ (18%), and, from the mother-liquor, the more sol. cis-β-*chloroacrylic acid*, m.p. 63—64°, $k^{18}=4{\cdot}77\times10^{-4}$ (34%), converted into (I) by heating at 125°. Similar treatment of (I) effects only partial decomp. J. W. B.

Acids of Chinese and esparto grass waxes and hydrocarbons of esparto and candelilla waxes.—See this vol., 551.

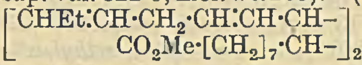
Preparation of oleyl chloride and α-mono-olein. K. TÄUFEL and F. KÜNKELE (Fettchem. Umschau, 1935, **42**, 27—29).—Details are given for the prep. of oleyl chloride (I) from oleic acid (II) and PCl_3 and PCl_5, and for that of α-mono-olein (III), m.p. 26—27°, b.p. 238—240°/3—4 mm., from (I) and *iso*propylideneglycerol (cf. A., 1920, i, 805). Interaction of (II) and $SOCl_2$ (cf. A., 1914, i, 246), and of (II) and a deficiency of PCl_5, gave compounds, m.p. 50° and 33°, respectively, free from Cl (and considered to be isooleic acids). The b.-p. (6 mm.) diagram of mixtures of (I) and (II) is given. The interconversion of (III) into the form m.p. 35° is accelerated by stirring the liquid while it is cooling. H. G. M.

Iodine values of linolenic, linoleic, and stearolic acids by the Wijs and Rosenmund–Kuhnhenn methods. Y. TOYAMA and T. TUTIYA (J. Soc. Chem. Ind. Japan, 1935, **38**, 32—35B).—The effect on the Wijs I val. of the amount of excess (30—70%) of reagent is about 3 units in the case of linolenic acid (I) and unimportant ($\not>$ 1) in that of linoleic (II) and stearolic (III) acids. The Rosenmund–Kuhnhenn vals. (IV) are practically independent of the excess of reagent in the case of (I) and (II), but are lower by some 7 and 4 units, respectively, than the Wijs vals. For (III) the (IV) are always > the Wijs I val. (which corresponds with the addition of 1 mol. of halogen), and increase considerably with increasing excess of reagent. E. L.

Dithiocyanate of linoleic acid and tetrathiocyanate of linolenic acid. Y. TOYAMA and T. TUTIYA (J. Soc. Chem. Ind. Japan, 1935, **38**, 35—36B).—Ozonolysis of *dithiocyanolinoleic acid* (I) and *tetrathiocyanolinolenic acid* (II) shows that the SCN groups are attached in the θι positions in (I) and in the θιλμ positions in (II), the double linkings most remote from the CO_2H group, as in the case of moroctic acid, being unattacked. E. L.

Products of partial bromination of linoleic and linolenic acids. Y. TOYAMA and T. TUTIYA (J. Soc. Chem. Ind. Japan, 1935, **38**, 36—38B).—Ozonolysis of the bromides obtained by partial bromination of linoleic (I) and linolenic (II) acids shows that Br, in contradistinction from $(SCN)_2$ (cf. preceding abstract), adds primarily to the unsaturated linking(s) most remote from CO_2H group. λμ-*Dibromo*-Δ^{θ}-*octadecenoic*, ξο-*dibromo*-$\Delta^{\theta\lambda}$-*octadecadienoic*, and ξολμ-*tetrabromo*-Δ^{θ}-*octadecenoic* acids have been prepared by treating (I) with one half, and (II) with one third and two thirds, respectively, of the amount of Br required theoretically for complete saturation. E. L.

Polymerisation of the methyl esters of higher unsaturated fatty acids. XV. Structure of the polymerisation product of methyl linoleate. K. KINO (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1935, **26**, 91—97).—MeOH separates the products of polymerisation of Me linoleate into a sol. portion (49%; I val. 166·0; mol. wt. 298) and an insol. *dimeride* (I) (49%; I val. 128·2; mol. wt. 541). From the products of ozonolysis of (I) are isolated $CH_2(CO_2H)_2$, $EtCO_2H$, an *acid* $CO_2H\cdot C_{10}H_{18}\cdot CO_2Me$ (neutralisation val. 238·7, sap. val. 454·2, mol. wt. 472) (purified through its Mg salt), a cryst. *substance*, m.p. 150—158°, and an acid (neutralisation val. 412·1, sap. val. 522·8, mol. wt. 265). (I) is therefore probably



$$\left[\begin{array}{r}\text{CHEt}\vdots\text{CH}\cdot\text{CH}_2\cdot\text{CH}\vdots\text{CH}\cdot\text{CH}-\\ \text{CO}_2\text{Me}\cdot[\text{CH}_2]_7\cdot\text{CH}-\end{array}\right]_2$$

J. W. B.

Ether-like compounds. XIV Acid hydrolysis of esters of tertiary alcohols. M. H. PALOMAA, E. J. SALMI, J. I. JANSSON, and T. SALO (Ber., 1935, **68**, [*B*], 303—307; cf. A., 1934, 867).—The temp. coeffs. of acid hydrolysis of esters of *tert.*-alcohols (I) differ widely from those of *sec.*-alcohols. Reaction with (I) resembles acetal rather than ester hydrolysis. The following compounds are new: Bu^{γ} *propionate*, b.p. 120—121°/763 mm.; Bu^{γ} *methoxyacetate*, b.p. 62—64°/22—23 mm.; αα-*dimethylpropyl methoxyacetate*, b.p. 71—73°/16 mm.; *dimethylmethoxymethylcarbinyl acetate*, b.p. 143—144·5°/755 mm.; α-*methylpropyl formate*, b.p. 94·5—95°/760 mm., and *methoxyacetate*, b.p. 168—168·5°/756 mm.; α-*ethylpropyl formate*, b.p. 116·5—117·5°/768 mm., and *methoxyacetate*, b.p. 184·5—185°/761 mm.; α-*methylbutyl methoxyacetate*, b.p. 185·5—186°/755 mm. H. W.

Simplified apparatus for the determination of lactic acid. II. H. LIEB and M. K. ZACHERL (Z. physiol. Chem., 1935, **231**, 88—91; cf. A., 1932, 1269).—Minor modifications and criticisms of Fuchs (cf. A., 1934, 56) are discussed. J. H. B.

Mechanism of reactions of ethyl acetoacetate, the enolates, and structurally related compounds. I. *C*- and *O*-Alkylation. A. Michael [with G. H. Carlson]. **II. Reaction of sodium enolates with acyl chlorides.** A. Michael and G. H. Carlson (J. Amer. Chem. Soc., 1935, **57** 159—164, 165—174).—I. The formation of *C*- and *O*-derivatives of $CH_2Ac{\cdot}CO_2Et$ (I) is interpreted by the author's theory of the formation of polymols. prior to reaction. The heat of combustion of $CHEtAc{\cdot}CO_2Et$ is > that of $OEt{\cdot}CMe{:}CH{\cdot}CO_2Et$ (II). The formation of (II) from (I) or $CH(OEt)_3$ does not proceed by way of $CMe(OEt)_2{\cdot}CH_2{\cdot}CO_2Et$.

II. AcCl and BzCl with Et sodioacetoacetate (III) give directly and nearly quantitatively Et diacetate, which is thus not formed by way of an *O*-derivative, but by direct addition of the CO of the chloride to the α-CH of the ester. Excess of AcCl has no effect on the velocity of the reaction, which is interpreted on the basis of the author's polymol. theory. $OAc{\cdot}CMe{:}CH{\cdot}CO_2Et$ (IV) is converted into $CHAc_2{\cdot}CO_2Et$ by (III), but not by heat, or by K_2CO_3 or the Cu enolate unless a trace of H_2O is present. (IV) reacts with $ONa{\cdot}CPh{:}CH{\cdot}CO_2Et$, and $OBz{\cdot}CMe{:}CH{\cdot}CO_2Et$ (V) with (III), intramolecularly to give *C*-substituted products, but (V) and Na give H_2 and $ONa{\cdot}CMe{:}CBz{\cdot}CO_2Et$ by intramol. change. (I), BzCl, and C_5H_5N give a liquid *form* of (V).

R. S. C.

Odour and constitution. α-Substituted γ-butyrolactones. B. Rothstein (Bull. Soc. chim., 1935, [v], **2**, 80—90).—The following chlorides (I) (cf. A., 1930, 318) are described: *decyl*, b.p. 106°/16 mm., *undecyl*, b.p. 117°/16 mm., *dodecyl*, b.p. 130°/15 mm., *citronellyl*, b.p. 98°/16 mm., and *rhodinyl chloride*, b.p. 97—98°/15 mm. The appropriate (I) reacts with $CH_2(CO_2Et)_2$ (Na derivative) (cf. A., 1901, i, 501) to give the following: *Et_2 hexyl-*, b.p. 143°/15 mm., β-ethylbutyl- (cf. A., 1932, 142), *heptyl-*, b.p. 157°/18 mm., *octyl-*, b.p. 167°/16 mm., *nonyl-*, b.p. 176°/15 mm., *decyl-*, b.p. 182°/13 mm., *undecyl-*, b.p. 192°/13 mm., *dodecyl-*, b.p. 201°/13 mm., *γη-dimethyl-$\Delta^{\beta\zeta}$-octadienyl-*, b.p. 145°/0·7 mm., *rhodinyl-*, b.p. 147°/0·8 mm., and *citronellyl-malonate*, b.p. 145°/0·75 mm. The Na derivatives of the above substituted malonic esters with $(CH_2)_2O$ at −15° and then at 40—50°, followed by hydrolysis with KOH and distillation under reduced pressure, give CO_2 and the following α-substituted *γ-butyrolactones*: *allyl-*, b.p. 110°/17 mm., *propyl-*, b.p. 107°/15 mm., *butyl-*, b.p. 124°/16 mm., iso*amyl-*, b.p. 129°/15 mm., *hexyl-*, b.p. 146°/16 mm., sec.-*hexyl-*, b.p. 143°/16 mm., *heptyl-*, b.p. 156°/15 mm., *octyl-*, b.p. 123°/0·5 mm., *nonyl-*, m.p. 28°, *decyl-*, m.p. 34°, *undecyl-*, m.p. 40°, *dodecyl-*, m.p. 46°, *γη-dimethyl-$\Delta^{\beta\zeta}$-octodienyl-*, b.p. 145°/0·72 mm., *γη-dimethyl-Δ^{ζ}-octenyl-*, b.p. 144°/0·57 mm., *γη-dimethyl-Δ^{η}-octenyl-*, b.p. 150°/0·85 mm., *phenyl-*, b.p. 178°/13·5 mm., and *benzyl-*, b.p. 150°/1·15 mm. The odour of the esters lessens with increasing mol. wt.; that of the more complex members cannot be analysed.

J. L. D.

Synthesis of ricinic (λ-ketostearic) acid. R. Perrotte (Compt. rend., 1935, **200**, 746—748; cf. A., 1934, 991).—λ-Bromoundeconitrile, b.p. 150°/2·5 mm., is transformed by $C_6H_{13}{\cdot}MgBr$ in Et_2O into *α-bromoheptadecan-λ-one*, m.p. 30—31°, converted by KCN in boiling EtOH into *λ-keto-octadeconitrile* (I), b.p. 205°/1·2 mm., m.p. 38—39°. (I) is hydrolysed by KOH–EtOH to γ-ketostearic (ricinic) acid, m.p. 81—81·5° (*Me* ester, m.p. 44·5°).

H. W.

Possibility of rupture of the carbon chain in derivatives of succinic acid. K. von Auwers and O. Ungemach (Ber., 1935, **68**, [*B*], 349—352).—Treatment of trimethylsuccinanil with 20% KOH–MeOH or of trimethylsuccinic anhydride with NH_2Ph in cold C_6H_6 gives trimethylsuccinanilic acid, m.p. 134—135°, formulated by analogy, $CO_2H{\cdot}CHMe{\cdot}CMe_2{\cdot}CO{\cdot}NHPh$. The isomeric acid is not formed in more than traces, if at all. Similar observations are made in the prep. of trimethylsuccin-*p*-toluidic acid, m.p. 127°. Treatment of tetramethylsuccinanil, m.p. 88°, with NaOH–EtOH affords *tetramethylsuccinanilic acid*, m.p. about 95° in a preheated bath, which cannot be obtained homogeneous from $({\cdot}CMe_2{\cdot}CO)_2O$ and NH_2Ph in C_6H_6. *Tetramethylsuccin*-p-*tolil*, m.p. 91·5°, is obtained from the acid and p-$C_6H_4Me{\cdot}NH_2$ and *tetramethylsuccin*-p-*toluidic acid* from the anhydride and p-$C_6H_4Me{\cdot}NH_2$ in cold C_6H_6. $({\cdot}CMe_2{\cdot}CO_2H)_2$ is transformed by $SOCl_2$ into $({\cdot}CMe_2{\cdot}CO)_2O$. α-Hydroxy-ββ-dimethylsuccinic anhydride and p-$C_6H_4Me{\cdot}NH_2$ in C_6H_6 afford *α-hydroxy-ββ-dimethylsuccin*-p-*toluidic acid*, m.p. 166—167° (the isomeric acid does not appear to be formed), which passes when heated into *α-hydroxy-ββ-dimethylsuccin*-p-*tolil*, m.p. 134°. Fission of the C chain is not observed when any of these compounds is heated with boiling conc. alkali; the behaviour of hydroxytrimethylsuccinic acid (A., 1934, 292) is exceptional.

H. W.

Multiple condensation of fumaric and maleic acids with ethylene glycol. Y. Tsuzuki (Bull. Chem. Soc. Japan, 1935, **10**, 17—26; cf. A., 1929, 1165).—$({\cdot}CH_2{\cdot}OH)_2$ reacts slowly with maleic acid (I) at 120—126°; above 130° (I) yields fumaric acid (II), which reacts still more slowly. $ZnCl_2$ catalyses both reaction and isomerisation of (I). The *products*, of general formula $H[{\cdot}CO{\cdot}CH{:}CH{\cdot}CO{\cdot}O{\cdot}CH_2{\cdot}CH_2{\cdot}O{\cdot}]_nH$, have m.p. from 50° to 95°, according to temp. and duration of reaction; from (I), $n=3$ to 6, and from (II), 5 to 8.

E. W. W.

Dilactic [oxidodi-αα′-propionic] acids. P. Vieles (Ann. Chim., 1935, [xi], **3**. 143—224).—Successive treatments of Na in Et_2O with $OH{\cdot}CHMe{\cdot}CO_2Et$ and $CHBrMe{\cdot}CO_2Et$ yield a mixture of Et_2 dilactates (I), $O(CHMe{\cdot}CO_2Et)_2$, hydrolysed with partial isomerisation by NaOH–EtOH to a mixture of the corresponding acids which can be separated through their Mg salts. More advantageously, (I) is converted by conc. aq. NH_3 into dl- (II), m.p. 184°, and meso- (III), m.p. 136°, *-dilactdiamide*, separable by EtOH. The action of alkali on (II) or (III) furnishes solely *dl*-dilactic acid (IV), m.p. 112°, whereas with *N*-H_2SO_4 at 100° (II) affords (IV) and (III) gives meso*dilactic acid*, m.p. 72—73°. Treatment of (I) with NH_2Ph at 170° and of the product with EtOH affords dl-, m.p. 168°, and meso-, m.p. 124—126°, *-dilactdianilide*; dl-, m.p. 179—180°, and meso-, m.p. 145°, *-dilactdi*-p-*toluidides* are obtained similarly. (IV), conveniently obtained by treatment of (I) with a large excess of NaOH, passes when distilled under atm. pressure into MeCHO, CO, CO_2, C_2H_4, and H_2O, and is largely unchanged at 20 mm. With Ac_2O it yields the anhydride (V),  $O{<}\substack{\mathrm{CHMe\cdot CO}\\ \mathrm{CHMe\cdot CO}}{>}O$, b.p. 108–109°/20 mm., m.p. 36°. With PCl_5 at room temp. it gives *dilactyl dichloride* (IV), b.p. 85°/20 mm. *Et_2*, b.p. 124·5°/21 mm., and *Me_2*, b.p. 113—114°/21 mm., *dilactate*, from (IV), the alcohol, and H_2SO_4 or, preferably, from (VI) and the alcohol, are described. The *Na_2*, *K_2*, *$(NH_4)_2$*, and Mg ($+6H_2O$) salts have been prepared. (II) is converted by heat into *dl*-dilactimide, m.p. 122°, which is also obtained from (III); it is transformed by *N*-H_2SO_4 into (IV). The *Na*, *Ag*, and *Cu* derivatives are described. (IV) appears resolvable into its optical antipodes by fractional crystallisation of the strychnine or brucine salts, but the readiest method of preparing the optically active acids consists in utilising the spontaneous resolution of (II) in all solvents studied; only in H_2O at low temp. is a hydrated *racemate* deposited. This is effected by slow evaporation at 40° of a saturated solution of (IV) containing nuclei of the active amides or by cooling a solution of (IV) saturated at 80° to 40—50° and seeding with either the *d*- or *l*-amide. d- and l-*Dilactdiamide* have m.p. 184°; $[\alpha]$ is quoted for various lines, temp., and concns. The crystals do not exhibit hemihedral faces. When heated at the lowest temp. necessary for evolution of NH_3 they yield (V). d- and l-*Dilactic acid* have m.p. 88°, $[\alpha]_{5461}^{17}$ ±126·8° in H_2O. With Ac_2O they give *anhydrides*, b.p. 108—110°/20 mm., m.p. < 36°, $[\alpha]_{5461}$ ±18·57° in C_6H_6 (with inversion of sign). The *Et_2* esters of same sign as acids (prep. from anhydride and EtOH, since H_2SO_4 causes racemisation) have b.p. 123—124°/20 mm., $[\alpha]_{5461}^{19}$ ±109·27°. The *Na*, $[\alpha]_D$ ±84·1°, and *Mg* ($+3H_2O$), $[\alpha]_{5461}$ ±20·7°, salts are described. (III) is not transformed by Ac_2O into an anhydride; this property enables traces of (IV) to be removed readily from (III). The *Et_2* ester, *Na_2*, *K_2*, *$(NH_4)_2$*, and Mg ($+3H_2O$) salts of (III) are described. H. W.

Tartaromanganic salts. G. LEJEUNE (Compt. rend., 1935, 200, 321—323).—When MnO_2 is added to a solution of Li or K tartrate a *complex* which liberates I from KI crystallises. With NH_4 tartrate two *complexes* are obtained in which Mn is bi- and ter-valent, separated by their solubilities in C_5H_5N.
H. D.

Reactions of methyl Δ^{β}-propene-ααβ-tricarboxylate. Three-carbon ring–chain prototropy involving a simple *cyclo*propane ring. J. W. BAKER (J.C.S., 1935, 188—194; cf. A., 1925, i, 916, 1277).—With conc. HCl Me Δ^{β}-propene-ααβ-tricarboxylate (I) gives itaconic acid, and with MeOH–KOH at 100°, it gives *cyclo*propane-1 : 1 : 2-tricarboxylic acid (II) [*triamide*, m.p. 238° (decomp.); (II) is hydrolysed (MeOH–KOH) to a *Me_1* ester, m.p. 169°]. (I) with HBr in AcOH at room temp. (3 days) gives Me γ-bromo-*n*-propane-ααβ-tricarboxylate (III) (cf. A., 1933, 935; 1934, 1219), which with $CHNa(CO_2Me)_2$ in MeOH gives *Me_5* n-*butane-ααβδδ-pentacarboxylate* (IV), m.p. 88° (cf. A., 1933, 935) [hydrolysed (HCl) to *n*-butane-αβδ-tricarboxylic acid (cf. J.C.S., 1906, 89, 1642)], and a mixture of unsaturated esters, b.p. 120—140°/1 mm., which with HBr as above gives a product (V), m.p. 45°, from which (III) and *Me* β-*bromo*-n-*propane*-ααβ-*tricarboxylate* (VI), m.p. 55° (β-*iodo*-ester, a liquid), are isolated. (III) with MeOH–KOH at 100° gives (II). (I) with HBr (10 days) also gives (V), which is not dimorphous with (III), and is not a result of the "reverse" addition of HBr to (I), because pure (I) with HBr gives only (III). (VI), a constituent of (V), is here obtained by the normal addition of HBr to the Δ^{α}-ester. (III) with boiling MeOH–AgOAc gives (II), also obtained from (III) with NaOMe in Et_2O at room temp., which suggests that cyclisation of (I) may occur through the OMe-compound rather than as a result of a ring–chain prototropic change. The Et_3 ester of (II) (A., 1884, 991), which does not reduce $KMnO_4$ or react with O_3, is rapidly converted by boiling MeOH–NaOMe into an ester which with O_3 affords CH_2O. This is best explained by postulating a ring–chain prototropic change catalysed by alkoxide ions. (I) with boiling MeOH containing NaOMe (1 mol.) gives *Me_6* cyclo*hexane*-1 : 1 : 2 : 4 : 4 : 5-*hexacarboxylate* (VII), m.p. 181° (after two Michael condensations), and an unsaturated residue [which contains (I)], which with HBr in AcOH at room temp. (4 days) gives a *stereoisomeride* (?), m.p. 125—126°, of (VII). (VII) is hydrolysed (boiling conc. HCl) to cyclo*hexane*-1:2:4:5-*tetracarboxylic acid*, m.p. 217° (decomp.). (*Me* ester, m.p. 88°, which may be a mixture of stereoisomerides), dehydrogenated (Se at 310°) to pyromellitic acid. The evidence suggests that in the triple tautomeric system Δ^{α}-ester $\rightleftarrows$ Δ^{β}-ester $\rightleftharpoons$ *cyclo*propane derivative, the equilibrium point is located mainly with the ring compound. (IV) (Na derivative) with $CH_2I\cdot CO_2Me$ in dry boiling MeOH gives *Me_6* n-*pentane*-αββγεε(or αββδεε)-*hexacarboxylate*, b.p. about 240°/4 mm., which with boiling conc. HCl affords n-*pentane*-αβγε(or αββδε)-*tetracarboxylic acid*, m.p. 204—205° [*Ba* salt $+ 4H_2O$; *Me_4* ester, b.p. 180°/0·8 mm., which undergoes a Dieckmann reaction to give *Me_3* cyclo*hexanonetricarboxylate*, a gum]. Me α-bromo-*n*-propane-ααβ-tricarboxylate with AgOH in boiling MeOH gives only Me_3 *n*-propane-ααβ-tricarboxylate.
J. L. D.

Propene-ααβ-tricarboxylic acids. R. MALACHOWSKI and W. CZORNODOLA [with J. ADAMICZKA] (Ber., 1935, 68, [*B*], 363—371; cf. A., 1934, 757).—Et_3 propane-ααβ-tricarboxylate, b.p. 146—147°/10 mm., is converted by Br in CCl_4 into *Et_3* α-*bromo-propane*-ααβ-*tricarboxylate* (I), b.p. 160—162°/7 mm. [corresponding *Me_3* ester (II), b.p. 147—150°/8 mm.]. (I) or (II) with K_2CO_3 or Na_2CO_3 affords mainly the saturated ester. Boiling C_5H_5N, quinoline, or, less satisfactorily, $NPhEt_2$ causes removal of HBr, but the double linking becomes displaced and the product contains the saturated ester in considerable amount. *Et_3* Δ^{α}-*propene*-ααβ-*tricarboxylate* (III), b.p. 154·0—154·5°/8 mm. (corresponding *Me_3* ester, b.p. 141°/8 mm.), is obtained in 70% yield by the condensation of $COMe\cdot CO_2Et$ with $CH_2(CO_2Et)_2$ in presence of Ac_2O and anhyd. $ZnCl_2$. Attempts to hydrolyse (III) to the corresponding acid were fruitless. Treatment of (III) with C_5H_5N causes isomerisation, and distillation of the equilibrium mixture thus obtained affords a const.-boiling mixture from which, by hydrolysis with $Ba(OH)_2$, *Δ^{β}-propene-ααβ-tricarboxylic acid* (IV), m.p. 129°, is isolated. Ozonisation of (IV) yields CH_2O. When heated above its m.p. (IV) affords CO_2 and itaconic acid. *Et_3 Δ^{β}-propene-ααβ-tricarboxylate* (V), b.p. 148·0—148·5°/8 mm., is prepared from EtI and the *Ag* salt of (IV). Acid hydrolysis of (III) and (V) gives no insight into their constitution since itaconic acid is produced in each case. Definite products of ozonolysis could not be isolated although the analogously constituted Et citraconate gives $COMe{\cdot}CO_2Et$ and Et itaconate yields $CO_2Et{\cdot}CO{\cdot}CH_2{\cdot}CO_2Et$ [*p*-nitrophenylhydrazone, m.p. 148·5° (corr.)]. (III) and (V) are differentiated by the addition of $CHNa(CO_2Et)_2$ in absence of EtOH and presence of Et_2O, whereby (III) affords *Et_5 β-methylpropane-ααβγγ-pentacarboxylate*, b.p. 220—221°/8 mm., hydrolysed with difficulty by boiling conc. HCl exclusively to β-methyltricarballylic acid, m.p. 164—165°, whereas (V) yields *Et_5 butane-ααβδδ-pentacarboxylate*, b.p. 223—224°/7 mm., hydrolysed to butane-αβδ-tricarboxylic acid (VI), m.p. 121°. If condensation is effected in C_6H_6 at 80° either ester finally yields (VI) exclusively. H. W.

α-Sulphoacrylic acid. H. J. BACKER and A. E. BEUTE (Rec. trav. chim., 1935, **54**, 200—205).—$CH_2{:}CBr{\cdot}CO_2NH_4$ reacts with $(NH_4)_2SO_3$ in H_2O at 25° to give *α-sulphoacrylic acid* $+2H_2O$ (I), m.p. 87—88°, and $+H_2O$ [*K*$+H_2O$ (II), *K H*, *Tl*, and *$NHPh_2$*, m.p. 152—158° (cryst. data by TERPSTRA), salts], isolated as its *Ba* salt $+5H_2O$ (III). With K_2SO_3 in H_2O at 100° (II) affords the *K* salt, $+2H_2O$, of αβ-disulphopropionic acid. With Br at 100° (III) gives *Ba β-bromo-α-sulphoacrylate* $+H_2O$ [*quinine* salt $+2H_2O$, m.p. 211° (decomp.)]. (II) with cold $KMnO_4$–Na_2CO_3 gives a quant. yield of $K_2C_2O_4$ and K_2SO_4. (I) with PCl_5 gives the *dichloride*, b.p. 111—113°/25 mm., converted by moist air into *α-chlorosulphonylacrylic acid*, m.p. 115°. J. W. B.

Kinetic investigation of the reaction between glutathione and methylglyoxal. J. O. GIRŠAVIČIUS and P. A. HEYFETZ (Biochem. Z., 1935, **276**, 190—197).—The reaction between AcCHO and reduced glutathione proceeds in neutral aq. solution rapidly to an equilibrium which is readily displaced by addition of I, by dilution, etc. The reactions are also greatly retarded in acid solution. With varying initial concns. of reactants, 1 mol. of each is involved. P. W. C.

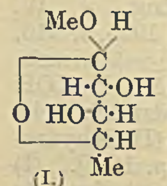
Compounds of dimethylglyoxime with cobaltous chloride. D. C. SEN and P. RÂY (J. Indian Chem. Soc., 1934, **11**, 899—904).—The green salt obtained from $CoCl_2,6H_2O$ and dimethylglyoxime (Feigl and Rubinstein, A., 1924, 1, 20) liberates I from acidified KI and H_2 with Zn; a saturated solution of it gives a yellow-brown cryst. *chlorohydroxydimethylglyoximecobalt*, OH replacing Cl. The green compound contains Co^{III}, whilst Thilo's red compound (A., 1931, 938) contains Co^{II}; the black compound of Dubsky and Brychta (A., 1929, 543) is the green compound mixed with hydrolysis products. F. R. S.

Ethylenic ketones obtained by dehydrating the corresponding ketols. J. COLONGE (Bull. Soc. chim., 1935, [v], **2**, 57—63).—βζθ-Trimethyl-Δ^{ϵ}-nonen-δ-one (cf. A., 1928, 396) gives a *pyrazoline*, b.p. 129—131°/19 mm. The ketol derived from $COMePr^{\beta}$ when distilled with I gives *βεζ-trimethyl-Δ^{δ}-hepten-γ-one*, b.p. 188—190°/750 mm. (*pyrazoline*, b.p. 112—114°/19 mm., converted by PhNCO into a *compound*, m.p. 103°). Similarly prepared are ββεζζ-pentamethyl-Δ^{δ}-hepten-γ-one, b.p. 91°/17 mm. (cf. A., 1931, 461) (*oxime*, m.p. 125°; *pyrazoline*, b.p. 119—120°/21 mm., converted by PhNCO into a *compound*, m.p. 118°), reduced (Na–EtOH) to *ββεζζ-pentamethylheptan-γ-ol*, b.p. 107°/20 mm., and *γδη-trimethyl-γη-diethyl-Δ^{ϵ}-nonen-δ-one*, b.p. 157—158°/28 mm. The mixed ketol obtained from fluorenone (I) and pinacolin with HCO_2H gives *α-fluorenylidene-γγ-dimethylbutan-β-one*, m.p. 76°. Similarly, the ketol from (I) and $COEtBu^{\gamma}$ with HCO_2H gives *β-fluorenylidene-δ-methylpentan-γ-one*, m.p. 103°. J. L. D.

Nomenclature of the α- and β-sugars. H. S. ISBELL (J. Chem. Educ., 1935, **12**, 96).—The rates of oxidation of sugars by aq. Br show that when the glycosidic OH lies in the same direction as the O forming the ring the sugar reacts with aq. Br more slowly than when the OH is directed away from the ring. The following rule is proposed. "When the O ring lies to the right, as in *d*-glucose, the more dextrorotatory member of the α–β pair shall be designated α, and the less, β; when the O ring lies to the left, as in *l*-glucose, the more lævorotatory member shall be designated α, and the less, β." L. S. T.

Specificity of hydroxyl groups in sugars. T. LIESER and R. SCHWEIZER (Naturwiss., 1935, **23**, 131).—Individual OH groups of sugars undergo the xanthate reaction according to experimental conditions. The view that experimental refinements can lead to a graduated substitution of OH and that particular reagents or circuitous methods are not essential for partial substitution is strengthened by the direct prep. of methylglucoside 2 : 6-dibenzoate, 2-methylglucosemercaptal 6-benzoate, glucosemercaptal 6-benzoate, and their derivatives. H. W.

Mechanism of carbohydrate oxidation. XVII. Preparation and structure of α-methyl-*l*-arabinomethyloside. D. R. SWAN and W. L. EVANS (J. Amer. Chem. Soc., 1935, **57**, 200—202; cf. A., 1934, 173).—Ca rhamnonate and H_2O_2–Fe^{III} give a syrup, which with HCl–EtSH affords an 18% yield of l-*arabinomethylosediethylmercaptan*, m.p. 109°, converted by $HgCl_2$–MeOH into a mixture of α- and *β-methyl*-l-*arabinomethylosides* (I), cryst., $[\alpha]_D^{31}$ −73·9° ⟶ −129·2° in $CHCl_3$, methylated (Me_2SO_4–NaOH–CCl_4) to 2:3-*dimethyl-methyl*-l-*arabinomethyloside*, b.p. 60—65°/6 mm.; this is hydrolysed (2% H_2SO_4) to 2 : 3-*dimethyl*-l-*arabinomethylose*, b.p. 97—99°/6 mm., $[\alpha]_D^{24}$ −43·8° in $CHCl_3$, which with HNO_3 affords (+)-dimethoxysuccinic acid. (I) shows the rapid hydrolysis of γ-glucosides, which, since it cannot have a pyranose structure, confirms the ring-structures of Haworth *et al.* R. S. C.



(I.)

Micro-chemical analysis of monosaccharides. R. Fisher and W. Paulus (Arch. Pharm., 1935, **273**, 83—96).—Details are given for micro-detection of monosaccharides. The following derivatives are characteristic, the m.p. given being those determined under the microscope under prescribed conditions. Mannose- (I) -phenylhydrazone*, m.p. 201°. *p*-Bromophenylhydrazones : arabinose (II), m.p. 165—166°; (I), m.p. 206—208°; galactose (III), m.p. 163—164°. Xylose- (IV) -*m*-nitrophenylhydrazone*, m.p. 164°. *o*-Nitrophenylhydrazones : (II), m.p. about 180°; (III), m.p. 174—176°; fructose (V), m.p. 162°. (II) benzoylhydrazone*, m.p. 211°. *p*-Bromobenzoylhydrazones : (II), m.p. 216—217°; rhamnose (VI), m.p. 191°; (III), m.p. 214—215°. *p*-Tolylhydrazones : (VI), m.p. 166—169°; (I), m.p. 200°. *o*-Tolylhydrazone* of (III), m.p. 182°. Phenylosazones : (II), m.p. 162°; (IV), m.p. 160°; (VI), m.p. about 184°; glucose (VII), (I), and (V), m.p. 224°; (III), m.p. about 192°. *p*-Bromophenylosazones : (VI), m.p. 216—218°; (VII) and (V), m.p. 222°. (VII) *p*-nitrophenylosazone*, m.p. 257°. Glucuronic acid can be detected as thiosemicarbazone, m.p. 223°; it interferes with all the above reactions except those marked *. Glucosides and binary mixtures of (I)—(VII) can be analysed. R. S. C.

3 : 6-Dimethylglucose. D. J. Bell (J.C.S., 1935, 175—176).—α- and β-Methylglucoside (1 mol.) with HBO_2 (2 mols.) in dry boiling $COMe_2$ give α-, $[\alpha]_D^{16}$ +84·4°, and β-*methylglucosidediboric acid*, $[\alpha]_D^{16}$ −60·4°, respectively (cf. A., 1932, 723) (only one of the HBO_2 complexes can be titrated with alkali), which with $MeI–Ag_2O$ in $COMe_2$ at 35° gives a mixture of Me 3 : 6- and 2 : 6-dimethylhexosides (I), b.p. 150°/0·4 mm., from which 3 : 6-dimethyl-β-methylglucoside 2 : 4-dibenzoate (II) is isolated after benzoylation in C_5H_5N. The α-isomeride gives no cryst. Bz derivative. (II) is debenzoylated (cf. A., 1934, 872) to β-*methyl*-3 : 6-*dimethylglucoside*, a syrup, $[\alpha]_D^{18}$ +55·4° in MeOH, hydrolysed to 3 : 6-*dimethyl-α-glucose*, m.p. 113—116°, $[\alpha]_D^{18}$ +102·5° (initial) to +61·52° in H_2O. The debenzoylated residues from the crystallisation of (II) with *p*-$C_6H_4Me{\cdot}SO_2Cl$ afford β-methyl-2 : 6-dimethylglucoside 3 : 4-di-*p*-toluenesulphonate (cf. A., 1932, 500). J. L. D.

Preparation of crystalline *d*-mannose and of crystalline *d*-ribose. P. A. Levene (J. Biol. Chem., 1935, **108**, 419—420).—Details of the prep. of cryst. *d*-mannose from vegetable ivory meal (hydrolysis with 75% H_2SO_4), and *d*-ribose from pure, ash-free guanosine (hydrolysis with 0·05*N*-H_2SO_4) are given, an essential condition being the production of a colourless hydrolysate. J. W. B.

Preparation of glucosidodihydroxyacetone penta-acetate. L. C. Kreider and W. L. Evans (J. Amer. Chem. Soc., 1935, **57**, 229).—This *compound*, m.p. 103° (corr.), $[\alpha]_D^{18}$ −25·2° in $CHCl_3$ [p-*nitrophenylhydrazone*, m.p. 187° (corr.), $[\alpha]_D^{19}$ −129·8° in $CHCl_3$], is prepared from glucosidyl bromide penta-acetate and $OH{\cdot}CH_2{\cdot}CO{\cdot}CH_2{\cdot}OAc$. R. S. C.

Glucosidodihydroferulic acid. N. K. Richtmyer and R. M. Hann (J. Amer. Chem. Soc., 1935, **57**, 227).—Use of Pd-black for hydrogenation in AcOH of tetra-acetylglucosidoferulic acid gives *tetra-acetyl*-β-d-*glucosidodihydroferulic acid*, m.p. 155° (corr.), $[\alpha]_D^{20}$ −25° in $CHCl_3$, deacetylated by NaOMe to the *acid*, m.p. 179—180° (corr.), $[\alpha]_D^{20}$ −56·9° in H_2O. R. S. C.

Polysaccharides synthesised by micro-organisms. I. Molecular structure of mannocarolose produced from glucose by *Penicillium Charles* II, G. Smith. W. N. Haworth, H. Raistrick, and M. Stacey (Biochem. J., 1935, **29**, 612—621).—*Mannocarolose* (I) $[\alpha]_{5780}^{21}$ +66° in H_2O, is separated from the reaction products of *P. Charles* II, G. Smith, on Czapek–Dox–glucose solution. Complete hydrolysis of (I) gives only *d*-mannose (II); the mol. wt. of (I) determined by η measurements = 8—9 (I) units. That (I) consists of mannopyranose units linked at positions 1 and 6 is shown by the isolation, by fractional distillation, of 2 : 3 : 4-*trimethylmethylmannopyranoside*, b.p. 130—133°/0·08 mm., $[\alpha]_{5780}^{21}$ +58° in H_2O, by hydrolysis of the completely methylated (I), m.p. 95—100°, $[\alpha]_{5780}^{21}$ +102° in $CHCl_3$, with conc. HCl at 15° for 4 days and subsequent glucoside formation, and also by the production of 2 : 3 : 4-*trimethylmannopyrano-δ-lactone* (II), b.p. 138—140°/0·04 mm., on oxidation of 2 : 3 : 4-*trimethylmannopyranose*, m.p. 102—103°, $[\alpha]_{5780}^{20}$ +7° in H_2O, with Br. (II) on oxidation with HNO_3 and subsequent esterification gave Me_2 *meso*-dimethoxysuccinate; treatment of the residue with NH_2Me gave *meso*-dimethoxysuccinmethylamide and *d*-arabotrimethoxyglutarmethylamide. 2 : 3-*Dimethylmethylmannopyranoside* (IV), b.p. 155—160°/0·08 mm., $[\alpha]_{5780}^{21}$ +64° in H_2O, and 2 : 3 : 4 : 6-tetramethylmethylmannopyranoside are also isolated from the hydrolytic products of completely methylated (I). (IV) gives 2 : 3-*dimethylpyranose*, $[\alpha]_{5780}^{21}$ +16° in H_2O. H. D.

Polysaccharides. XIX. Molecular structure of waxy maize starch. W. N. Haworth, E. L. Hirst, and (Mrs.) M. D. Woolgar (J.C.S., 1935, 177—181).—Waxy maize starch (I) (prep. described) contains a preponderance of amylose as distinct from amylopectin, is sol. in hot H_2O, gives a reddish-purple colour with I, and is hydrolysed (enzyme) at the same rate as potato starch. (I) in H_2O with EtOH gives "prepared" starch (II) which is sol. in H_2O and has $[\alpha]_{5780}^{20}$ +212° in H_2O. (II) in AcOH–Cl_2 with $Ac_2O–SO_2$ at 20—55° gives a *triacetate* (III), $[\alpha]_D^{22}$ +167° in $CHCl_3$ (apparent mol. wt. 37,000), which gives no colour with I; with Ac_2O in C_5H_5N, (II) gives (III) (apparent mol. wt. 35,000). (III) prepared by the C_5H_5N method is hydrolysed by 0·5% NaOH–EtOH at room temp. to (I). Either (III) with Me_2SO_4 in $COMe_2$–30% NaOH at 55° (many treatments) gives a OMe-derivative from which a substance (IV), m.p. 153—156° (previous softening), which closely resembles the methylated amylose fraction of potato starch (cf. A., 1928, 1360; 1932, 1116) is isolated. Hydrolysis (fuming HCl at 0°) of (IV) followed by treatment of the product with boiling 3% HCl–MeOH gives tetramethylmethylglucoside (4·7%), which corresponds with a chain length of about 29 α-glucopyranose units in (I), similar to that which obtains in methylated amylose and amylopectin from potato starch, and some trimethylmethylglucoside. J. L. D.

VI. Water-soluble polysaccharide European larch. F. C. Peterson, M. Maughan, and L. E. Wise (Cellulosechem., 1934, **15**, 109—114).—3% of a H_2O-sol. polysaccharide is obtained from European larch (*Larix decidua*, Mill.) by extraction with cold H_2O, purification by the tannin–$Pb(OAc)_2$ method, and removal of ash by electrodialysis. Uronic acids, OMe, and mannose are absent, and the product contains 11·63% of anhydroarabinose (furfuraldehyde, thiobarbituric acid, and diphenylhydrazone methods) and 81·95% of anhydrogalactose (van der Haar–Tollens method). It is thus $[(C_5H_8O_4)(C_6H_{10}O_5)_6]_n$ and is identical with the polysaccharide from West and East American larches. The mol. wt. (by I val.) is 8000 and the Cu reduction (Allihn) 0·06 g. Cu_2O per g. A. G.

Nitration of starch. J. Grard (Compt. rend., 1935, **200**, 410—411).—Starch and H_2O heated to 150° (autoclave) yield a plastic mass which is pressed into fine threads, dried, and converted by HNO_3–H_2SO_4 into an unstable *nitro-product*. E. W. W.

Action of liquid bromine on cellulose. E. Beutel and A. Kutzelnigg (Monatsh., 1935, **65**, 205—212).—Contrary to earlier observations, liquid Br attacks and dissolves cellulose, giving a viscous, reddish-brown solution (I) and HBr. Reaction takes place suddenly, after keeping for a few min. at 100° or several weeks at room temp. If too little liquid Br is present a black mass, sol. in alkali with a brown colour, is formed. By treating (I) with H_2O a brown plastic substance, sol. in org. solvents, is obtained. By dry distillation of this a light brown, fuming oil distils at 58—107° and a charred residue is left. Keratin is also completely sol. in excess of liquid Br. M. S. B.

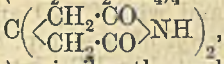
Compounds of sulphur dioxide with various amines.—See this vol., 447.

γ-Chloro-amines and their reactions. C. Mannich and E. Margotte (Ber., 1935, **68**, [*B*], 273—278).—α-Dimethylaminobutan-γ-ol, obtained in 85% yield by reduction of the keto-base with Na–Hg, is transformed by $SOCl_2$ in $CHCl_3$ into *γ-chloro-α-dimethylaminobutane* (I), b.p. 38—39°/10 mm. (*hydrochloride*, m.p. 168°). *γ-Chloro-α-piperidinobutane* (II), b.p. 90—91°/11 mm. (*hydrochloride*, m.p. 208°), is obtained similarly in 80% yield. (I) is transformed by boiling $NPhMe_2$ into *α-dimethylaminobutene*, b.p. 89—91° (very hygroscopic *hydrochloride*; *methiodide*, m.p. 151°). (II) passes when boiled into *α-piperidinobutene*, b.p. 59—61°/12 mm. (*picrate*, m.p. 91°). (I), NH_2Ph, and Cu-bronze at 150° afford *γ-anilino-α-dimethylaminobutane*, b.p. 155—157°/14 mm. [*picrate*, m.p. about 157° (decomp.)]. *γ-Anilino-α-piperidinobutane* (*picrate*, m.p. 139°) has b.p. 191—193°/11 mm. $NHMe_2$, Cu-bronze, and (I) in EtOH–H_2O at 150° give *αγ-tetramethyldiaminobutane*, b.p. 55—56°/12 mm. (*dimethiodide*, m.p. >250°). *αγ-Dipiperidinobutane*, b.p. 150—153°/11 mm., yields a *picrate*, m.p. about 191° (decomp). *α-Piperidino-γ-dimethylaminobutane*, b.p. 107—108°/12 mm., yields a *picrate*, m.p. 181°, *platinichloride*, m.p. about 225° (slight decomp.), and *aurichloride*, m.p. about 187° (decomp.). *γ-Methylamino-α-dimethylaminobutane*, b.p. 55—56°/14 mm. [*picrate*, m.p. about 186° (decomp.)], and *α-piperidino-γ-methylaminobutane*, b.p. 104—105°/12 mm. [*aurichloride*, m.p. about 169° (decomp.)], are described. (I), NH_3–EtOH, and Cu-bronze at 130—140° afford *γ-amino-α-dimethylaminobutane*, b.p. 55°/16 mm. [*aurichloride*, m.p. about 195° (decomp.); *picrate*, m.p. about 181° (decomp.); the *Bz* compound, b.p. 181°/16 mm., gives a hygroscopic *hydrochloride* and *hydrobromide* which, like the free base, have powerful anæsthetising action], and *di-(α-dimethylamino-γ-butyl)amine*, b.p. 138°/16 mm. [*aurichloride*, m.p. about 183° (decomp.); *dihydrochloride*, m.p. 198—199°, of the Bz derivative]. *γ-Amino-α-piperidinobutane*, b.p. 102—104°/14 mm. [*picrate*, m.p. about 141° (decomp.)], and *di-(α-piperidino-γ-butyl)amine*, b.p. 215—216°/14 mm. [*aurichloride*, m.p. about 205° (decomp.); *picrate*, m.p. 189°], are described. (I) and $OH{\cdot}CH_2{\cdot}CH_2{\cdot}NH_2$ at 140° yield *α-dimethylamino-γ-β′-hydroxyethylaminobutane*, b.p. 130—132°/11 mm. (hygroscopic *hydrochloride*, m.p. 172°). (I) and $CHNa(CO_2Et)_2$ in boiling EtOH yield *Et_2 γ-dimethylamino-α-methyl*-n-*propylmalonate*, b.p. 120—122°/14 mm. (yield 72%), which does not give cryst. salts. *Et_2 γ-piperidino-α-methyl*-n-*propylmalonate*, b.p. 145—147°/0·5 mm., is hydrolysed by aq. $Ba(OH)_2$ to the corresponding *acid*, m.p. 156° (*Ba* salt). With somewhat greater difficulty (I) is transformed into *Et γ-dimethylamino-α-methyl*-n-*propylacetoacetate*, b.p. 130—135°/15 mm., converted by 3% KOH at room temp. into *α-dimethylamino-γ-methyl*-n-*hexan-ε-one*, b.p. 80—83°/11 mm. (*semicarbazone hydrochloride*, m.p. 188°). (I) and KCN in boiling H_2O give *γ-dimethylamino-α-methylpropionitrile*, b.p. 75·78°/13 mm. (*hydrochloride*, m.p. 135°). $NHPh{\cdot}NH_2$ and (I) react very vigorously at 140° giving NH_3, NH_2Ph, and an unstable base $C_{12}H_{14}N_2$, b.p. 140—142°, probably an indole derivative. H. W.

Thermal behaviour of betaines. R. Kuhn and F. Giral (Ber., 1935, **68**, [*B*], 387—395).—Betaines with long C chains pass almost quantitatively into the isomeric esters when heated above their m.p., thus resembling α-betaines (Willstätter *et al.*, A., 1904, i, 235, 560). Salts of the corresponding unsaturated acids or lactones are formed in traces if at all. Since it is very improbable that conditions maintain which favour intramol. isomerisation it appears that very preponderatingly Me groups are transferred from N to the O of neighbouring mols.

ξ-Aminopentadecoic acid hydrochloride (I) (Kuhn *et al.*, A., 1934, 876) is converted by successive treatment with $AgNO_3$–HNO_3 in EtOH and conc. NH_3 into *ξ-aminopentadecoic acid* (II), m.p. 175—176° (*nitrate*, m.p. 86°; *perchlorate*, m.p. 69—70°, decomp. about 180°; *platinichloride*, decomp. 202° after darkening at 195°; *cuprichloride*, decomp. 220° after darkening at 200°). (II) gives a sparingly sol. *sulphate* in *N*-H_2SO_4 but no ppts. with saturated solutions of $HgCl_2$, $CdCl_2$, or $SnCl_2$ in EtOH [distinction from (III)]. (I) and EtOH–HCl afford *Et ξ-aminopentadecoate hydrochloride*, m.p. 149—150°, whence (Ag_2O in EtOH) *Et ξ-aminopentadecoate*, m.p. 79—81°. ξ-Trimethylpentadecabetaine trihydrate (III) (*loc. cit.*) loses 3Me as MeI during the determination of NMe and readily loses $3H_2O$ at 100°/high vac., or slowly over $CaCl_2$ at 20°/0·5 mm.; the anhyd. material absorbs $3H_2O$ when exposed to air. (III) affords a *nitrate*, m.p. 185°, *hydrochloride*, m.p. 237—238°, *mercurichloride*, m.p. 168°, and a *compound*, $2C_{18}H_{37}O_2N,CdCl_2$, m.p. 182—183°. When slowly heated/15 mm. (III) is transformed into *Me ξ-dimethylaminopentadecoate*, m.p. 28—29° (*aurichloride*, m.p. 89—90°; *platinichloride*, m.p. 129—130°; *picrate*, m.p. 87—88°; *picrolonate*, m.p. 100—101°; *hydrochloride*, m.p. 146—147°). Dihydrocivetone*iso*oxime with conc. HCl at 180—190° gives π-aminoheptadecoic acid hydrochloride (IV), m.p. 154—155°, from which *π-aminoheptadecoic acid* (V), m.p. 176°, is best obtained by repeated treatment with boiling, dil. EtOH. (V) yields a *perchlorate*, m.p. 76—77°, decomp. about 180°, a *platinichloride*, m.p. 205° (decomp.) after darkening at 190°, *cuprichloride*, m.p. 220—221° (decomp.), *sulphate* $3NH_2\cdot[CH_2]_{16}\cdot CO_2H,H_2SO_4,2H_2O$, m.p. 240°, and a *compound* with $CdCl_2$. *Et π-aminoheptadecoate hydrochloride* has m.p. 150°. (IV) is converted by KOH–Me_2SO_4 in boiling H_2O into *π-trimethylheptadecabetaine* (VI), m.p. 236—237° (also $+3H_2O$), which yields an *aurichloride*, m.p. 140—141°, *platinichloride*, m.p. 220° (decomp.), and *mercurichloride*, m.p. 158—159°. When heated/3 mm., (VI) passes into *Me π-dimethylaminoheptadecoate*, m.p. 37·5° (*hydrochloride*, m.p. 155°; *picrate*, m.p. 93—93·5°; *picrolonate*, m.p. 108—109°; *aurichloride*, m.p. 100°; *platinichloride*, m.p. 134°). H. W.

Labile glutamine peptides.—See this vol., 404.

Amides and *spiro*-cyclic imides of methanetetra-acetic acid. H. J. Backer (Rec. trav. chim., 1935, 54, 194—199).—By the action of the appropriate amine on $C(CH_2\cdot COCl)_4$ (this vol., 328) are obtained the *methyl*-, m.p. 209—209·5° (*NO*-derivative, explodes at 146·5°), tert.-*butyl*-, m.p. 229·5°, and *dimethylamide*, m.p. 187·5°, the *piperidide*, m.p. 168°, *anilide* (I), m.p. 271° [$(NO_2)_8$-derivative (II), m.p. 280° (decomp.)], p-*nitroanilide*, decomp., about 300° [gives (II) with abs. HNO_3], p-*toluidide*, m.p. 260°, *α-naphthylamide*, m.p. 283—284°, *methylanilide*, m.p. 237° (p-NO_2-derivative, m.p. 115—125°, decomp. 137°), *diphenylamide*, m.p. 219—219·5° [$(NO_2)_{16}$-derivative, m.p. about 175°, decomp. 200°], of methanetetra-acetic acid. By heating $C(CH_2\cdot CO_2NH_4)_4$ at 210° is obtained the spiro-*di-imide*  $C\left(\left\langle{}^{CH_2\cdot CO}_{CH_2\cdot CO}\right\rangle NH\right)_2$, not melting at 340° (*Ag* derivative); similar thermal decomp. of (I) gives the spiro-*di*(*phenylimide*), m.p. 330° [$(NO_2)_2$-derivative, decomp. 150°]. J. W. B.

Formation of salts of amidoximes and benzhydroxamic acid. J. V. Dubský, M. Kuraš, and J. Trtílek (Coll. Czech. Chem. Comm., 1935, 7, 1—9).—Benzamidoxime (I) has m.p. 80°; the substance, m.p. 68°, obtained along with it, is a *compound*, 2(I),PhCN. The following *salts* are prepared: from (I), $NH_2\cdot CPh:NO\cdot Cu\cdot OH$, $+H_2O$ and anhyd., and $(NH_2\cdot CPh:NO)_3Ni$, decomp. 90—125°; from amygdalamidoxime (II), $2(II),Ni(OH)_2,2H_2O$; from oxaldiamidoxime, $[OH\cdot N:C(NH_2)\cdot C(NH_2):NO\cdot]_2Ni,+2H_2O$; from aminoacetamidoxime (not isolated), $[NH_2\cdot CH_2\cdot C(NH_2):NO\cdot]_2Cu,H_2SO_4$ and another *Cu* salt, and $[NH_2\cdot CH_2\cdot C(NH_2):NO]_2Ni,HCl,2H_2O$; from benzhydroxamic acid, $(OH\cdot CPh:NO\cdot)_2Fe\cdot OH,H_2O$ and $(OH\cdot CPh:NO\cdot)_2Cu$. R. S. C.

Preparation of normal aliphatic thiocyanates. P. Allen, jun. (J. Amer. Chem. Soc., 1935, 57, 198—199).—The following *n*-alkyl *thiocyanates* are prepared in 83—95% yield from the bromide and KCNS: *amyl*, b.p. 90—91°/16 mm.; *octyl*, b.p. 141—142°/19 mm.; *nonyl* (67·3%), b.p. 156—157°/19 mm.; *decyl*, b.p. 154—155°/15 mm.; *undecyl*, b.p. 160—161°/10 mm.; *dodecyl*, b.p. 170—172°/10 mm.; *tridecyl*, b.p. 173—176°/7 mm.; cyclo*hexyl* (by NH_4CNS; 31·2%), b.p. 111—112°/16 mm. R. S. C.

Preparation of diazomethane and its homologues. D. W. Adamson and J. Kenner (J.C.S., 1935, 286—289).—An improved prep. of Me nitroso-β-methylamino*iso*butyl ketone (A., 1933, 598) is described. Many nitrosoketones (I) (revised b.p. listed) are prepared similarly and give diazohydrocarbons (II) when they are distilled with Et_2O containing some $Pr^βOH$ ($Bu^αOH$ for the higher homologues) and 1% $NaOPr^β$–$Pr^βOH$. (II) are determined as their *p*-nitro- and 3 : 5-dinitro-benzoates. The following are described: n-*amyl p-nitrobenzoate*, b.p. 133°/0·1 mm.; *crotonyl*, m.p. 50—51°, and *furfuryl* 3 : 5-*dinitrobenzoate*, m.p. 84—86°. The other nitrobenzoates (listed) are identical with those prepared by Buchner *et al.* (A., 1905, ii, 274), but not with all those of Henstock (A., 1933, 372). The benzoate, nitrobenzoate, and iodide prepared from $CHEtN_2$ contains no *iso*-compounds, which indicates that decomp. of the diazonium ion is initiated or occurs simultaneously with anionic (*e.g.*, OH) attack in the α- or β-position (cf. A., 1934, 874). Equimol. amounts of $β\text{-}C_{10}H_7\cdot OH$ and (I) in EtOH containing K_2CO_3 at room temp. give ethers (listed), mesityl oxide, and N_2 (cf. A., 1933, 598), which suggests that β-naphthoxy-ions more readily co-ordinate covalently with alkyl than with H, as (II) formation occurs only at 60—70°. The $Pr^α$ ether is homogeneous (cf. A., 1898, i, 592). Vinyldiazomethane in Et_2O in daylight affords pyrazole during 36 hr. following a unimol. decomp. Propenyldiazomethane is much more stable and requires 14 days for an analogous change. J. L. D.

Organometallic compounds. R. Garzuly-Janke (J. pr. Chem., 1935, [ii], **142**, 141—144).—The results of Plätz (A., 1934, 1209) are not considered to disagree with the classification of organometallic compounds (Garzuly, "Samml. chem. u. chem.-techn. Vorträge," 29, Stuttgart, 1927), where salts of TlR^I_2 (R=alkyl) are regarded as resembling those of the alkali metals. H. G. M.

Organic salts of titanium. G. Carteret (Bull. Soc. chim., 1935, [v], 2, 159—160).—The following are described: *Na titanocitrate*, $OH\cdot C_3H_4(CO_2\cdot TiO\cdot ONa)$ (easily hydrolysed in 2% solution at $p_H > 7$), *alkali titanolactates* and *titanostearates* $(C_{17}H_{35}\cdot CO_2)_2Ti(OM)_2$ and $C_{17}H_{35}\cdot CO_2TiO\cdot OM$ (M=metal). J. L. D.

Organic compounds of gold. IV. *n*-Propyl compounds. A. Burawoy and C. S. Gibson (J.C.S., 1935, 219—223; cf. A., 1934, 877).—Pyridinotrichlorogold with $MgPr^αBr$ gives di-*n*-propylmonobromogold (I) (cf. A., 1931, 1043), which with $(\cdot CH_2\cdot NH_2)_2$ gives ethylenediaminodi-*n*-propylgold bromide (II) (cf. A., 1932, 1316), converted by HBr into *monoethylenediaminotetra*-n-*propyldibromodigold* (III), a non-electrolyte, m.p. 110—111° (decomp.). (III) in $CHCl_3$ slowly gives (II) and (I). (III) explodes when heated, but when boiled with $CHCl_3$, it gives *monoethylenediaminodi*-n-*propyldibromodigold*, decomp. at 140°, in which one Au atom is univalent and 2-covalent, and the other tervalent and 4-covalent. (III) with excess of HBr in CCl_4 gives (I), which with Br (2 mols.) in CCl_4 at room temp. gives *mono*-n-*propyldibromogold* (IV) $[Pr^aAuBr_2]_2$, m.p. 54°, which is much more stable at 18—22° than the analogous Et compound (cf. A., 1934, 877). At 80—85°, (IV) gives Pr^aBr and AuBr in 0·5 hr., and with $KBr–H_2O$, it affords $KAuBr_2$ and (I). (IV) in $CCl_4–C_5H_5N$ gives pyridinotribromogold and *pyridinodi*-n-*propylmonobromogold*, m.p. 61—62° (cf. A., 1931, 78), also obtained from (II) with C_5H_5N in light petroleum. The dipole moment of diethylmonobromogold is $< 1\cdot0\times 10^{-18}$ e.s.u., which supports the symmetrical structure (A., 1934, 877) previously assigned to this compound, whereas (IV), using a Pt condenser as Ag reacts immediately with (IV), gives a val. of $5—6\times 10^{-18}$ e.s.u., which indicates an unsymmetrical structure. A probable structure for (IV) is suggested.

J. L. D.

Polymerisation of *cyclo*hexene. H. I. Waterman, J. J. Leendertse, and A. C. ter Pooten (Rec. trav. chim., 1935, **54**, 245—248).—*cyclo*Hexene (I) dissolved in C_5H_{12} in presence of $AlCl_3$ does not react at −78°, 0°, or 40°. At 70° polymerisation occurs giving a product the fractions of which have been studied before and after hydrogenation. Vals. of n_D^{20} for the hydrogenated product are in agreement with calc. vals. for *cyclo*hexyl compounds of the same mol. wt. Polymerisation occurs in C_5H_{12} at −78° in presence of HCl and 10% $AlCl_3$, giving chloro*cyclo*hexene (II) and a mixture of chloropoly*cyclo*hexyl compounds (III). (II), with and without the addition of (I), remains unchanged in presence of $AlCl_3$ in C_5H_{12} at −78°, and (I) in presence of HCl at −78° to 0° in C_5H_{12} does not react. It is inferred that (III) are formed by the addition of HCl to (I) polymerides and not from (II) as an intermediate.

R. S. B.

Polymerisation of *cyclo*hexene in presence of phosphoric oxide. R. Truffault (Compt. rend., 1935, **200**, 406—408).—*cyclo*Hexene at its b.p. polymerises in presence of P_2O_5 to *cyclo*hexyl*cyclo*hexene (80—90%). Amylene and terpenes condense similarly, and C_6H_6 with propylene to form PhPr.

E. W. W.

Normal *cyclo*hexyl sulphite. P. Carré and D. Libermann (Bull. Soc. chim., 1935, [v], 2, 160—161).—Voss and Blanke's product (cf. A., 1931, 462) is *cyclo*hexene (I), whereas that of Kitasato and Sone (A., 1931, 819) is a mixture of (I) and *cyclo*hexanol, but contains no S, although the latter's crude product was probably mainly *cyclo*hexyl sulphite (II). (II) decomposes when heated/8 mm. J. L. D.

Internal energy relationships among aromatic carbocyclic substances. IV. Law of distance. O. Schmidt (Ber., 1935, 68, [*B*], 356—359; cf. this vol., 203).—It is shown mathematically that it is not possible to explain the C–C linking by exchange of electrons as in the case of H_2 and that the only possible scheme is based on Lewis' postulates. H. W.

Action of some catalytic poisons on the hydrogenation of benzene in a liquid medium at room temperature.—See this vol., 456.

Nitration of monobromotoluenes. II. Influence of cresol on the nitration. M. C. Geerling (Rec. trav. chim., 1935, 54, 235—238).—Nitration of o-C_6H_4MeBr (I) with HNO_3 (*d* 1·52) in presence of 3 : 5-dinitro-*o*-cresol (II) or 2 : 4-dinitrophenol (III) [or in presence of *o*-cresol or PhOH since these are first nitrated to (II) or (III)] occurs smoothly to give exclusively $(NO_2)_1$-derivatives, the same proportion of 4- (20%) and 5-NO_2- (37·4%) derivatives being obtained in each case. This is probably due to the formation of additive compounds of (I) with (II) or (III), the binary m.-p. curve proving the existence of the compound (I)–(II), f.p. 58·7°. J. W. B.

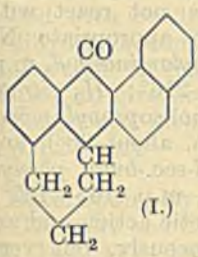
Total asymmetric synthesis by addition of bromine to an ethylenic linking. T. L. Davis and R. Heggie (J. Amer. Chem. Soc., 1935, **57**, 377—379).—2 : 4 : 6-Trinitrostilbene adds Br asymmetrically in right circularly polarised light of 3600—4500 A.; the max. observed α was +0·022°, [α] +0·04°. The product loses its optical activity when preserved.

R. S. C.

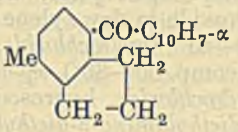
Hydrocarbons derived from phenylmethyl- and phenylethyl-acetic acids. P. A. Levene and R. E. Marker (J. Biol. Chem., 1935, **108**, 409—418).—The Mg compound of $CHMePh\cdot CH_2Br$ (I) (from the alcohol, obtained from the active acid), $[M]_D^{25}$ −3·98°, and CH_2O and hydrolysis of the product with 90% EtOH containing 2% of conc. HCl gives l-γ-*phenyl*-n-*butyl alcohol*, b.p. 85·90°/0·5 mm., $[\alpha]_D^{30}$ −3·0°, converted by PBr_3 into the l-*bromide*, b.p. 77—80°/1 mm., $[\alpha]_D^{30}$ −6·93°, converted (Grignard) into *l*-β-phenyl-*n*-butane, $[\alpha]_D^{22}$ −2·3° (A., 1933, 606). Hence (I) must have the structure assigned. Reduction (Grignard) of *l*-$CHEtPh\cdot CH_2Br$ (II), $[M]_D^{30}$ −0·92°, gives *d*-β-*phenyl*-n-*butane*, b.p. 71—74°/20 mm., $[\alpha]_D^{30}$ +1·56°. The Mg compound of (II) with CO_2 gives l-β-*phenyl*-n-*valeric acid*, b.p. 120—128°/0·4—0·5 mm., $[\alpha]_D^{30}$ −7·43°, and with CH_2O and hydrolysis affords l-γ-*phenyl*-n-*amyl alcohol*, b.p. 86—94°/1 mm., $[\alpha]_D^{30}$ −1·29°, converted by PBr_3 into the l-*bromide*, b.p. 78—82°/1 mm., $[\alpha]_D^{30}$ −7·2°, reduced (Grignard) to γ-*phenyl*-n-*pentane*, b.p. 38—41°/0·7 mm., α 0°. These results exclude rearrangement during the bromination of the carbinols and thus confirm the configurative relationships previously deduced (*loc. cit.*). All rotations are for the homogeneous liquids. J. W. B.

Synthesis of methylcholanthrene. L. F. Fieser and A. M. Seligman (J. Amer. Chem. Soc., 1935, 57, 228—229).—Pyrolysis (Elbs) of α- and β-naphthyl *ar*-α-tetrahydronaphthyl ketones gives *hydrocarbons* [*e.g.* (I)], m.p. 119° and 270°, respectively. p-C_6H_4MeBr gives (Blanc) two $ClCH_2$-derivatives, which by treatment with $CHNa(CO_2Et)_2$ and subsequent hydrolysis and decarboxylation give an acid, the chloride of which by ring-closure affords a mixture of two *methylbromohydrindones*, m.p. 154° and 95°, respectively, both yielding (Clemmensen) the same *methylbromohydrindene*, b.p. 265—267°. The Grignard reagent therefrom with α-$C_{10}H_7$·COCl gives the liquid *ketone* (II), which affords (Elbs) methylcholanthrene, the structure of which is thus confirmed.

R. S. C.



(I.)



(II.)

Synthesis of condensed polynuclear hydrocarbons by the cyclodehydration of aromatic alcohols. III. Cyclisation of some phenylated alcohols and related olefines. R. O. Roblin, jun., D. Davidson, and M. T. Bogert (J. Amer. Chem. Soc., 1935, 57, 151—159; cf. A., 1934, 642).—Cyclisation of *sec.*-phenylalkyl alcohols is best effected by 90% H_2SO_4, first at 9—10° and then at room temp. for 2 hr. 85% acid or shorter treatment with 90% acid gives much olefines. 7- or 8-Membered rings are not formed. Usually 6-membered rings are formed in preference to or faster than 5-membered. Migration of ethylenic linking must be postulated for some cyclisations reported. The yield of cyclic product is a max. when the OH is at the δ-position relative to the Ph; if it is at the α-position, or if a styrene is the starting material, polymerisation and no cyclisation occurs. Previous and present results are summarised.

The following are prepared; α-phenyl-*n*-butyl alcohol (I), b.p. 137°/21 mm., from PhCHO and MgBuBr; *α-phenylpentan-β-ol* (impure) (II), b.p. 127°/15 mm. (*phenylurethane*, m.p. 80°), from CH_2Ph·MgCl and Pr^aCHO; *α-phenyl-γ-methylpentan-β-ol* (III), b.p. 132°/15 mm. (*phenylurethane*, m.p. 103°), from CH_2Ph·CHO and $MgBu^{\beta}Br$; α-phenylpentan-γ-ol (IV), b.p. 130°/15 mm., from $CH_2Ph·CH_2$·CHO and MgEtBr; *α-phenyl-γ-methylpentan-γ-ol* (V), b.p. 138°/20 mm. (*phenylurethane*, m.p. 94°); Ph·$[CH_2]_4$·OH (VI), b.p. 137°/14 mm., from Ph·$[CH_2]_3$·MgBr (VII) and CH_2O or, better, $CH_2Ph·CH_2$·MgBr and $(CH_2)_2O$; *ε-phenylpentan-β-ol* (VIII), b.p. 134—135°/16 mm. (*phenylurethane*, m.p. 57°), from (VII) and MeCHO; Ph·$[CH_2]_5$·OH (IX), from (VII) and $(CH_2)_2O$ or Ph·$[CH_2]_4$·MgBr (X) and CH_2O; *ζ-phenylhexan-β-ol* (XI), b.p. 148°/18 mm. (*phenylurethane*, m.p. 65°), from (X) and MeCHO; ζ-phenyl-β-methylhexan-β-ol (XII), b.p. 206° (*phenylurethane*, m.p. 64·5°), from (X) and $COMe_2$; *η-phenylheptan-β-ol* (XIII), b.p. 164°/23 mm., from Ph·$[CH_2]_5$·MgBr and MeCHO; α-phenyl-Δ^{δ}-pentene (XIV), b.p. 206°, from $CH_2Ph·CH_2$·MgBr and CH_2:CH·CH_2Br (XV) or (IX) and H_3PO_4; α-phenyl-Δ^{ϵ}-hexene (XVI) from (VIII) and (XV). Attempts to prepare ε-phenyl-γ-methylpentan-β-ol from (*a*) $CH_2Ph·CH_2$·CHMe·MgBr and MeCHO, and (*b*) $CH_2Ph·CH_2$·CNaAc·CO_2R and MeI, failed. By cyclisation 1-*methyltetrahydronaphthalene*, b.p. 218—220° [oxidised ($KMnO_4$) to *o*-$C_6H_4(CO_2H)_2$ (XVII)], is formed from (II), (IV), (VIII), (IX), and (XIV), 1-*ethyltetrahydronaphthalene*, b.p. 237—238°, from (XI) and (XVI), 1-n-*propyltetrahydronaphthalene*, b.p. 253°, from (XIII), and 1-iso*propyltetrahydronaphthalene*, b.p. 247°, from (XII); (III) and (V) give mixtures of 1-*methyl*-1-*ethylindane* (XVIII), b.p. 218°, and 1 : 2-*dimethyltetrahydronaphthalene* (XIX), b.p. 235°, in the ratios 76·3 : 23·7 and 20·5 : 79·5, respectively. (I) gives a *polymeride*, b.p. 163—165°/2 mm. (XVIII) and (XIX) with $KMnO_4$ give 1-*methyl*-1-*ethylhomophthalic acid*, m.p. 115° (decomp.) (*anhydride*, liquid), and (XVII), respectively. The cyclic compounds were identified by dehydrogenation with S. 1-$C_{10}H_7Pr^a$ obtained in this way or by Clemmensen reduction of α-$C_{10}H_7$·COEt, gives a picrate, m.p. 90—92°; the picrate, m.p. 140—142°, is that of the 2-Pr isomeride (cf. lit.). Physical data are given for all the compounds prepared.

R. S. C.

Preparation of tetrahydronaphthalene peroxide. W. Nussle, jun., G. W. Perkins, and G. Toennies (Amer. J. Pharm., 1935, 107, 29—32).—Hock and Susemihl's method is modified (A., 1933, 153; B., 1933, 421). Dry air (10—12 litres per hr.) is aspirated for 45 hr. through 1 litre of tetrahydronaphthalene (I) at 75°. Unchanged (I) is removed at 1—1·5 mm. and the crystals from the residue are crystallised 3 times from light petroleum–EtOAc (70 : 22) giving 23 g. of peroxide, m.p. 56°.

E. H. S.

Identity of the hydrocarbon, $C_{18}H_{16}$, obtained by dehydrogenation of sterols and genins with 3′-methyl*cyclo*pentenophenanthrene. O. Diels and H. F. Rickert (Ber., 1935, 68, [*B*], 267—272).—Attempts to establish the identity of "sterol $C_{18}H_{16}$" (I) with 3′-methyl*cyclo*pentenophenanthrene (II) (Kon *et al.*, A., 1934, 288) by conversion into the characteristic compound $C_{18}H_{13}O_2N$ (Diels *et al.*, A., 1928, 169) were unsuccessful but the experiments are not regarded as crucial because of the experimental difficulties of controlling the action of nitrous fumes. Fractional adsorption of (I) by Al_2O_3 from light petroleum shows the presence in it of a hydrocarbon $C_{18}H_{14}$, m.p. 238—239°, possibly identical with that obtained by Ruzicka *et al.* (A., 1933, 278) by dehydrogenation of cholatrienic acid with Se and by Kon *et al.* (*loc. cit.*). (I), which after purification retains the m.p. 125—126° and other properties described previously, is transformed by Br in CCl_4 in daylight into several compounds from which the *substance* $C_{18}H_{13}Br_3$, decomp. 235°, is isolated. Since this compound is also produced from (II) and the phenomena of the reaction are identical in each case, the identity of (I) and (II) is regarded as established although certain differences remain unexplained. The prep. of (II) is improved.

H. W.

[Identity of 3′-methyl-1 : 2-*cyclo*pentenophenanthrene with Diels' hydrocarbon, $C_{18}H_{16}$.] O. Diels and H. F. Rickert (Ber., 1935, 68, [*B*], 325—326).—Mainly a reply to Hilleman (this vol., 335), whose work, in conjunction with that of Diels (preceding abstract), establishes the identity of "sterol $C_{18}H_{16}$" and the synthetic products of Bergmann and of Kon.

H. W.

Dicyanoamides. J. Biechler (Compt. rend., 1935, **200**, 141—143).—Phenyl-, *p*-tolyl-, and *o*-anisyl-cyanamide (K or Ag derivative) in C_6H_6 containing CNBr at room temp. give *phenyl-* (I), m.p. 87·5°, p-*tolyl-*, m.p. 69°, and o-*anisyl-dicyanoamide*, m.p. 62°, respectively. *o*-Tolyl-, monochlorophenyl-, and α-naphthyl-cyanamide give mixtures of polymerides of the corresponding dicyanoamides. (I) when heated gives a trimeride (?). Madelung and Kern's prep. of $NMe(CN)_2$ (cf. A., 1922, i, 438) gives an impure product. J. L. D.

Nitro- and amino-derivatives of *tert*.-butylbenzene. D. Craig (J. Amer. Chem. Soc., 1935, **57**, 195—198).—$PhBu^{\gamma}$ (modified prep.; 79% yield) and H_2SO_4–HNO_3 at 20—40° give a mixture of *o*- (23 parts) and *p*- (77 parts) -NO_2-, reduced (Fe–HCl) to a mixture (I) of *o*- (II) and *p*- (III) -NH_2-compounds. *o*-$NHPh{\cdot}C_6H_4{\cdot}CO_2Me$ (modified prep.) and MgMeI give the *hydriodide*, m.p. 180—200°, of a base, a *substance*, m.p. 122—124°, and o-tert.-*butyldiphenylamine*, m.p. 71—72° (*Ac* derivative, m.p. 88—89°), also obtained in poor yield from (II) and *o*-$C_6H_4Cl{\cdot}CO_2H$ (IV). (II), β-$C_{10}H_7{\cdot}OH$, and a drop of conc. HCl, when refluxed, give $NHPh{\cdot}C_{10}H_7$-β. Heating (I) and its hydrochloride gives p-tert.-*butyldiphenylamine* (V), m.p. 66—67°, b.p. 170—173°/3 mm., also obtained in poor yield from $NHPh_2$ with $Bu^{\gamma}Cl$ ($AlCl_3$) or $Bu^{\gamma}OH$ (H_3PO_4), and from (IV) and (III). Long heating of (III) and its hydrochloride gives some (V), and *di*-p-tert.-*butyldiphenylamine*, m.p. 107—108°, b.p. 190—195°/3 mm. (*Bz*, m.p. 192—193°, and *Ac* derivative, m.p. 160—161°), also obtained from *p*-$C_6H_4Bu^{\gamma}{\cdot}OH$, PCl_5, and the Bz derivative of (III) by way of p-tert.-*butylphenyliminophenylmethyl* p-tert.-*butylphenyl ether*, m.p. 134—136°. (III), *p*-$C_6H_4(OH)_2$, and a trace of HCl give *di*-(N-p-tert.-*butylphenyl*)-p-*phenylenediamine*, m.p. 176—177°; α- and β-$C_{10}H_7{\cdot}NH_2$ give similarly p-tert.-*butylphenyl*-α-, m.p. 91—92°, b.p. about 205°/2 mm., and -β-*naphthylamine*, m.p. 76—78°, b.p. 213°/3 mm. R. S. C.

Aminoalkylamino-derivatives of carbocyclic compounds. H. Wojahn (Arch. Pharm., 1935, **273**, 77—83).—NH_2Ph and aliphatic Cl-aldehydes do not give Schiff's bases; at $>$ 100° the Cl reacts and mixtures are formed. By condensation of β-amino-aldehydes with the appropriate base and hydrogenation (Pd–$BaSO_4$) of the product are obtained N-γ-*dimethylamino*-ββ-*dimethyl*-n-*propyl-aniline*, b.p. 152°/17 mm. (*dipicrate*, m.p. 150°), -*benzylamine*, b.p. 150°/17 mm. (*dipicrate*, m.p. 138°), -β′-*phenylethylamine*, b.p. 160°/17 mm. (*dipicrate*, m.p. 170°), and -o-*anisidine*, b.p. 173°/17 mm. (*dipicrate*, m.p. 138—140°; *dihydrochloride*, m.p. 192—193°), N-γ-*methylamino*-ββ-*dimethyl*-n-*propyl*-, b.p. 170°/17 mm. (*dihydrochloride*, m.p. 190°), and N-(β-*dimethylaminomethyl*-n-*butyl*)-o-*anisidine*, b.p. 180—182°/17 mm. (*dipicrate*, m.p. 106°), and N-γ-*diethylamino*-ββ-*dimethyl*-n-*propyl*-p-*anisidine*, b.p. 198°/17 mm. (*dihydrochloride*, m.p. 178°), and -p-*aminophenol* (*dihydrochloride*, m.p. 238—240°). R. S. C.

Preparation and properties of dialkylaminoalkyl phenyl-α-naphthylcarbamates. A. B. Boese, jun., and R. T. Major (J. Amer. Chem. Soc., 1935, **57**, 175—176).—*Phenyl-α-naphthylcarbamyl chloride* (from α-$C_{10}H_7{\cdot}NHPh$ and $COCl_2$ in $CHCl_3$ at room temp.), m.p. 105°, does not react with $NEt_2{\cdot}CH_2{\cdot}CH_2{\cdot}OH$, but with the appropriate Na alkoxide in dry xylene gives β-*diethylaminoethyl*, m.p. 60—61° (*hydrochloride*, m.p. 214—216°; H_2 *citrate*, decomp. 50—80°), αγ-*di*(*diethylamino*)iso*propyl* (*monohydrochloride*, hygroscopic, decomp. about 90°), and α-*diethylamino*-β-*diethylaminomethyl*-sec.-*butyl phenyl*-α-*naphthylcarbamate* (*hydrochloride*, m.p. 165—167°). These esters have powerful anæsthetic action and are non-toxic when injected subcutaneously, but very toxic when administered intravenously. R. S. C.

Significance of some anomalous dipole moments.—See this vol., 430.

Reduction of nitro- and polynitro-compounds. XIV. Aromatic compounds. K. Brand and J. Mahr (J. pr. Chem., 1935, [ii], **142**, 153—176; cf. A., 1932, 575).—The prep. of a no. of substituted azoxybenzenes and their intermediates is described. The following are new: 2-*nitro*-6-*hydroxylamino*-, m.p. 87°, and -6-*nitroso*-p-*xylene*, m.p. 134—135°; 4-*nitro*-6-*hydroxylamino*-, m.p. 126·5—127·5°, and -6-*nitroso*-m-*xylene*, m.p. 108°; 3 : 3′-*dinitro*-2 : 5 : 2′ : 5′- (I), m.p. 191—192°, and -4 : 6 : 4′ : 6′-*tetramethylazoxybenzene* (II), m.p. 201—202° [lit. 185—190° (decomp.)]; 5 : 6 : 7 : 8-*tetrahydronaphthyl-2-hydroxylamine*, m.p. 66—67°; 2-*nitroso*-5 : 6 : 7 : 8-*tetrahydronaphthalene* (impure), an oil; 2 : 2′-*azo*- (III), m.p. 127—128°, -*hydrazo*-, m.p. 121—122° (with cold conc. HCl gives the azo- and 2-NH_2-compounds), and -*azoxy*-5 : 6 : 7 : 8 : 5′ : 6′ : 7′ : 8′-*octahydronaphthalene*, m.p. 100—101°. For formation of azoxy- from hydroxylamino- and nitroso-benzene derivatives under previously defined conditions, k are as follows: 2 : 6 : 2′ : 6′-Me_4- 0·29, (I) 12·5, (II) 15—16; 1 : 1′-azonaphthalene, variable, 1—3·6; (III) 1·6—1·9. These and former results show that *m*-Me increases and *o*-Me decreases k, but that *p*-Me is almost without effect (cf. lit.). k for $Ph{\cdot}N_2O{\cdot}Ph$ is increased 30—300 times by 0·0005—0·005*N*-KOH. R. S. C.

Action of titanous chloride on nitrophenylhydrazones; *p*-nitro- and 2 : 4-dinitro-phenylhydrazones. A. K. Macbeth and J. R. Price (J.C.S., 1935, 151—153).—Reduction of *p*-nitrophenylhydrazones with $TiCl_3$ results in absorption of 8 equivs. of H, scission, and formation of *p*-phenylenediamines, whilst 2 : 4-$(NO_2)_2$-compounds absorb 12H, with no scission and formation of 2 : 4-diaminophenylhydrazines. Phellandral gives a p-*nitro*-, m.p. 169—170°, and 2 : 4-*dinitro-phenylhydrazone*, m.p. 202—203°, and the 2 : 4-*dinitrophenylhydrazones* of the following are described: $COEt_2$, m.p. 156°; *o*-$C_6H_4Cl{\cdot}CHO$, m.p. 209°; 4-*iso*propyl*cyclo*hexan-1-one, m.p. 119—120°; thujone, m.p. 116—117°; protocatechualdehyde, m.p. 275° (decomp.); vanillin, m.p. 267—268°; and veratraldehyde, m.p. 264—265°. F. R. S.

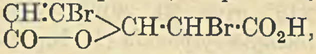
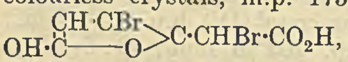
Preparation of the hydrochloride of *m*-dihydrazinobenzene through the bis-diazonium compound from *m*-phenylenediamine. H. A. J. Schoutissen (Rev. trav. chim., 1935, **54**, 253—255).—Tetrazotisation of *m*-$C_6H_4(NH_2)_2$ at −5° to −10°

in conc. HCl and reduction of the bisdiazo-compound with $SnCl_2$–conc. HCl gives a good yield of *m*-dihydrazinobenzene dihydrochloride, which condenses with KCNO to give the disemicarbazide, with CH_2Ac_2 to give *m*-phenylene-1 : 1′-bis-3 : 5-dimethylpyrazole, and with piperonal to give the *dihydrazone*, m.p. 225—226°. J. W. B.

Heteropolarity. XXVI. Coupling processes. W. Dilthey and C. Blankenburg (J. pr. Chem., 1935, [ii], **142**, 177—190; cf. A., 1932, 1125).—Coupling may take place either by rearrangement of an ion, $[PhN_2]^+X^-$, in which X=CN, OPh, etc., or, particularly in acid, but also in alkaline solution, by addition of the diazonium ion to an activated C and subsequent rearrangement of the salt-like compound. Activation of phenols and their ethers in alkaline solution may occur by formation of  (R=H or alkyl); it is hindered by positive groups (Me, Cl, etc.) in the *o*- and negative groups (NO_2) in the *m*-position, but aided by the former in the *m*- or the latter in the *o*-position. Activation of C is also effected by Ph, so that $(p\text{-}C_6H_4Me)_2C{:}CH_2$ (I) and $(p\text{-}OMe{\cdot}C_6H_4)_2C{:}CH_2$ (II) will couple with $p\text{-}PhS{\cdot}C_6H_4{\cdot}CO{\cdot}C_6H_4{\cdot}N_2Cl\text{-}p$ (III) (*loc. cit.*) in AcOH. The *azo*-compounds obtained by coupling (III) with the following substances in AcOH are described: NPh_3 (*perchlorate*, m.p. > 360°); resorcinol, m.p. 175°; pyrocatechol, m.p. 123—125°; phloroglucinol Me_3 ether, m.p. 135—136°; guaiacol, m.p. 149° (prep. in KOH–EtOH); $o\text{-}NO_2{\cdot}C_6H_4{\cdot}OH$, m.p. 166—167° (obtained only in EtOH–NaOH); $o\text{-}NO_2{\cdot}C_6H_4{\cdot}OMe$, m.p. 163—164°; $CO(CH_2{\cdot}CO_2Et)_2$ (slowly), m.p. 99°; (II), m.p. about 120° [*perchlorate* (IV), solid]; (I), an oil [*perchlorate* (V), cryst.]. The following do not couple with (III): veratrole (VI) in AcOH, anisole, $p\text{-}C_6H_4(OH)_2$, $p\text{-}C_6H_4(OMe)_2$, and $p\text{-}NO_2{\cdot}C_6H_4{\cdot}OH$. The following give oily azo-compounds: (VI) in NaOH or C_5H_5N, pyrogallol, dinaphthalene dioxide, $m\text{-}NO_2{\cdot}C_6H_4{\cdot}OH$, and Et dinitrophenylacetoacetate. (IV) and (V) are formulated as $R{\cdot}N{:}N{\cdot}CH_2{\cdot}C^+Ar_2(ClO_4)^-$. (III) and H_2O at 60° give p-*hydroxy*-p-*phenylthiolbenzophenone*, m.p. 159—160°. R. S. C.

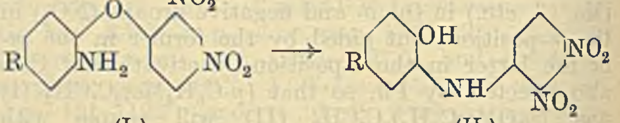
Hydrogenation and hydrogenolysis of ethers. E. M. Van Duzee and H. Adkins (J. Amer. Chem. Soc., 1935, **57**, 147—151).—$CH_2Ph{\cdot}OAlk$ (I) and $CH_2Ph{\cdot}OAr$ (II) undergo hydrogenolysis [(II) more readily than (I)] during treatment with H_2 (150—250 atm.) in presence of Raney Ni and Et_2O, at a lower temp. (100—150°) than other ethers; PhMe and AlkOH or ArOH are produced. Hydrogenation of (I) or (II) does not occur; at > 150° some of the fission products are reduced. ArOAr′ (III) undergo fission at 150—200°; the hydrogenolysis products [but not (III)] are reduced. ArOAlk are more stable than (I)—(III); at ≯ 200° the corresponding *cyclohexyl alkyl* ether is usually produced. AlkOAlk′ are stable at 200°. Raney Ni is more effective than Ni-kieselguhr for fission of C·O linkings. The following are new: *Et*, b.p. 125—130°/6—7 mm., *Bu*ᵅ, b.p. 150—153°/13 mm., *Ph*, b.p. 180—182°/7 mm., m.p. 23°, and *benzyl*, b.p. 186—188°/7 mm., *dodecyl ethers*; the *Ph* iso*amyl*, b.p. 118°/2 mm., *benzyl Et*, b.p. 115—118°/13 mm., *Me Bu*ᵅ, b.p. 144—146°, *Et Bu*ᵅ, b.p. 161—162°, *Ph benzyl*, b.p. 176—181°/2 mm., and cyclo*hexyl* iso*amyl*, b.p. 113—115°/7 mm., *ethers* of $({\cdot}CH_2{\cdot}OH)_2$; *benzyl* sec.-*Bu ether*, b.p. 108—109°/29 mm.; *γ-butoxy-*, b.p. 81—85°/13 mm., and γ-cyclo*hexyloxy-*, b.p. 91—93°/2 mm., *-propyl alcohols*; *benzyl*, b.p. 166°/7 mm., and *Bu*ᵅ, b.p. 116—118°/10 mm., *γ-phenylpropyl ethers*; o-, b.p. 151—153°/5 mm., m-, b.p. 141—143°/2 mm., and p-, b.p. 162—164°/5 mm., m.p. 45—46°, *tolyl anisyl ethers*; *Ph δ-phenylbutyl ether*, b.p. 144—146°/1 mm.; cyclo*hexyl* δ-cyclo*hexylbutyl*, b.p. 150—153°/5 mm., and γ-cyclo*hexylpropyl*, b.p. 138—140°/5 mm., *ethers*; γ-cyclo*hexylpropyl Bu*ᵅ *ether*, b.p. 117—118°/10 mm.; *Et* γ-cyclo*hexyloxypropyl-*, b.p. 173—175°/4 mm., and β-cyclo*hexyloxyethyl-*, b.p. 162—164°/4 mm., *-malonates*; o-*benzyloxybenzanilide*, m.p. 117—118°; s-*tri-anisylbenzene*, m.p. 142—142·5°; 1 : 3 : 5-*tri*-p-*methoxy*cyclo*hexyl*cyclo*hexane*, b.p. 230—240°/1 mm. H. B.

Introduction of *iso*butyl groups into phenols, cresols, and homologous compounds. Q. R. Bartz, R. F. Miller, and R. Adams (J. Amer. Chem. Soc., 1935, **57**, 371—376).—$CH_2{:}CMe{\cdot}CH_2Cl$, b.p. 73—73·5°/746 mm., and K_2CO_3 in $COMe_2$ or NaOEt in dry EtOH with the appropriate phenol give the β-*methylallyl ethers* of PhOH, b.p. 70°/8 mm., *o*-, b.p. 82·5°/5 mm., *m*-, b.p. 85·5°/4 mm., and *p*-cresol, b.p. 84°/3 mm., *m*-4-, b.p. 90°/3 mm., *p*-, b.p. 88·5°/4 mm., and *o*-4-xylenol, b.p. 98·5°/4 mm., *o*-methoxy-, b.p. 107·5°/9 mm., *p*-chloro-, b.p. 101·5°/8 mm., and *o*-β-methylallyl-phenol, b.p. 104°/5 mm., 3-β-methylallyl-*o*-, b.p. 106°/5 mm., and -*p*-cresol, b.p. 118°/4 mm., 4-β-methylallyl-3-, b.p. 120°/4 mm., and -4-*iso*propyl-*m*-cresol, b.p. 105·6°/6 mm., and resorcinol, b.p. 128°/3 mm.; also *resorcinol di*-β-*methylallyl ether*, b.p. 147°/6 mm. These alone or in $NPhEt_2$ at about 230—245° give 50—80% yields of the following: o-β-*methylallylphenol* (I), b.p. 95°/9 mm.; 3-β-*methylallyl*-o- (II), b.p. 87°/4 mm., and -p-*cresol* (III), b.p. 101°/7 mm.; 4-β-*methylallyl*-m-*cresol* (IV), b.p. 98°/7 mm.; 6-β-*methylallyl*-2 : 4-, b.p. 103°/6 mm., -2 : 5-, b.p. 100°/6 mm., and -3 : 4-*dimethylphenol*, b.p. 116°/7 mm.; 6-β-*methylallylguaiacol*, b.p. 115°/8 mm.; 4-*chloro*-2-β-*methylallylphenol*, b.p. 113°/8 mm.; 2-β-*methylallyl*-4-iso*propyl*-m-*cresol*, b.p. 110°/6 mm.; 2 : 6-*di*-β-*methylallylphenol*, b.p. 110°/2 mm.; 3 : 5-*di*-β-*methylallyl*-o-, b.p. 134°/7 mm., and -p-*cresol*, b.p. 127°/7 mm.; 2 : 4-di-β-*methylallyl*-m-*cresol*, b.p. 130°/7 mm.; and 4 : 6-*di*-β-*methylallylresorcinol*, b.p. 145°/3 mm. By hydrogenation (PtO_2) in EtOH at 2—3 atm. are obtained 3-iso*butyl*-o-, b.p. 100°/9 mm., m.p. 41—42°, and -p-*cresol* (V), b.p. 106°/9 mm., 4-iso*butyl*-m-*cresol*, b.p. 105°/8 mm., 6-iso*butyl*-2 : 4- (VI), m.p. 69—70°, -2 : 5-, m.p. 73—74°, and -3 : 4-*dimethylphenol*, b.p. 107°/3 mm., 2-iso*butyl*-4-iso*propyl*-m-*cresol* (VII), b.p. 111°/2 mm., 2-iso*butyl*-, m.p. 21°, b.p. 86°/6 mm., and 2 : 6-*di*iso*butyl-phenol*, b.p. 118°/6 mm., 3 : 5-*di*iso*butyl*-o- (VIII), b.p. 121°/2 mm., m.p. 48—49°, and -p-*cresol* (IX), b.p. 121°/2 mm., and 2 : 4-*di*iso*butyl*-m-*cresol* (X), b.p. 120°/4 mm. Isomerisation by conc. aq. alkali gives 80% yields of 2-iso*butenylphenol* (XI), b.p. 81°/6 mm., m.p. 22°, 3-iso*butenyl*-o- (XII), b.p. 112°/18 mm., and -*p-cresol*, b.p. 102°/8 mm., and 4-*isobutenyl-m-cresol*, b.p. 127°/17 mm. The following are described; *acetates* of (I), b.p. 98°/6 mm., (II), b.p. 116°/12 mm., (III), b.p. 115°/5 mm., and (IV), b.p. 123°/5 mm.; *p-nitrobenzoates* of (I), m.p. 42°, (III), m.p. 66—67°, (VI), m.p. 100—101°, (VII), m.p. 128·5, (VIII), m.p. 103—104°, (IX), m.p. 87—88°, (X), m.p. 130·5°, (XI), m.p. 64°, and (XII), m.p. 69·5°; *aryloxyacetic acids* from (III), m.p. 116—117°, (IV), m.p. 77—78°, (V), m.p. 99°, and (XII), m.p. 79—80°. Dimethyldihydrobenzofurans result by too long heating of the allyl ethers or by treating them with 2 mols. of C_5H_5N,HCl at 235—245° or, in some cases, by keeping the solution in moist ligroin with anhyd. $MgSO_4$. Thus are obtained 1 : 1-*dimethyl*-, b.p. 62°/7 mm., 1 : 1 : 6-, b.p. 74°/8 mm., 1 : 1 : 5-, b.p. 87°/11 mm., and 1 : 1 : 4-*trimethyl*-, b.p. 88°/10 mm., and 4-*chloro*-1 : 1-*dimethyl*-1 : 2-*dihydrobenzfuran*, b.p. 96°/5 mm. Ring closure is also effected by aq. $HgCl_2$, which leads to 1-*chloromercurimethyl*-1-*methyl*-, m.p. 81°, 1 : 6-, m.p. 72·5°, and -1 : 4-*dimethyl*-1 : 2-*dihydrobenzfuran*, m.p. 102·4°, and thence by KI or KBr to 1-*iodo*-, m.p. 73°, and 1-*bromo-mercurimethyl*-1 : 4-*dimethyl*-1 : 2-*dihydrobenzfuran*, m.p. 93—94°. Bu$^\beta$ enhances antiseptic action of the phenols less than does Bu$^\alpha$. R. S. C.

Ring fission of *o*-nitrophenols by sulphuric acid. I. O. Neunhoeffer and H. Kölbel (Ber., 1935, 68, [*B*], 255—263).—6-Nitro-2 : 4-dimethylphenol (I) is converted by H_2SO_4 at 110—120° into *αγ-dimethylmuco-γ-lactonic acid*, m.p. 156° (*monoamide*, m.p. 125—128°), which rapidly absorbs $1H_2$ and more slowly a further $1H_2$ with formation of a mixture of stereoisomeric dimethyladipic acids. 2 : 4-Dibromo-6-nitrophenol and 100% H_2SO_4 at 125° yield humic substances (characteristic of *o*-Br-derivatives), a (?) *pyrrolone* compound, m.p. 215°, and the two lactonic *acids*,  $\begin{matrix}\text{CH:CBr}\\ \text{CO—O}\end{matrix}\!>\!\text{CH}\cdot\text{CHBr}\cdot\text{CO}_2\text{H}$, colourless crystals, m.p. 175°, and  $\text{OH}\cdot\begin{matrix}\text{CH}\cdot\text{CBr}\\ \text{C——O}\end{matrix}\!>\!\text{C}\cdot\text{CHBr}\cdot\text{CO}_2\text{H}$, red crystals, m.p. 268—270° (partial decomp.); these are reduced by $SnCl_2$ and HCl to hydromuconic acid, catalytically hydrogenated to adipic acid. Treatment of 1-nitro-β-naphthol with 95% H_2SO_4 at ≯90° yields exclusively *cinnam-o-hydroxamic acid* (II) $OH\cdot C(:N\cdot OH)\cdot C_6H_4\cdot CH:CH\cdot CO_2H$, m.p. 195°, which is stable towards acids and alkalis but is transformed by MeOH into the Me ester of *o*-carboxycinnamolactone (III), m.p. 65°, and o-*carbomethoxycinnamic acid* (IV), m.p. 152°. (III) and (IV) are hydrolysed to *o*-carboxycinnamic acid, m.p. 203° (dibromide, m.p. 215°). (II) is hydrogenated (PtO_2 in Pr$^\beta$OH) to β-*o*-carboxyphenylpropionic acid, m.p. 166°. Fission of nitrophenols does not occur with conc. HCl, with conc. HCl and $SnCl_4$ at 180°, with 20% $HClO_4$, with $POCl_3$, or with Ac_2O; H_3PO_4, dehydrated at 220°, behaves similarly to H_2SO_4 but reaction is slow by reason of the insolubility of the materials. The *Me hydroxamates* of β-methyl-, m.p. 114°, and αγ-dimethyl-, m.p. 122°, -muconic acids are obtained from *o*-nitro-*p*-cresol and (I), respectively. The mechanism of the reaction is obscure but it appears probable that an intermediate product is formed which, according to experimental conditions, passes into either hydroxamic acid or carboxylic acid. H. W.

Benzenesulphonyl derivatives of *o*-aminophenol. C. B. Pollard and L. H. Amundsen (J. Amer. Chem. Soc., 1935, 57, 357—358).—Directions are given for the prep. of *o*-$PhSO_2\cdot NH\cdot C_6H_4\cdot OH$, *o*-$PhSO_2\cdot NH\cdot C_6H_4\cdot O\cdot SO_2Ph$, and *o-aminophenyl benzenesulphonate*, m.p. 87—87·3° (*Bz* derivative, m.p. 90·5—91°, also obtained from $PhSO_2Cl$ and *o*-$NHBz\cdot C_6H_4\cdot OH$). R. S. C.

Rearrangement of *o*-aminodiphenyl ethers. II. K. C. Roberts, C. G. M. de Worms, and (Miss) H. B. Clark (J.C.S., 1935, 196—20).—The rates of rearrangement (in min.) of diphenyl ethers (I) to diphenylamines (II) in $AcOH–C_5H_5N$ by varying R are NH_2 (50), OMe (13), Me (7), H (5), I (15), Br (30), Cl (60). The factors governing the mechanism of the change are discussed. The following are described:



(I.) (II.)

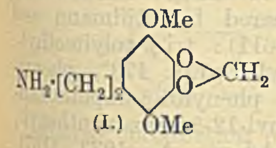
2-*aminoquinol 4-benzoate*, m.p. 161—164°; 2′ : 4′-*dinitro*-2 : 4-*diaminodiphenyl ether*, m.p. 166—170°, converted into 2′ : 4′-*dinitro-5-amino-2-hydroxydiphenylamine*, decomp. 237—240°; 2′ : 4′-*dinitro-5-acetdinitrophenylamido-2-hydroxydiphenylamine*, decomp. above 250°, obtained directly from 1 : 2 : 4-$OH\cdot C_6H_3(NHAc)_2$ and 1 : 2 : 4-$C_6H_4Cl(NO_2)_2$ (III); 2′ : 4′-*dinitro-2-amino-4-methoxydiphenyl ether*, m.p. 178°, obtained from 2-*amino-4-methoxyphenol hydrochloride*, m.p. 171°, converted into 2′ : 4′-*dinitro-2-hydroxy-5-methoxydiphenylamine*, m.p. 157°; 2′ : 4′-*dinitro*-2-, m.p. 123°, and -4-*aminodiphenyl ether*, m.p. 223° (decomp.); 4-*iodo*-2′ : 4′-*dinitro-2-aminodiphenyl ether*, m.p. 125°, converted into 5-*iodo*-2′ : 4′-*dinitro-2-hydroxydiphenylamine*, m.p. 145°; 4-*bromo*-2′ : 4′-*dinitro-2-hydroxydiphenyl ether*, m.p. 140°, converted into 5-*bromo*-2′ : 4′-*dinitro-2-hydroxydiphenylamine*, m.p. 190°; 4-*chloro*-2′ : 4′-*dinitro-2-aminodiphenyl ether*, m.p. 152°, converted into 5-*chloro*-2′ : 4′-*dinitro-2-hydroxydiphenylamine*, m.p. 215°; 2 : 4-*dinitrophenyl* 2′ : 4′-*dinitro-2-aminodiphenyl-4-carboxylate*, m.p. 89°, hydrolysed to the *acid*, m.p. 115°, but not forming the diphenylamine; 2 : 4-*dinitrophenyl* 2′ : 4′-*dinitro-2-hydroxydiphenyl-5-carboxylate*, m.p. 155°, hydrolysed to the *acid*, m.p. 185°; and 4 : 2′ : 4′-*trinitro-2-aminodiphenylamine*, m.p. 225° (decomp.), obtained from 4-nitro-2-aminophenol and (III). F. R. S.

Fries reaction with α-naphthyl esters. R. W. Stoughton (J. Amer. Chem. Soc., 1935, 57, 202—204).—α-$C_{10}H_7$ *propionate* and *valerate* have b.p. 134—135°/2 mm. and 172—176°/6 mm., respectively. When heated with $AlCl_3$ at 100° (2 hr.) and then at 120° (1 hr.), the appropriate α-$C_{10}H_7$ esters give 2- (I) (61%) and 4- (II) (5%) -acetyl- and 2 : 4-diacetyl- (III) (4%), 2- (54%) and 4- (6%), m.p. 188—189°, -*propionyl*- and 2 : 4-*dipropionyl*- (2%), m.p. 100—101°, 2- (55%) and 4- (3%) -butyryl and 2 : 4-*dibutyryl*- (2%), m.p. 101—102°, and 2- (40%), m.p. 75—76°, and 4- (2%), m.p. 168—169°, -*valeryl-α-naphthol.* The diacyl compounds give o-$C_6H_4(CO_2H)_2$ on oxidation. (II), but not (I), with $AlCl_3$ under similar conditions gives a mixture of (I), (II), and (III). By Clemmensen reduction are obtained 50—63% yields of 2-ethyl-, m.p. 69—70° (lit. 68—68·5°), b.p. 128—133°/3 mm., -*propyl-*, m.p. 51—52°, b.p. 133—136°/2 mm., -*butyl-*, m.p. 71—72°, b.p. 145—149°/4 mm., and -*amyl-α-naphthol*, m.p. 55—56°, all unstable in air. R. S. C.

Isomerisation of phenolic ethers at high temperatures. II. Isomerisation of phenyl β-naphthylmethyl ether. O. Behaghel and H. Freiensehner (Ber., 1935, 68, [*B*], 341—343).—The $CH_2\cdot C_{10}H_7$-β resembles the CH_2Ph residue in its capacity for isomerisation (cf. A., 1934, 999). β-$C_{10}H_7\cdot CH_2\cdot OPh$ passes at 250° in presence of a little Zn into PhOH, o- (I) and p- (II) -*β-naphthylmethylphenol*, and resin. (I), b.p. 189°/2 mm., m.p. 69°, is obtained from NaOPh and 2-$C_{10}H_7\cdot CH_2Br$ in PhMe, whereas (II), m.p. 192°/2 mm., m.p. 96°, is prepared from PhOH, 2-$C_{10}H_7\cdot CH_2Br$, and Zn. H. W.

Carbylamines. XX. Reaction between naphthols and aromatic carbylamines. M. Passerini and A. Neri (Gazzetta, 1934, 64, 934—937; cf. A., 1925, i, 1298).—β-$C_{10}H_7\cdot OH$ and *p*-tolylcarbylamine react slowly in C_6H_6 to form 2-*hydroxy-*1-*naphthylglyoxaldi-*p-*methylanil*, m.p. 146—148°, which when boiled in C_6H_6 oxidises slowly to 4 : 5-*benzocoumaran-*2 : 3-*dionedi-*p-*methylanil*, m.p. 187—188°, with di-*p*-tolylcarbamide. E. W. W.

Pharmacodynamic properties of β-aminoethylapiole. J. V. Supniewski (Acta Biol. Exp. Warsaw, 1932, 7, 49—60).—Apiolealdehyde is condensed with $MeNO_2$ and the product reduced to the *oxime* and finally to β-*aminoethylapiole* (I). The *hydrochloride* of (I) resembles mescaline in its pharmacological action.



(I.)

Ch. Abs. (*r*)

Constituents of guaiacum resin. III. Synthesis of *dl*-guaiaretic acid diethyl ether. R. D. Haworth and I. Richardson (J.C.S., 1935, 120—122).—β-3-*Methoxy-*4-*ethoxyphenyl-α-methylcrotonic acid*, m.p. 127—128° (*Et* ester, b.p. 195—200°/15 mm., m.p. 58—60°), from 3-methoxy-4-ethoxybenzaldehyde and $CHMeBr\cdot CO_2Et$, is reduced (Na–Hg) to the *propionic acid*, m.p. 63—64° [*Me* ester (I), b.p. 158—160°/0·3 mm.]. 3-*Methoxy-*4-*ethoxyphenylacetonitrile*, b.p. 156—158°/0·4 mm., m.p. 53—54°, from 3-methoxy-4-ethoxyphenylpyruvic acid and NH_2OH,HCl, and (I) with KOEt, followed by hydrolysis, lead to β-*keto-αδ-bis-*(3-*methoxy-*4-*ethoxyphenyl*)-γ-*methylvaleramide*, m.p. 114—115°, converted by alkaline hydrolysis into *αδ-bis-*(3-*methoxy-*4-*ethoxyphenyl*)-*α-methylbutan-β-one*, b.p. 230—235°/0·3 mm., m.p. 57—58° [$(NO_2)_2$-derivative, m.p. 133—134°]. The ketone and MgMeI give a carbinol, dehydrated ($KHSO_4$) to dl-*guaiaretic acid Et₂ ether*, m.p. 103—104°, reduced to the H_2-derivative, m.p. 98—99° [Br_2-, m.p. 134—135°, and $(NO_2)_2$-derivatives, m.p. 111—112°]. The inactive H_2-derivative is also produced by reduction of l-*guaiaretic acid* Et_2 *ether*, m.p. 95—96°, $[\alpha]^{19}_{D}$ —48·0° in EtOH, obtained by ethylation of the K salt of *l*-guaiaretic acid (II) from guaiacum resin. This confirms the structure $CH_2R\cdot CHMe\cdot CMe{:}CHR$ [R=4 : 3-$(OH)(OMe)C_6H_3\cdot$] for (II). F. R. S.

Influence of alkyl- and alkylene-thiol groups on the therapeutic action of organic compounds. III. Some allylthiol compounds. K. Brand and W. Bausch (Arch. Pharm., 1935, 273, 65—76; cf. A., 1934, 665).—*o*-, m.p. 38—39° (lit. 54°), and *p*-Nitrophenyl allyl sulphide, m.p. 41° (lit. 38—39°) [prep. by reduction of $(NO_2\cdot C_6H_4\cdot S\cdot)_2$ by Na_2S and condensation of the resulting thiol with $CH_2{:}CH\cdot CH_2Br$], are reduced by Fe–25% HCl and a trace of Cu to o- (I), an oil (*hydrochloride*, m.p. 143·5—144° after sintering at 138°; *picrate*, m.p. 137·5°; Ac_2, an oil, and *carbamide* derivative, m.p. 139—139·5°), and p-*aminophenyl allyl sulphide* (II), an oil [*hydrochloride*, m.p. 193° (decomp. from 140°); *sulphate*, m.p. 233—234° (decomp. from 200°); *picrate*, m.p. 144—146°; *Ac*, m.p. 121° (*dibromide*, m.p. 111°), and *phenylcarbamide* derivative, m.p. 93·5°]. (I) gives 8-*allylthiol-*2-*phenylquinoline-*4-*carboxylic acid*, m.p. 212°; (II) gives the corresponding 6-*allylthiol* compound, dimorphic, m.p. 168°, and 2-*phenyl-*1-p-*allylthiolphenyl-*4 : 5-*diketopyrrolidine-*4-p-*allylthiolanil*, m.p. 138—139°. The compounds have little or no pharmacological action. R. S. C.

Rearrangement of *o*-acetamido-sulphones and -sulphides. W. J. Evans and S. Smiles (J.C.S., 1935, 181—188).—Rearrangement of *o*-aminosulphones containing a sufficiently positive C may be effected with aq. NaOH; the products are characterised as sulphinic acids by conversion into disulphides and subsequent degradation to derivatives of $NHPh_2$. Similarly the NHAc-derivatives yield the corresponding Ac derivatives of the sulphinic acids. In the *o*-amino-sulphides, rearrangement is not effected under the same conditions as with the -sulphones, but the Ac derivatives are converted into *N*-acetylthiols. The factors controlling the rearrangements are discussed and the conclusions reached are confirmed by experimental evidence. 2-Nitro-2′-aminodiphenyl sulphide [*Ac* (I), m.p. 138°, $PhSO_2$, m.p. 172°, o-*nitrobenzoyl*, m.p. 150°, and *picryl* derivatives, m.p. 206—207°] with MeI and MgO gives 2-*nitro-*2′-*methylaminodiphenyl sulphide*, m.p. 110° (*Ac*, m.p. 124°, and o-*nitrobenzoyl* derivatives, m.p. 146°). 2-*Nitro-*2′-*dimethylamino-*5′-*methyldiphenyl sulphide*, m.p. 104°, is obtained from 1 : 2-$SCl\cdot C_6H_4\cdot NO_2$ and *p*-$C_6H_4Me\cdot NMe_2$. (I) and HNO_3 give 2 : 4′-*dinitro-*2′-*acetamidodiphenyl sulphide*, m.p. 179—180°, hydrolysed to the -*amino*-compound, m.p. 193°, deaminated to 2 : 4′-*dinitrodiphenyl sulphide*, m.p. 158—159°. 2 : 4-*Dinitro-*2′-*aminodiphenyl sulphide*, m.p. 148°, forms an *Ac* derivative, m.p. 199°. 2-*Nitro-*2′-*acetamidodiphenylsulphone* (II), m.p. 107°, by oxidation (H_2O_2) of the sulphide, is hydrolysed to the -*amino*-compound, m.p. 132—134°; 4-*chloro-*2-*nitro-*2′-*acetamido-* (III), m.p. 171°, 2-*nitro-*2′-*benzenesulphonamido-* (IV), m.p. 144—145°, 2-*nitro-*2′-*benzenesulphonylmethylamino-*, m.p. 189°, and 2 : 4′-*dinitro-*2′-*acetamido-diphenylsulphone* (V), m.p. 186—187°, are similarly prepared. Oxidation (H_2O_2) of the picryl derivative of (I) gives 2-*nitro-γ-picrylamidodiphenyl sulphide*, m.p. 250—251° (decomp.).

(II) with aq. NaOH forms 2-o-*nitrophenylaminobenzenesulphinic acid*, m.p. 124°, whilst with NaOH–EtOH followed by MeI, 2-*acet*-o-*nitrophenylamidophenylmethylsulphone*, m.p. 135—136°, is obtained. (III) and NaOH give a sulphinic acid converted into *bis*-2-p-*chloro*-o-*nitrophenylaminodiphenyl disulphide*, m.p. 174°, or methylated to 2-p-*chloro*-o-*nitrophenylaminophenylmethylsulphone*, m.p. 190°. (III) and NaOH–EtOH followed by MeI afford 2-*acet*-p-*chloro*-o-*nitrophenylamidophenylmethylsulphone*, m.p. 172°. (IV) and NaOH–EtOH–MeI yield 2-o-*nitrophenylbenzenesulphonamidophenylmethylsulphone*, m.p. 169°. The Na sulphinate formed by rearrangement of (IV) and $HgCl_2$ afford 2-o-*nitrophenylbenzenesulphonamidophenyl mercurichloride*, m.p. 224—225°. (V) and NaOH–EtOH and MeI give 5-*nitro*-2-*acet*-o-*nitrophenylamidophenylmethylsulphone*, m.p. 175—176°, whilst (V) and NaOH yield a sulphinic acid, degraded to 2 : 3′-*dinitrodiphenylamine*, m.p. 158°.

(I) and NaOH–EtOH–$COMe_2$ followed by MeI afford 2-*acet*-o-*nitrophenylamidophenyl Me sulphide*, m.p. 151°, hydrolysed to the 2-o-*nitrophenylamino*-compound, m.p. 98°. Rearrangement of 2-nitro-2′-aminodiphenyl sulphide in $COMe_2$ leads to 2-*acet*-o-*nitrophenylamidophenylmercaptan*, m.p. 114°, which with HI yields 2-o-*nitrophenyl*-1-*methylbenzthiazolonium iodide*, m.p. 203° (decomp.), and with $HClO_4$ forms the *perchlorate*, m.p. 192°. 4-Chloro-2-nitro-2′-aminodiphenyl sulphide is rearranged to 2-*aceto*-p-*chloro*-o-*nitrophenylamido-phenyl Me sulphide*, m.p. 142°, hydrolysed to the 2-p-*chloro*-o-*nitrophenylamino*-compound, m.p. 126°. Rearrangement of 2 : 4-dinitro-2′-aminodiphenyl sulphide (VI) yields 2-*acet*-op-*dinitrophenylamidophenyl Me sulphide*, m.p. 155—156°; of *o*-nitrophenyl 2-acetamido-1-naphthyl sulphide gives 2-*acet*-o-*nitrophenylamido*-, m.p. 158°, hydrolysed to 2-o-*nitrophenylamino*-1-*naphthyl Me sulphide*, m.p. 110°; of the *o*-nitrobenzoyl derivative of (VI) affords 2-o-*nitrobenz*-o-*nitrophenylamidophenyl Me sulphide*, m.p. 245°; and of 2-nitro-2′-dimethylamino-5′-methyldiphenyl sulphide gives 5-*nitro*-2-*acet*-o-*nitrophenylamidophenyl Me sulphide*, m.p. 192—193°. F. R. S.

***cis*- and *trans*-Chlorohydrins of *cyclo*hexene.** P. D. Bartlett (J. Amer. Chem. Soc., 1935, **57**, 224—227).—2-Chloro*cyclo*hexanone and $MgPr^{\beta}Cl$, $MgBu^{\beta}Cl$, or Mg *cyclo*hexyl chloride give 64, 72, and 27% yields, respectively, of a mixture of *A*- (I) (27%) (α-*naphthylurethane*, m.p. 165°) and B-2-*chloro*cyclo*hexanol* (II) (73%), b.p. 93—94°/26 mm. (α-*naphthylurethane*, m.p. 94°), separable quantitatively by NaOH–aq. EtOH, which hydrolyses (I) 300 times as fast as (II). (II) and boiling NaOH give 76% of *cyclo*hexanone. Modification of the conditions of reaction of *cyclo*hexene and HOCl failed to produce any (II), and (I) is almost the sole product of ring-fission of *cyclo*hexene oxide by $ZnCl_2$–Et_2O or conc. HCl. (I) and 0·5*N*-KOH–EtOH at 81° give only very slowly a little (II). (II) is assigned the *trans*-structure by analogies. R. S. C.

New series of urethanes. W. A. Lott and W. G. Christiansen (J. Amer. Pharm. Assoc., 1935, **24**, 22—23).—β-*Methyl*-, m.p. 132—133°, and β-*amylcinnamylurethane*, m.p. 77·5—78°, prepared from the corresponding alcohols, $COCl_2$, and NH_3, possess no hypnotic action on rats. The grouping $CHPh{:}CR^{-}$, or the non-absorption of the urethane is responsible for the lack of activity. The corresponding amides are active, and therefore it seems unlikely that these urethanes are not absorbed. H. T.

Addition of chloroform and bromoform to *o*-chlorobenzaldehyde. J. W. Howard and I. Castles (J. Amer. Chem. Soc., 1935, **57**, 376—377).—*o*-$C_6H_4Cl{\cdot}CHO$ and $CHCl_3$ or $CHBr_3$ give o-*chlorophenyl-trichloro*-, b.p. 170—171°/6—7 mm. (*acetate*, b.p. 162—163°, m.p. 86°; *propionate*, b.p. 175°/4 mm., m.p. 38°; *butyrate*, b.p. 201°/15 mm.; *benzoate*, m.p. 81°), and -*tribromo-methylcarbinol*, b.p. 195—196°/8 mm. (*acetate*, m.p. 102—103°; *propionate*, m.p. 78°; *butyrate*, b.p. 208—210°; *benzoate*, m.p. 91°). R. S. C.

β-Amino-α-diphenylylpropyl alcohol. S. Machlis and K. C. Blanchard (J. Amer. Chem. Soc., 1935, **57**, 176—177).—Ph_2, EtCOCl, and $AlCl_3$ in CS_2 give 4-*propionyldiphenyl*, m.p. 97° (not the 3-compound; cf. A., 1910, i, 392) (α-Br-compound, m.p. 79°), the *oximino*-derivative (prep. by $Bu^{\alpha}O{\cdot}NO$), m.p. 176°, of which gives by hydrogenation (Pd–C) in EtOH–HCl at 35 lb. pressure β-*amino-α-diphenylylpropyl alcohol*, unstable [*hydrochloride* (I), m.p. 253° (decomp.)]. (I) has pressor action one third that of ephedrine, but is sparingly sol. R. S. C.

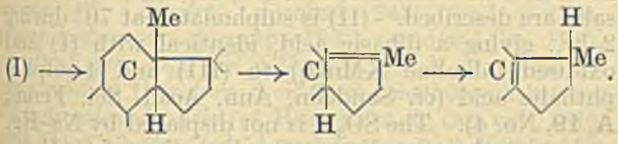
Halochromic salts from triarylmethylthiolacetic acids. M. Gomberg and W. E. Gordon (J. Amer. Chem. Soc., 1935, **57**, 119—124).—The following $CAr_3{\cdot}S{\cdot}CH_2{\cdot}CO_2H$ are prepared by Biilmann and Duc's method (A., 1924, i, 611): tri-*p*-tolylmethyl-, m.p. 185°, phenylxanthenyl-, m.p. 173°, phenylthioxanthenyl-, m.p. 180°, phenyldi-β-naphthoxanthenyl-, m.p. 202°, 12-phenyl-12-β-benzoxanthenyl-, m.p. 191° (cf. Wallis and Adams, A., 1933, 1167), tri-*p*-anisylmethyl-, m.p. 162°, diphenyl-α-naphthylmethyl- (I), m.p. 187°, and phenyldiphenylyl-α-naphthylmethyl- (II), m.p. 118°, -thiolacetic acids. These undergo fission when treated with $HClO_4$, $ZnCl_2$, $FeCl_3$, or $SnCl_4$ (usually) in AcOH and yield halochromic salts (*A*) of the type $CAr_3Cl,ZnCl_2$, which are hydrolysed to $CAr_3{\cdot}OH$. The (*A*) from (I) undergo fairly rapid decomp. to 11-phenylchrysofluorene; those from (II) similarly give 11-diphenylyl- (III) and (probably) 8 : 11-diphenyl-chrysofluorene, m.p. 190°. (III) is also obtained from *l*-(II) (Wallis and Adams, *loc. cit.*) and $ZnCl_2$ in AcOH. Absorption spectra of solutions of (II) (and phenyldiphenylyl-α-naphthylmethyl chloride) with $ZnCl_2$ or $HClO_4$ also indicate the formation of CAr_3X ($X=ClZnCl_2$ or ClO_4) and not simply additive compounds. The conclusions of Wallis (A., 1931, 1050) regarding the structure of such halochromic salts are based on misleading experimental evidence and do not preclude the quinonoid formulation (cf. A., 1902, i, 89). The quinocarbonium salt structure $[CR_2{:}C_6H_4{<}^{H}]^{+}X^{-}$ (A., 1910, i, 869) explains satisfactorily the known properties. 9-Phenylfluorenylthiolacetic acid is not cleaved to any appreciable extent by $ZnCl_2$ or $HClO_4$;

halochromism is not observed. The following *salts* are described: *tri*-p-*tolylmethyl chloride zincichloride* and *ferrichloride*; *phenylxanthenyl chloride zincichloride, ferrichloride,* and *stannichloride*; *phenylthioxanthenyl chloride zincichloride, ferrichloride,* and *stannichloride*; *phenyldi*-β-*naphthoxanthenyl chloride zincichloride* and *stannichloride*; 12-*phenyl*-12-β-*benzoxanthenyl chloride zincichloride, ferrichloride,* and *stannichloride*; *tri*-p-*anisylmethyl chloride ferrichloride*. *Phenylxanthenyl* and 12-*phenyl*-12-β-*benzoxanthenyl perchlorates* have m.p. 282° and 260°, respectively.
H. B.

Constitution of triarylmethyl derivatives. A. Hantzsch and A. Burawoy (Ber., 1935, 68, [*B*], 329—332).—Mainly in reply to Lifschitz (A., 1934, 1000), it is maintained that there are only colourless, ester-like triarylmethyl derivatives and coloured triarylmethyl salts. The essential difference is that the acid residue is ionically united in the latter compounds. The colour of carbonium salts is due to the presence of conjugated systems in their cations.
H. W.

[Law of periodicity.] A. Hantzsch and A. Burawoy (Ber., 1935, 68, [*B*], 333; cf. A., 1934, 769).—A reply to Petrenko-Kritschenko (A., 1934, 1000).
H. W.

Migration of the quaternary methyl group during dehydrogenation of sterols and similar compounds. E. Bergmann (Chem. and Ind., 1935, 175—176).—It is suggested that the migration of Me from C_{13} to C_{17} in the dehydrogenation of methoxyœstratrienol (I) is analogous to retropinacolinic rearrangement:

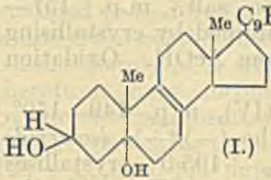


Similar production of 3′-methyl-1 : 2-*cyclo*pentenophenanthrene from cholesterol, involving fission of the C_8 side-chain with the adjacent H as C_8H_{18}, would afford proof of the location of the Me at C_{13}.
J. W. B.

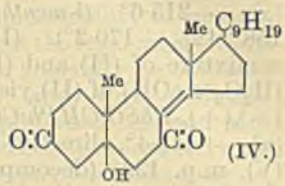
Migration of the quaternary methyl group during dehydrogenation of sterols etc. J. W. Cook (Chem. and Ind., 1935, 176).—Migration of Me is regarded as a process which accompanies the elimination of the group at C_{17} ($C_8H_{17}{}^{\beta}$ or OH) and which is independent of the dehydrogenation. The fluorescence of $C_{18}H_{16}$ obtained by dehydrogenation of sterols must be due to an impurity since none is exhibited by 3′-methyl-1 : 2-*cyclo*pentenophenanthrene.
J. W. B.

Effect of varying storage conditions on deterioration of ergosterol. L. R. Ellison and G. F. Hall (Analyst, 1935, 60, 92—95).—The effects of various manipulative treatments, and of storage in air or N_2, with or without light, on the $[\alpha]_D$ and m.p. of ergosterol are described (cf. A., 1931, 618). E. C. S.

Ergosterol and dehydroergosterol. M. Müller (Z. physiol. Chem., 1935, 231, 75—84).—Hydrogenation (Pd) of dehydroergosterol peroxide gives *ergostenediol II* (I), m.p. 219°, $[\alpha]_D$ +23·6° in $CHCl_3$ (*acetate*, m.p. 196°, $[\alpha]_D$ +22·08° in $CHCl_3$), differing from the -diol I (II), obtained from ergosterol peroxide,

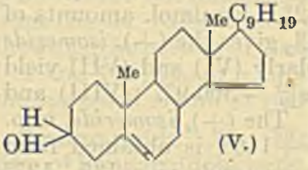


(I.)



(IV.)

in the position of the double linking. Ergostatrienediol (III) (A., 1930, 338) does not condense with maleic anhydride, indicating that the double linkings are not in the same ring. Reduction of (III) or ergostadienediol with H_2–Pd gives (I). Oxidation of (I) or (II) with CrO_3–AcOH affords 3 : 7-*diketo*-5-*ergostenol* (IV), $C_{28}H_{44}O_3$, m.p. 254° (decomp.), $[\alpha]_D$ +62·6° in $CHCl_3$, absorption max. at 254 mμ. Treatment of (I) or (II) with HCl in $CHCl_3$ yields *ergostadienol* (V), m.p. 171—172°, [α] −28·45° [*acetate* (VI), m.p. 174°, $[\alpha]_D$ −35·4° in $CHCl_3$]. With H_2–Pd, (VI) affords ergostanol acetate. (I) and (II) are not oxidised by $Pb(OAc)_4$.
J. H. B.



(V.)

Determination of sterols. A. Heiduschka and H. Sommer (Z. Unters. Lebensm., 1935, 69, 75—77).—The prep. of *phytosterol* (I) *oleate*, m.p. 83·5°, and *stearate*, m.p. 90·5°, is described. Esters of (I) and cholesterol may be determined colorimetrically using Liebermann's reaction.
E. C. S.

Synthesis of one of the dihydroanthraquinols. C. Prévost (Compt. rend., 1935, 200, 408—410).—$AgI(OBz)_2$ (A., 1933, 711) reacts with anthracene to form the *dibenzoate* (I), m.p. 127·5—128°, of a *dihydroanthraquinol* (II), to which, with a *substance*, $C_{28}H_{18}O_4$, m.p. 250°, (I) is hydrolysed by $Ba(OH)_2$. When (II) is heated slowly it melts at 150—180° (decomp.); heated rapidly, it polymerises. E. W. W.

Amidine hydrochlorides. J. B. Ekeley, D. V. Tieszen, and A. Ronzio (J. Amer. Chem. Soc., 1935, 57, 381).—*iso*Hex-, m.p. 113·5°, *phenoxybutyr*-, m.p. 150°, m-*tolu*-, m.p. 185·5°, and p-*chlorobenz-amidine hydrochloride*, m.p. 241—242°, are prepared.
R. S. C.

Reactivity of atoms and groups in organic compounds. XV. Relative reactivities of the hydrogen of the hydroxyl group in benzoic acid and certain of its derivatives. J. F. Norris and W. H. Strain (J. Amer. Chem. Soc., 1935, 57, 187—192; cf. A., 1934, 56, 406).—The relative rates of reaction of BzOH and its *o*-NO_2-, *o*- and *m*-Br-, *o*- and *m*-Cl-, *o*- and *m*-Me, and *o*-OMe-derivatives with di-*p*-tolyldiazomethane (a non-ionic bimol. reaction) is approx. ∝ the ionisation const. of the acid, but not to the rate of catalysed esterification.
R. S. C.

Further stereochemical studies. Optical isomerism of *d*-phenylsulphinylphenylacetic acids. W. Piechulek and J. Susko (Bull. Acad. Polonaise, 1934, A, 455—470).—PhS·CHPh·CO_2H (I) (modified prep.) is separated into the d- (II), m.p. 129—130°, $[\alpha]_D^{18}$ +216° [*cinchonidine*, m.p. 176—178° (decomp.),

$[\alpha]_D^{19}$ +38·6°, and *brucine* salt ($1C_6H_6$), m.p. 97°, $[\alpha]_D$ +55°], and the l-*isomeride* (III), m.p. 129—130°, $[\alpha]_D$ −215·6° (l-*menthylamine* salt, m.p. 157—158°, $[\alpha]_D$ −170·2°). (I) is obtained by crystallising a mixture of (II) and (III) from AcOH. Oxidation (H_2O_2–AcOH) of (II) yields $(+)_s(+)_c$-*PhSO·CHPh·CO₂H* (IV), m.p. 149—150°, $[\alpha]_D$ +419·4°, directly, and the $(-)_s(+)_c$ *isomeride* (V), m.p. 139° (decomp.), $[\alpha]_D$ +195·0°, crystallises from the mother-liquor. Similarly (III) yields the $(-)_s(-)_c$ *isomeride* (VI), m.p. 148—149° (decomp.), $[\alpha]_D$ −420·4°, and the $(+)_s(-)_c$ *isomeride* (VII), m.p. 139° (decomp.), $[\alpha]_D$ −191·2°. Equimol. amounts of (IV) and (V) in EtOH–$CHCl_3$ gives the $(+)_c$ *isomeride* (VIII), $[\alpha]_D^{20}$ +304·4°; similarly (VI) and (VII) yield the $(-)_c$ *isomeride* (IX), $[\alpha]_D^{23}$ −306·9°. (VIII) and (IX) exist in solution only. The $(+)_s$ *isomeride*, m.p. 135—137° (decomp.), $[\alpha]_D$ +116°, is obtained from (IV) and (VII) and the $(-)_s$ *isomeride*, m.p. 135—137° (decomp.), $[\alpha]_D$ −117°, from (V) and (VI). A racemate mixture, m.p. 146—147° (decomp.), is obtained from EtOH solution of (IV) plus (VI); another racemate mixture, m.p. 135° (decomp.), is obtained from (V) and (VII). Oxidation (H_2O_2–AcOH) of (II) or (IV) yields the corresponding *sulphonyl* compound, m.p. 180—197° (decomp.), $[\alpha]_D^{19}$ +107·6°, which racemises in $COMe_2$ to the *inactive acid*, m.p. 151—153° (decomp.). All vals. of [α] are in EtOH–$CHCl_3$ (1 : 1 vol.). F. N. W.

Rotatory power and chemical constitution. I. Preparation and resolution of α-benzyl-*n*-hexoic acid and some derivatives. H. R. Burjorjee, (Miss) Kamakshi, B. K. Menon, and D. H. Peacock (Proc. Indian Acad. Sci., 1934, **1**, **A**, 407—411).—$CH_2Ac·CO_2Et$ (Na derivative) with Bu^gBr in boiling EtOH gives a product (I), the Na derivative of which with CH_2PhCl, followed by hydrolysis, gives dl-α-*benzyl*-n-*hexoic acid* (II), b.p. 181—182°/5 mm. (*Ag* salt; resolved through its *quinine* salt, m.p. 95°, to the d-*acid*, $M[\alpha]_D^{29}$ +57·6° in C_6H_6; *amide*, m.p. 97°, *anilide*, m.p. 97°). Similarly are prepared dl-α-p-, m.p. 62° (*Ag* salt; *amide*, m.p. 138°; *anilide*, m.p. 116°; d-*acid*, $M[\alpha]_D^{30}$ +116·3° in C_6H_6) and -m-*bromo*-, b.p. 217°/8 mm. (*Ag* and *Ba* salts; *amide*, m.p. 91°; *anilide*, m.p. 119°; d-*acid*, $M[\alpha]_D^{30}$ +57° in C_6H_6), dl-α-p-, m.p. 160° (*Ag* salt; d-*acid*, $M[\alpha]_D^{29}$ +14·5° in C_6H_6), and -m-*carboxybenzyl*-n-*hexoic acid*, m.p. 115° (*Ag* salt; d-*acid*, $M[\alpha]_D^{29}$ +23·1° in C_6H_6). The greater influence of Br than CO_2H on $M[\alpha]$ as compared with H is probably due to the electromeric effect of Br. J. L. D.

Influence of catalysts on the reaction of sulphur with unsaturated organic compounds. I. Vulcanisation at high temperatures. O. Schwarzkopf (Bull. Soc. chim., 1935, [v], 2, 64—69).—Whilst Et cinnamate (I) alone does not react with S at 160—170°, approx. one atom of S is absorbed by each mol. of (I) in the presence of the vulcanisation catalysts $(CH_2)_6N_4$ and K xanthate. J. G. A. G.

Rotatory power and chemical constitution. II. Preparation and resolution of β-*p*-bromophenyl-α-benzylpropionic acid and similar compounds. H. R. Burjorjee, B. K. Menon, and D. H. Peacock (Proc. Indian Acad. Sci., 1934, **1**, **A**, 412—417).—Et sodiobenzylmalonate with *p*- and *m*-$NO_2·C_6H_4·COCl$ in EtOH gives *Et* α-*benzyl*-α-p-*nitrobenzylmalonate*, m.p. 76°, and an oil, respectively, neither of which can be hydrolysed nor gives an amide. Et benzylacetoacetate with *p*-$C_6H_4Cl·CH_2Br$, followed by hydrolysis, gives dl-β-*phenyl*-α-p-*chlorobenzylpropionic acid*, m.p. 86°, resolved through the *quinine* salt, m.p. 183° into the d-*acid*, m.p. 74°, $M[\alpha]_D^{29·5}$ +27·97° in C_6H_6. dl-β-*Phenyl*-α-m-*chlorobenzyl*-, m.p. 64° (d-*acid*, m.p. 73·5°, $M[\alpha]_D^{29·5}$ +22·45° in C_6H_6; *quinine* salt, m.p. 173°), -α-p-, m.p. 92° (d-*acid*, m.p. 90°, $M[\alpha]_D^{29·5}$ +51·35° in C_6H_6; *quinine* salt, m.p. 175°), and -α-m-*bromobenzylpropionic acid*, m.p. 81° (l-*acid*, m.p. 89·5°, $M[\alpha]_D^{29·5}$ −33·4° in C_6H_6; *quinine* salt, m.p. 161°), are prepared similarly. dl-β-*Phenyl*-α-p-, m.p. 212°, and -m-*carboxybenzylpropionic acid*, m.p. 159°, cannot be resolved. The following are also prepared: β-p-, m.p. 134·5°, and -m-*bromophenylpropionic acid*, m.p. 71°, and dl-β-p-*bromophenyl*-α-m-*bromobenzylpropionic acid*, m.p. 110° (*amide*, m.p. 138·9°; *anilide*, m.p. 156°), which cannot be resolved. The larger effect on $M[\alpha]$ of Br than Cl is probably due to the greater electromeric effect of Br. J. L. D.

Twitchell's reagent. E. Schlutius (J. pr. Chem., 1935, [ii], **142**, 49—78).—The reagent prepared by condensation of $C_{10}H_8$, oleic acid, and conc. H_2SO_4 is ι- or κ-6- or 7-sulpho-1-naphthylstearic acid (I) (cf. Sandelin, G.P. 114,491), and can be partly purified through the Pb salt. Oleic acid with $C_{10}H_8$ and 1⅓ mols. of Al_2Cl_6 gave ι- or κ-1-*naphthylstearic acid* (II) [oxidised to hemimellitic acid (III); does not form emulsions or foams, or hydrolyse fats]. The *Me* ester, *acid chloride*, and *Na*, *K*, *Al*, *Pb*, and *Cu* salts are described. (II) is sulphonated at 70° during 2 hr., giving a dibasic acid, identical with (I) and oxidised (alkaline $KMnO_4$) to (III) and 4-sulphophthalic acid (cf. Sandelin, Ann. Acad. Sci. Fenn., **A**, **19**, No. 4). The SO_3H is not displaced by Na–Hg, and must therefore be β. Condensation of $C_{10}H_8$ in conc. H_2SO_4 with saturated and hydroxystearic (IV) acids failed to give products which hydrolysed fats. Only unsaturated acids give compounds with that property, but (IV) with 4% oleum and $C_{10}H_8$ gave a product with some hydrolysing power. H. G. M.

(−)Phenylmethoxyacetonitrile. (Miss) I. A. Smith (J.C.S., 1935, 194—196).—$SOCl_2$ and *r*-phenylmethoxyacetamide give a mixture of the nitrile and BzCN, but P_2O_5 in PhMe affords the pure nitrile. P_2O_5 and the (+)-amide yield (−)-*phenylmethoxyacetonitrile*, b.p. 120°/17 mm. $[\alpha]_{5461}^{20}$ −63·5° in $COMe_2$. Racemisation with EtOH–KOH gives a final small (+)-rotation, whilst with H_2O, the product is inactive. MgPhBr with the *r*-nitrile affords benzoin Me ether and with BzCN yields $CPh_3·OH$. F. R. S.

Hydrogenation of phenylpyruvic acid. J. Jarrousse (Compt. rend., 1935, **200**, 324—326).—Reduction of phenylpyruvic acid with Na–Hg in acid solution gives a γ-*lactone* (I), m.p. 225°, of αγ-*dihydroxy*-β-*phenyl*-γ-*benzylglutaric acid* (II) [*Ac* derivative (III), m.p. 168°]. Hydrolysis of (III) or the action of OH′ on (I) gives (II), m.p. 140°. Maintaining (II) at 150—175° for 2—3 min. gives an *isomeride* of (I), m.p. 136°. H. D.

Synthesis of glucocaffeic acid. F. MAUTHNER (J. pr. Chem., 1935, [ii], **142**, 149—151).—Me caffeate and acetylglucosidyl bromide in aq. $COMe_2$–NaOH give an oil, hydrolysed by cold 6% $Ba(OH)_2$ to *glucocaffeic acid*, m.p. 159—160° after sintering.

R. S. C.

Esters of caffeic acid. B. HELFERICH and F. VORSATZ (J. pr. Chem., 1935, [ii], **142**, 191—192).—Caffeic acid, the alcohol, and H_2SO_4 at 100° (2 hr.) give the *Me* (I), m.p. 162°, *Et*, m.p. 149·5°, Pr^{a}, m.p. 127°, and Bu^{a}, m.p. 110°, esters, sol. in Na_2CO_3, but recovered therefrom by Et_2O. (I) is also formed at room temp. (several days) and the structure thus indicated is confirmed by the $FeCl_3$ colour characteristic of chlorogenic acid. R. S. C.

Resolution of tertiary hydroxy-carboxylic acids. E. W. CHRISTIE, A. MCKENZIE, and A. RITCHIE (J.C.S., 1935, 153—155).—r-4-*Methoxybenzilic acid*, obtained from KOH–EtOH and 4-methoxybenzil, could not be resolved. *r*-Phenyl-*p*-tolylglycollic acid is resolved through the quinine salt into (+)*phenyl*-p-*tolylglycollic acid*, m.p. 125—127°, $[\alpha]_{5461}^{20}$ +2·5° in EtOH (*Et* ester, $[\alpha]_{5461}^{21}$ +4·4° in $COMe_2$), reduced to the inactive -acetic acid. r-p-*Tolylmethylglycollic acid*, m.p. 102—104°, from *p*-$C_6H_4Me{\cdot}MgBr$ and $AcCO_2H$, is resolved by quinine into the (−)*acid*, m.p. 140—142°, $[\alpha]_{5461}^{20}$ −51·2° into EtOH. *r*-Anisylmethylglycollic acid is resolved with morphine (cf. McKenzie *et al.*, A., 1932, 1037). F. R. S.

Constitution of norcaryophyllenic acid. G. R. RAMAGE and J. L. SIMONSEN (Chem. and Ind., 1935, 151).—Dehydronorcaryophyllenic acid (I) with O_3 yields probably α-*keto*-ββ-*dimethylglutaric acid*, hygroscopic (2 : 4-*dinitro*-, decomp. 243°, and p-*nitrophenylhydrazone*, decomp. 192°), oxidised by H_2O_2 in alkali to $CO_2H{\cdot}CH_2{\cdot}CMe_2{\cdot}CO_2H$. Norcaryophyllenic acid is therefore d-cis-3 : 3-*dimethyl*cyclo*butane*-1 : 2-*dicarboxylic acid* (cf. Ruzicka *et al.*, this vol., 351), and (I) 3 : 3-*dimethyl*-Δ^1-cyclo*butene*-1 : 2-*dicarboxylic acid*. R. S. C.

Stereoisomeric 4-methyl*cyclo*hexane-1-carboxylic-1-acetic acids. S. GOLDSCHMIDT and G. GRÄFINGER (Ber., 1935, **68**, [*B*], 279—286).—Crit. re-examination has been made of the work of Qudrat-i-Khuda (A., 1931, 1055), whose 4-methyl*cyclo*hexane-1-carboxylic-1-acetic acid (I) (*A*, m.p. 137°; *B*, m.p. 129°; *C*, m.p. 174°; *D*, m.p. 146°) affords the sole instance of the existence of monocyclic compounds in more forms than can be accounted for by a plane ring structure. The constitution of Et 4-methyl*cyclo*hexylidenecyanoacetate (II) is confirmed since the sole product of its oxidation by $KMnO_4$ is 4-methyl*cyclo*hexanone, identified as the semicarbazone. The possibility of isomerisation during the addition of KCN to (II) appears excluded by the results of oxidation of the isomeric forms of (I). The possible production of mixtures of stereoisomeric (I) by a different process is examined by treatment of Ag_2 4-methyl*cyclo*hexane-1 : 1-diacetate with I, hydrolysing the *lactone* $C_{10}H_{16}O_2$, b.p. 98°/0·6 mm., to 4-methyl-1-hydroxymethyl*cyclo*hexane-1-acetic acid, and oxidising the latter substance with $KMnO_4$–$Ba(OH)_2$ to (I), which yields *C* and *A*, but affords no evidence of the existence of *B* or *D*. Re-examination of the separation by treatment of the NH_4 salts of *A*, *B*, *C*, and *D* with EtOH as described or by a modified procedure indicates impossibility of success. *A* and *C* are isolable thereby, and the residual fractions consist mainly of *A* which can generally be obtained therefrom only incompletely and with difficulty by direct crystallisation. A preferable method consists in converting the acids into their imides (*A*, m.p. 129°; *C*, m.p. 171°) and subsequent semi-hydrolysis, whereby *A* is transformed into a sparingly sol. *semi-amide*, m.p. 191°. Indications of the existence of *B* and *D* are not obtained and they should be deleted from the lit. The mixed m.-p. diagram of *A* and *C* shows the formation of 2 additive compounds (*A* : *C* = 1 : 1 and 4 : 1) the m.p. of which are approx. those of the supposed *B* and *D* varieties. H. W.

Amino-acids. V. Modification of the reduction of benzamidoacrylic acids in the Erlenmeyer synthesis. V. DEULOFEU. **VI. Preparation of 3-hydroxy-4-methoxyphenylalanine.** V. DEULOFEU and O. REPETTO (Anal. Fís. Quím., 1934, **32**, 152—158, 159—164; cf. A., 1933, 1159).—V. An improved method of reduction by Na–Hg of $CHR{:}C(NHBz){\cdot}CO_2H$ to $CH_2R{\cdot}CH(NHBz){\cdot}CO_2H$ (R = Ph, *p*-$C_6H_4{\cdot}OMe$, furyl, piperonyl) is described. 2 : 4-$(OMe)_2C_6H_3{\cdot}CHO$ and $NHBz{\cdot}CH_2{\cdot}CO_2H$ (I) when heated with NaOAc and Ac_2O give an *azlactone*, m.p. 181° (softens at 167°), which on hydrolysis with 1% NaOH yields α-*benzamido*-2 : 4-*dimethoxycinnamic acid*, m.p. 214—215°. Reduction with Na–Hg gives the N-*Bz* derivative, m.p. 162—164°, of α-*amino*-β-2 : 4-*dimethoxyphenylpropionic acid*, m.p. 241° (*phenylurethane*, m.p. 178°).

VI. *iso*Vanillin (II) and (I) give an azlactone (*Ac* derivative, m.p. 139°) which yields α-*benzamido*-3-*hydroxy*-4-*methoxycinnamic acid*, m.p. 194°, reduced to the N-*Bz* derivative, m.p. 180°, of α-*amino*-β-3-*hydroxy*-4-*methoxyphenylpropionic acid* (III), m.p. 272° (decomp.). With hydantoin and thiohydantoin, (II) gives 3-*acetoxy*-4-*methoxybenzylidene-hydantoin* (IV), m.p. 248°, and -2-*thiohydantoin*, m.p. 251°, respectively. Reduction of (IV) gives 3-*hydroxy*-4-*methoxybenzylhydantoin*, m.p. 194°, hydrolysed [$Ba(OH_2$] to (III). With diketopiperazine, (II) gives *bis*-(3-*acetoxy*-4-*methoxybenzylidene*)*diketopiperazine*, m.p. > 290°, which when reduced with P and HI yields 3 : 4-$(OH)_2C_6H_3{\cdot}CH_2{\cdot}CH(NH_2){\cdot}CO_2H$ (cf. Hirai, A., 1921, i, 248). F. R. G.

Phenylsuccinic acid series. XI. Interaction of the optically active and inactive diphenylsuccinic anhydrides with butyl alcohol and aniline. H. WREN and G. L. MILLER (J.C.S., 1935, 157—160).—Interaction of $Bu^{a}OH$ and *r*-diphenylsuccinic acids in various solvents in glass and SiO_2 vessels shows that the ratio of Bu H *r*- to *meso*-diphenylsuccinate in the product depends on the nature of the vessel and of the solvent; isomerisation in glass is invariably > in SiO_2. These two factors also operate in producing racemisation during the interaction of $Bu^{a}OH$ and the *d*-anhydride. In non-basic solvents the effect is almost entirely due to the glass. Reaction between NH_2Ph and the *d*-anhydride occurs so rapidly and under such mild conditions that the nature of the vessel has little influence; in sufficiently basic solvents racemisation is very pronounced. Evidence is advanced against the view that a *r*-compound in dil. solutions necessarily behaves as a mixture of *d*- and *l*-forms. The following *diphenylsuccinates* have been prepared : *Buᵅ* r-, m.p. 46—47° ; *Buᵅ H* r-, m.p. 129—130° ; *Buᵅ* meso-, m.p. 100—101° ; *Buᵅ H* meso-, m.p. 159·5—160·5° ; *Buᵅ* d-, m.p. 64—64·5°, $[\alpha]^{20}_{5461}$ +279·5° in $COMe_2$; *Buᵅ H* d-, m.p. 93·5—94°, $[\alpha]^{17}_{5461}$ +349·6° in $COMe_2$; *Buᵅ* l-, m.p. 64—64·5°, $[\alpha]^{19\cdot5}_{D}$ −227·3° in $COMe_2$; and *Buᵅ H* l-, m.p. 93·5—94°, $[\alpha]^{19\cdot4}_{D}$ −278·8° in $COMe_2$. *r*-Diphenylsuccinic anhydride and PhCN give an additive *product*, m.p. 218—222°. Amounts of *r*- and *meso*-compounds are determined by f.p. F. R. S.

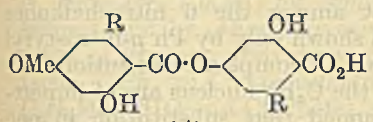
Isomeric α-cyano-β-phenyl-α-methylglutaric acids and their derivatives. S. Avery and F. C. McGrew (J. Amer. Chem. Soc., 1935, **57**, 208—211).—The work of Carter and Lawrence (Proc. C.S., 1900, **16**, 178) is amplified and in places corr. The *A*- (α-, *trans*-) and *B*- (β-, *cis*-) -series of compounds described below are believed to be stereoisomeric. Et_2 α-cyano-β-phenyl-α-methylglutarate, m.p. 90° (I), with KOH–abs. EtOH gives the corresponding *A*-acid (II), m.p. 164° (*K* and K_2 salts), which with HCl–EtOH regenerates (I) and with AcCl gives the *anhydride*, m.p. 111° [considered (*loc. cit.*) to be the imide], hydrolysed to (II) by hot H_2O ; by the *brucine* salts (that of *d*-acid less sol.) it yields the d- and l-*forms*, m.p. 185—187°, $[\alpha]_D$ +7·4°, −7·5°. The corresponding *B*-acid (III), m.p. 194°, is similarly resolved, the d- (less sol. *brucine* salt) and l-*forms* having m.p. 164—165° (decomp.) and $[\alpha]_D$ +32·4°, −32·1°. All of these CN-compounds with KOH yield α-carbethoxy-β-phenyl-α-methylglutaric acid (IV), m.p. between 176° and 190° (decomp.) (no substance, m.p. 148°, was isolated), giving slowly at 125° or rapidly in H_2O at 175° β-phenyl-α-methylglutaric acid (V), m.p. 127°. (I) with H_2SO_4–AcOH yields A-α-*carbethoxy*-β-*phenyl*-α-*methylglutarimide* (VI), m.p. 149° (corr.); the corresponding *B*-ester (VII) yields similarly the B-*imide* (VIII), m.p. 128—129°, whilst the Me esters corresponding with (I) and (VII) give A-, m.p. 172—173°, and B-α-*carbomethoxy*-β-*phenyl*-α-*methylglutarimide*, m.p. 167—169°, respectively. (VII) and (VIII) with K_2CO_3–EtOH afford A-, m.p. 163—164°, and B-α-*carbethoxy*-β-*phenyl*-α-*methylglutaramic acid* (position of NH_2 unknown), m.p. 168—170°, respectively, both rapidly dehydrated by hot, conc. HCl to the corresponding imide. All the above products with HCl–AcOH at 150° give (V) and a mixture, m.p. 115—117°, of much of an *isomeride* with a little (V). (V) is obtained quantitatively from (IV) by H_2O at 140—150°. Et_2 α-cyano-β-phenyl-αβ-dimethylglutarate gives an ester-imide analogous to (VI), but none could be obtained from the β-phenyl-α-benzyl-β-methyl, or β-phenyl-α-benzyl esters. The Me_2, Pr_2, and Bu_2 esters corresponding with (I) and the α-cyano-esters of other substituted glutaric acids are less readily separated into pure isomerides. R. S. C.

Additive reactions of unsaturated α-keto-acids. IV. (Misses) M. Reimer, E. Tobin, and M. Schaffner (J. Amer. Chem. Soc., 1935, **57**, 211—215; cf. A., 1934, 72).—3 : 4-$C_6H_3(OMe)_2$·CH:CH·CO_2H (I) and 3 : 4-*dimethoxybenzylidenepyruvic acid* (II) resemble the 4- rather than the 3-OMe-acids. (II) (prep. from $AcCO_2H$, veratraldehyde, and KOH–MeOH), m.p. 155° (*Et*, m.p. 71—72°, and *Me*, m.p. 118°, esters), is only slightly photosensitive and with Br (1 mol.) in cold $CHCl_3$ gives a *dibromide*, m.p. 134—136°, which with cold H_2O or, better, hot MeOH gives β-*bromo*-3 : 4-*dimethoxybenzylidenepyruvic acid* (III), m.p. 157° (decomp. ; softens at 150°) (*Me* ester, m.p. 141—142°) ; with 2 mols of Br in $CHCl_3$ (II) gives a mixture, which with Br in AcOH affords β : 6-*dibromo*-3 : 4-*dimethoxybenzylidenepyruvic acid* (*Me* ester, m.p. 171—172°), which, when heated above the m.p., 162—164° (decomp.), yields α : 6-*dibromo*-3 : 4-*dimethoxycinnamaldehyde*, m.p. 180° (decomp.) [*semicarbazone*, m.p. about 215° (decomp.)], oxidised by H_2O_2–Na_2CO_3 to the corresponding *acid* (IV), m.p. 233°. (I), m.p. 179—181°, gives only the dibromide (V), m.p. 149°. α-*Bromo*-3 : 4-*dimethoxycinnamic acid* [not obtained from (V), but readily from (III) by H_2O_2], m.p. 167—168° (*Me* ester, m.p. 83°), with cold H_2O gives α-*bromo*-3 : 4-*dimethoxystyrene*, m.p. 67° [also obtained from (V)], and α-*bromo*-β-*hydroxy*-3 : 4-*dimethoxycinnamic acid*, m.p. 166° (*Me* ester, m.p. 145—147°) ; with Br it affords αβ : 6-*tribromo*-γ-3 : 4-*dimethoxyphenylpropionic acid*, m.p. about 149° (resolidifies, second m.p. much >200°), which at 150° loses HBr to form (IV) (*Me* ester, m.p. 139° ; oxidised by $KMnO_4$ to 6-bromoveratric acid), which with 25% KOH–EtOH gives an *isomeride*, m.p. 198° [*Me* ester, m.p. 92° ; changes slowly to (IV) when heated], and a small amount of α : 6-*dibromo*-3 : 4-*dimethoxystyrene*, m.p. 100° R. S. C.

o-Aldehydo-carboxylic acids. II. Synthesis of 4-methoxyphthaldehydic acid and a new synthesis of opianic acid. S. N. Chakravarti and M. Swaminathan (J. Indian Chem. Soc., 1934, **11**, 873—875).—Oxidation (SeO_2) of 5-methoxyhomophthalic acid gives 4-methoxyphthalonic acid, isolated as the *anilino*-derivative, m.p. 165°, which when heated yields the *anilino*-derivative, m.p. 179—180°, of 4-*methoxyphthalaldehydic acid*, m.p. 141°. Reduction (Na–Hg) of the acid leads to 5-*methoxyphthalide*, m.p. 119°. A similar series of reactions from 3 : 4-dimethoxyhomophthalic acid, m.p. 116°, gives opianic acid. F. R. S.

Lichen substances. XLVII. Constitution of physodic acid. II. Y. Asahina and H. Nogami. **XLVIII. Microphyllic acid, a new depside from *Cetraria callata* f. *microphyllina*.** A. Zahlbruckner, Y. Asahina, and F. Fuzikawa. **XLIX. Synthesis of methyl sekikoate dimethyl ether.** Y. Asahina and M. Yasue (Ber., 1935, 68, [*B*], 77—80, 80—82, 132—134).—XLVII (cf. A., 1934, 891). Treatment of Me *iso*physodate Me_3 ether with conc. KOH–EtOH at 160° leads to hexoic acid and *protophysodon Me_3 ether* (I) $C_{21}H_{28}O_4$, b.p. 130°/0·08 mm. (I) and Br in AcOH yield a *Br_3*-derivative (II), m.p. 126—127°, regarded by analogy with the Br-substituted derivative of orcinol Me_2 ether (Fuzikawa, this vol., 347) as 2 : 4 : 2′-*tribromo*-5 : 3′ : 5′-*trimethoxy*-3-*methyl*-1′-n-*amyldiphenyl ether*. Physodic acid is therefore a depsidone derivative the skeleton of which is a Ph_2 ether derived from orcinol and hydroxyolivetol. Oxidation of (I) with $Na_2Cr_2O_7$ in AcOH causes destruction of the hydroxyolivetol nucleus with formation of 6-methoxy-2-methyl-*p*-benzoquinone, m.p. 151°, whereas similar treatment of (II) occurs at the expense of the orcinol nucleus with formation of 3-bromo-6-methoxy-2-*n*-amyl-*p*-benzoquinone, m.p. 114°. Repeated crystallisation of crude atranorin from *Parmelia physodes* leads to the isolation of chloroatranorin, m.p. 207—208°.

XLVIII. Extraction of the thalli of *C. collata* leads to the isolation of microphyllinic acid (I), m.p. 116°, which gives a violet colour with $FeCl_3$ but no colour with bleaching powder. (I) is transformed by CH_2N_2 into the *Me* ester, m.p. 118°, whilst olivetonide Me_2 ether, m.p. 94°, is also produced if excess of the reagent is used. Boiling, conc. HCO_2H converts (I) smoothly into olivetonide and its Me_1 ether. (I) is therefore *A* ($R=CH_2{\cdot}CO{\cdot}C_5H_{11}$); it is related to α-collatolic acid in the same manner as is olivetoric to physodic acid.



(*A*)

XLIX. 4-Hydroxy-3 : 5-dimethoxyallylbenzene is hydrogenated (Pd–C in EtOH) to 4-*hydroxy*-3 : 5-*dimethoxy*-n-*propylbenzene* (I), b.p. 143—146°/3 mm., (sparingly sol. *Na* salt; *acetate*, m.p. 87—88°; *benzoate*, m.p. 91—92°). (I) in anhyd. HCN is converted by HCl and $AlCl_3$ into 3-*hydroxy*-2 : 5-*dimethoxy*-6-n-*propylbenzaldehyde* (II), m.p. 94—95°. Condensation of (II) with 2 : 4-*dimethoxy*-6-n-*propylbenzoyl chloride* (from divaricatic acid Me ether and $SOCl_2$) in C_5H_5N affords *sekika-aldehyde Me₂ ether*, m.p. 102—103°, oxidised by $KMnO_4$ to *sekikaic acid Me₂ ether* (III), m.p. 141—142°, the Me ester, m.p. 80—81°, of which is identical with that obtained from natural sources. (III) is therefore 3-2′ : 4′-dimethoxy-6′-*n*-propylbenzoyl-2 : 4-dimethoxy-6-*n*-propylbenzoic acid. H. W.

Cannizzaro reaction applied to the aliphatic and arylaliphatic series. L. PALFRAY and S. SABETAY (Compt. rend., 1935, **200**, 404—406).—Reaction of aldehydes (I) of these series with $CH_2Ph{\cdot}OK$ (II) (A., 1932, 867; 1934, 758) is not a simple Cannizzaro reaction, since (II) with heptaldehyde, hydroxycitronellal, or myrtenal yields BzOH, with reduction of (I). $COPh_2$ and (II) give BzOH and $CHPh_2{\cdot}OH$. E. W. W.

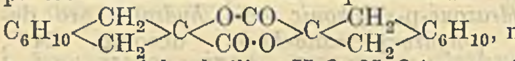
Action of maleic anhydride on aldehydo-amine bases. G. LA PAROLA (Gazzetta, 1934, **64**, 919—931).—The general reaction $NR{:}CHR'+({:}CH{\cdot}CO)_2O-H_2O=NHR{\cdot}CO{\cdot}CH{:}CH{\cdot}CO_2H+R'CHO$ proceeds at 40—50° in EtOH. Thus the product when R=Ph and R′=Ph, $C_6H_4{\cdot}OMe$, or CHPh:CH is maleanilic acid; when $R=C_6H_4{\cdot}OEt$ and R′=Ph, is *p*-phenetylmaleamic acid. When R=*o*-, *m*-, and *p*-$C_6H_4{\cdot}CO_2H$ and R′=Ph, o-, m-, and p-*carboxyphenylmaleamic acids*, m.p. 187°, 204°, and 212°, respectively, are formed; when $R=\alpha\text{-}C_{10}H_7$ and R′=Ph, the product is *α-naphthylmaleamic acid*, m.p. 142°, of which the β-isomeride is obtained when $R=\beta\text{-}C_{10}H_7$ and $R'=C_6H_4{\cdot}OMe$. Benzylideneaminoazobenzene yields *benzeneazophenylmaleamic acid*, m.p. 202°. E. W. W.

Reaction of phenylhydrazine-*p*-sulphonic acid with aldehydes. H. BILTZ [with BODENBURG and WANDERSCHECK] (Ber., 1935, **68**, [*B*], 221—226).—The presence of SO_3H diminishes the stability of the compounds with aldehydes, which usually are hydrates, $OH{\cdot}CHR{\cdot}NH{\cdot}NH{\cdot}C_6H_4{\cdot}SO_3H$. They generally dissociate into their components in H_2O, but re-combination accompanies crystallisation. Simultaneous action of $NHPh{\cdot}NH_2$ and *p*-$SO_3H{\cdot}C_6H_4{\cdot}NH{\cdot}NH_2$ affords the aldehydephenylhydrazones. Substituents which have a negative effect on C attached to CHO in the aldehyde favour the stability of the hydrate and 2 such activating groups favour the loss of H_2O and production of the true hydrazone. The following *-phenylhydrazone-*p*-sulphonic acid hydrates* are described: p-*hydroxybenzaldehyde*-, decomp. 245°, which does not lose H_2O at 70—80°/diminished pressure, its *Na* salt ($+3H_2O$), and (?) the similar products from *m*-$OH{\cdot}C_6H_4{\cdot}CHO$; p-*dimethylaminobenzaldehyde*-, decomp. about 246°; p-*nitrobenzaldehyde*- (?$+3H_2O$) and its *Na*, *Mg*, *Pb*, and *Ba* ($+2H_2O$) salts; *piperonal*-, decomp. 180—190° after softening at 160—170° (Na salt). *Protocatechualdehydephenylhydrazone*-p-*sulphonic acid*, decomp. 260° or 248—256° when slowly heated, its *Na* and NH_4 salts are described. H. W.

Equilibria between amino-acids and aromatic aldehydes. I. J. M. GULLAND and I. H. MEAD (J.C.S., 1935, 210—217). The condensation of aromatic aldehydes and NH_2-acids or esters leads (*a*) irreversibly, to the arylidene derivatives of arylserines and of αβ-diarylhydroxyethylamines (Erlenmeyer, A., 1895, i, 281); (*b*) reversibly, to *N*-arylidene derivatives (Schiff's bases) (cf. Bergmann and others, A., 1925, i, 890). The Schiff's bases obtained are *Ba* 2-*hydroxy*-3- and -5-*methoxybenzylideneglycine* [condensation of the aldehyde, glycine, and $Ba(OAc)_2$], and *Ba* 2 : 5- and 2 : 3-*dimethoxybenzylideneglycine*. Vanillin, *iso*vanillin, veratraldehyde, and *p*-$NMe_2{\cdot}C_6H_4{\cdot}CHO$ do not condense. Polarimetric study of the rates of reaction of *d*-phenylalanine with 2 : 3-, 2 : 5-, and 3 : 4-$(OMe)_2C_6H_3{\cdot}CHO$ shows that the first two aldehydes condense more rapidly and to a greater extent than the third, the products having greatly increased [α]. Condensations are reversible, and the aldehydes and NH_2-acids are recovered as 2 : 4-dinitrophenylhydrazones, α-naphthylureide or *p*-toluenesulphonyl derivative after the hydrolysis of the condensation products by acid. Structures for the condensation products are discussed. F. R. S.

Benzeneazolignin and the phenolic nature of "dioxan-lignin." E. WEDEKIND (Naturwiss., 1934, **23**, 70). "Dioxan-lignin" (I), prepared by heating lignin with dioxan–HCl at 100°, is sol. in many org. solvents and aq. NaOH (not Na_2CO_3), and still contains about 15·5% OMe. In AcOH it gives Br- and NO_2-compounds. Its alkaline solution develops scarcely any colour with PhN_2Cl, but acid ppts. from the solution thus obtained an *azo*-compound (N 5·6%), electrometric titration of which leads to a formula, $C_{19}H_{20}O_6$, for (I). Diazotised *p*-$NH_2{\cdot}C_6H_4{\cdot}SO_3H$ affords similarly a H_2O-sol. *dye*, which dyes animal fibres yellow. R. S. C.

Reactions of *trans*-2-ketodecahydronaphthalene. II. E. Lehmann and B. Krätschell (Ber., 1935, 68, [*B*], 360—363; cf. this vol., 84).—The action of boiling 40% NaOH on *trans*-3-chloro-2-ketodecahydronaphthalene (improved prep.) leads to 3-hydroxy-2-ketodecahydronaphthalene, which immediately undergoes disproportionation to 2 : 3-*dihydroxydecahydronaphthalene*, m.p. 168° (oxidised by $KMnO_4$ in $COMe_2$ to *trans-cyclo*hexane-1 : 2-diacetic acid, m.p. 107°), and non-isolable 2 : 3-diketodecahydronaphthalene, which suffers ring contraction with formation of 2-*hydroxy*-Bz-*hexahydrohydrindene*-2-*carboxylic acid* (I) ($+0{\cdot}5H_2O$), m.p. 134° (*Me* ester, m.p. 49°). (I) passes when heated into the spiro-*lactide*



$$C_6H_{10}{<}\begin{matrix}CH_2\\CH_2\end{matrix}{>}C{<}\begin{matrix}O\cdot CO\\CO\cdot O\end{matrix}{>}C{<}\begin{matrix}CH_2\\CH_2\end{matrix}{>}C_6H_{10}$$

, m.p. 201°, re-converted by boiling H_2O, NaOAc, or alkali into (I). Treatment of (I) with 80% H_2SO_4 at 75—80° gives CO, Bz-*hexahydrohydrind*-2-*one*, b.p. 93°/12 mm. (*oxime*, m.p. 164°), and Δ^1-Bz-*hexahydroindene*-2-*carboxylic acid*, m.p. 161°. The Cl_2-derivative (*loc. cit.*) is hydrolysed to (I) and hence is 2 : 2-*dichloro*-3-*ketodecahydronaphthalene*. H. W.

Synthesis of unsaturated compounds from β-ionone and tetrahydroionone. R. G. Gould, jun., and A. F. Thompson, jun. (J. Amer. Chem. Soc., 1935, **57**, 340—345).—Syntheses intended eventually to lead to reduction products of vitamin-*A* are recorded. β-Ionone, C_2H_2, and K *tert.*-amyloxide (I) in Et_2O at −15° to 0° give a mixture, b.p. 114—117°/2 mm. (*Ag* salt), of *γ-hydroxy*-ε-2 : 6 : 6-Δ^1-*trimethyl*cyclo*hexenyl-γ-methyl*-Δ^δ-*penten*-Δ^α-*inene* and ε-*keto-γ*-2 : 6 : 6-Δ^1-*trimethyl*cyclo*hexenyl*-Δ^α-*hexinene*, which by partial hydrogenation (Pd) in MeOH or EtOH gives a mixture of the derived ethylenic compounds, which with Ac_2O or $CCl_3\cdot CO_2H$ gives ε-2 : 6 : 6-Δ^1-*trimethyl*cyclo*hexenyl-γ-methyl*-$\Delta^{\beta\delta}$-*pentadien-α-ol*, which is isolated as the oily *H phthalate*, and with PBr_3 gives α-bromo-ε-2 : 6 : 6-Δ^1-*trimethyl*cyclo*hexenyl-γ-methyl*-$\Delta^{\beta\delta}$-*pentadiene*, an oil. This with Et sodioacetoacetate (II) affords after hydrolysis by 5% KOH–MeOH η-*keto*-α-2 : 6 : 6-Δ^1-*trimethyl*cyclo*hexenyl*-$\Delta^{\alpha\gamma}$-*octadiene*, b.p. 165—168°/3 mm. (*semicarbazone*, m.p. 160—165°), hydrogenated (PtO_2) in AcOH to η-keto-α-2 : 6 : 6-trimethyl*cyclo*hexyloctane (III) (semicarbazone, m.p. 113·5—114°). Tetrahydroionone and C_2H_2, best with (I), in Et_2O give a 75% yield of ε-2 : 6 : 6-*trimethyl*cyclo*hexyl-γ-methyl*-Δ^α-*pentinen-γ-ol*, b.p. 117—118°/2 mm., hydrogenated (PtO_2) in AcOH to the corresponding OH-pentane *derivative*, b.p. 112—113°/2 mm. (*Ac* derivative, b.p. 124—125°/2 mm.), or in EtOH to ε-2 : 6 : 6-*trimethyl*cyclo*hexyl-γ-methyl*-Δ^α-*penten-γ-ol*, b.p. 115—116°/2 mm. This with Ac_2O or, better (55%), $CCl_3\cdot CO_2H$ gives ε-2 : 6 : 6-*trimethyl*cyclo*hexyl-γ-methyl*-Δ^β-*penten-α-ol*, b.p. 125—126°/2 mm. (*H phthalate*), and with PBr_3 α-bromo-ε-2 : 6 : 6-*trimethyl*cyclo*hexyl-γ-methyl*-Δ^β-*pentene*, an oil, which with (II) affords η-*keto*-α-2 : 6 : 6-*trimethyl*cyclo*hexyl-γ-methyl*-Δ^γ-*octene*, b.p. 165—168°/3 mm. (*semicarbazone*, m.p. 133°), giving (III) by hydrogenation. R. S. C.

Reaction of magnesium with α-halogenoketones. C. H. Fisher (J. Amer. Chem. Soc., 1935, 57, 381).—α-Bromoacetomesitylene in Et_2O–C_6H_6 reacts with 0·6 Mg to give a OMgBr-derivative, which with acid affords $C_6H_2Me_3\cdot COMe$ (45%) and $(C_6H_2Me_3\cdot CO\cdot CH_2\cdot)_2$ (10%). $CPh_2{:}CBr\cdot COPh$ gives no Grignard reagents. R. S. C.

Influence of chemical nature and position of substituents on morphological relationship. C. Weygand and F. Schächer. **Determination of constitution by morphological methods. Direction of enolisation of keto-enols.** C. Weygand, P. Koch, and F. Schächer (Ber., 1935, 68, [*B*], 227—234, 234—239; cf. A., 1929, 564, 815).—Of the two *m*-methylchalkones only Ph *m*-methylstyryl ketone (I) is morphologically related to the parent substance (II) whilst among the 6 nitrochalkones similar relationship is shown only by Ph *p*-nitrostyryl ketone. Assuming that in complex substitution only the groups vicinal to the C_6H_6 nucleus are of importance, it may be assumed that substitution in one C_6H_6 nucleus of (II) is governed by the same laws as in $CHPh{:}CH\cdot CO_2H$ or $CHPh{:}CH\cdot CHO$ and in the other must resemble that of COPhMe. By analogy, direct substitution in positions 3 and 4′ is impossible, and these are termed "quasi-substituted," to indicate hindrance to the entry of a new atom or group. Only in these positions can a relatively simple substituent (Me, NO_2) exercise so little influence on the fine structure of (II) that morphological relationships between (II) and its derivatives are possible. Among the 4 cryst. methylchalkones, isomorphism occurs only between the 3- and 4′-derivatives. The following data appear new: o-*tolyl styryl ketone*, b.p. 218—219°/12 mm., from *o*-$C_6H_4Me\cdot CHO$ and COPhMe, and NaOH or NaOMe; *Ph* o-*methylstyryl ketone*, b.p. 209—211°/19 mm., 197°/7 mm., from PhCHO and *o*-methylacetophenone; *m*-tolyl styryl ketone, in forms m.p. 66°, 53°, 67°, and 68°, respectively; (I) forms, m.p. 51° and 61° (corresponding *dipicrate*, m.p. 107°) (Mayer's variety, m.p. 73°, could not be observed); *o*-nitrophenyl styryl ketone, m.p. 123° and 125·5°, respectively; Ph *o*-nitrostyryl ketone, m.p. 129°; *m*-nitrophenyl styryl ketone, m.p. 145°, polymerises very readily (a second form has m.p. 120°); Ph *m*-nitrostyryl ketone, m.p. 131° and 110°.

Ozonisation of CHMeBzAc in EtCl leads to products derived from $CMeBz{:}CMe\cdot OH$ and $CMeAc{:}CPh\cdot OH$. It follows therefore that fission by O_3 permits conclusions as to the constitution in solution of keto–enols which do not suffer after-enolisation and cannot yield dienols, but throws no light on the structure of the solid. It is only certain that the diketo-form does not participate in the present equilibrium. Application of morphological methods (see above) shows that the modifications, m.p. 84° and 64° respectively, of $CH_2Bz\cdot CO\cdot C_6H_4Me$-*p* are isomorphous with forms of *p*-$C_6H_4Me\cdot CO\cdot CH{:}CHPh$ and $NO_2\cdot C_6H_4\cdot CH{:}CHPh$ and hence are polymorphous varieties of *p*-$C_6H_4Me\cdot CO\cdot CH{:}CPh\cdot OH$, whereas the form, m.p. 42°, is isomorphous with forms of $C_6H_4Me\cdot CH{:}CHBz$ and $NO_2\cdot C_6H_4\cdot CH{:}CHBz$ and therefore is *p*-$C_6H_4Me\cdot C(OH){:}CHBz$. The dibromide of (I) is transformed by KOAc and K_2CO_3 in boiling EtOH into *Ph α-bromo*-m-*methylstyryl ketone*, b.p. 190—193°/2 mm., and thence by boiling KOH–MeOH into m-*methyldibenzoylmethane* (III), m.p. 53°. Solidification of (III) is provoked only by Ph *m*-methylstyryl ketone, m.p. 66° (of the possible *m*- and *m′*-methylchalkones); hence (III) is $m\text{-}C_6H_4Me\cdot C(OH){:}CHBz$. Similarly seeding of molten *o*-nitrodibenzoylmethane, m.p. 117°, with the various *o*- and *o′*-nitrochalkones establishes the constitution $o\text{-}NO_2\cdot C_6H_4\cdot C(OH){:}CHBz$. H. W.

Steric hindrance in compounds of mesitylene and triphenylbenzene. E. P. Kohler and L. W. Blanchard, jun. (J. Amer. Chem. Soc., 1935, 57, 367—371).—Steric hindrance is not evident in the reaction of β-mesityl αβ-unsaturated ketones. It is, however, shown by similar $\beta\text{-}2:4:6\text{-}C_6H_2Ph_3$ ketones and by other derivatives of $C_6H_3Ph_3$; formation of fluorene derivatives from the latter is very facile. *Ph* 2 : 4 : 6-*trimethylstyryl ketone* (I) (from $C_6H_2Me_3\cdot CHO$ and COPhMe), m.p. 96°, readily forms a *dibromide*, m.p. 140°, which with NaOMe gives *Ph* β-*methoxy*-2 : 4 : 6-*trimethylstyryl ketone*, m.p. 113°, oxidised by $KMnO_4$ to $C_6H_2Me_3\cdot CO_2Me$ and hydrolysed by acids to $C_6H_2Me_3\cdot CO\cdot CH_2Bz$. (I) and MgPhX give, by 1 : 4-addition, β-*phenyl*-β-*mesitylpropiophenone*, m.p. 64° (*oxime*, m.p. 185°), and *mesityl* 2 : 4 : 6-*trimethylstyryl ketone* (similarly prepared), m.p. 99°, with MgMeX gives similarly β-*mesityl*-n-*butyromesitylene*, b.p. 194°/1 mm. However, 2 : 4 : 6-*trimethylstyryl ketone*, m.p. 67°, reacts by both 1 : 4- and 1 : 2-addition. The following are also described: β-*Mesityl*-n-*butyl Me ketone semicarbazone*, m.p. 169°; *mesityldimethylcarbinol*, m.p. 113°; *mesityldiphenylcarbinol*, m.p. 88°.

$1:3:5\text{-}C_6H_3Ph_3$ and Br in CS_2 give 1-*bromo*-2 : 4 : 6-*triphenylbenzene* (II), m.p. 129—130°. The structure of this and other derivatives described below is proved by the reactions detailed. The Grignard reagent (III) of (II), obtained in 94% yield in C_6H_6 or xylene, but not at all in Et_2O, gives some $C_6H_3Ph_3$ and an 84% yield of 2 : 4 : 6-*triphenylbenzoic acid* (IV), m.p. 253—255° (decomp.) [*Me* ester, m.p. 91°, obtained by CH_2N_2, or, in poor yield, by Me_2SO_4–NaOH, but not by MeI and the Ag salt (not obtained pure)]. 2 : 4 : 6 : 2′ : 4′ : 6′-*Hexaphenyldiphenyl* (V), m.p. 348°, not formed from (II) and (III), is obtained in 50% yield from (III) and $CuCl_2$. (III) and AcCl give 2 : 4 : 6-*triphenylacetophenone*, m.p. 125° (*benzylidene* derivative, double m.p. 192 and 210°), which with MgMeI gives 1 mol. of CH_4 and a Mg-compound, from which it is regenerated by acids. 2 : 4 : 6-*Triphenylbenzophenone* (VI), m.p. 168—169°, is obtained similarly (60% yield) or from $C_6H_3Ph_3$, AcCl, and $AlCl_3$ (90% yield). 2 : 4 : 6 : 2′ : 4′ : 6′-*Hexaphenylbenzophenone* (VII), m.p. 266°, is obtained from (III) (or $1:3:5\text{-}C_6H_3Ph_3$ and $AlCl_3$) and $COCl_2$ in C_6H_6, which gives also much $C_6H_3Ph_3$ and some (V). (V) and 0·5% Na–Hg in C_6H_6–EtOH give 2 : 4 : 6-*triphenylbenzhydrol* (VIII), m.p. 158°, also obtained from PhCHO and an excess of (III), but bimol. reduction could not be effected. (VIII) is indifferent to Me_2SO_4, but by MgEtBr, followed by BzCl, affords the *benzoate*, m.p. 156°, very slowly hydrolysed by KOH–MeOH; it is oxidised to (VI) by PhCHO or CrO_3, and with conc. acids gives 1 : 3 : 9-*triphenylfluorene*, m.p. 149°. (VII) with Na–Hg and C_6H_6–MeOH yields 2 : 4 : 6 : 2′ : 4′ : 6′-*hexaphenylbenzhydrol*, m.p. 248—249° (decomp.), converted by HI into 1 : 3-*diphenyl*-9-(2 : 4 : 6-*triphenylphenyl*)*fluorene*, m.p. 221°. (IV) does not form a chloride; with, *e.g.*, $SOCl_2$ it gives 1 : 3-*diphenylfluorene*, m.p. 183°, converted by MgPhBr into 1 : 3 : 9-*triphenylfluorenol*, m.p. 207°. (VI) and (VII) with Na in C_6H_6 give dark purple ketyls, decomposed by H_2O or AcOH to about equal amounts of ketone and carbinol, but not associating to bimol. compounds. R. S. C.

Reaction between organic magnesium compounds and α-bromo-ketones. II. E. P. Kohler and M. Tishler (J. Amer. Chem. Soc., 1935, 57, 217—224; cf. A., 1932, 616).—α-Bromo-ketones may react with Grignard reagents by metathesis (*A*) (to form $CHR{:}CR\cdot OMgBr$ and RBr), preliminary elimination of HBr (*B*), enolisation and addition at the CO (*C*), or, for αβ-unsaturated ketones, addition to the conjugated system. (*B*) may be expected only if the H in the β-position is unusually reactive. (*A*) must occur when (*B*) and (*C*) are prohibited by the structure of the ketone if the latter is saturated or if its ethylenic linking is sterically hindered, and it may be expected with the most reactive Grignard reagents. (*C*), however, generally occurs with the less reactive Mg compounds formed from acidic hydrocarbons or ketones. In other cases the course of the reaction is determined by the nature of the ketone; thus, simple halogeno-ketones with unusually reactive CO, *e.g.*, $CH_2Cl\cdot COMe$, react solely by addition; halogen derivatives of acidic (readily enolised) ketones react solely by (*A*), as also do those of β-disulphones (I). The mechanism of Howk *et al.* (A., 1933, 1049) for (*A*) is improbable, particularly for $COPh\cdot CBr{:}CPh_2$ and (I). (*A*) probably occurs by formation of unstable addition compounds. Examples of expected and unexpected reactions are given below.

$CHPh_2\cdot CHBr\cdot COPh$ (II) reacts by (*A*) with MgMeI, MgPhBr, and $CPh_2{:}CPh\cdot MgBr$ to form $CHPh_2\cdot CH{:}CPh\cdot OMgX$ and the appropriate bromide. $CPh{⋮}C\cdot MgBr$ (III) (modified prep.) and (II) by (*C*) give δ-*bromo*-γ-*hydroxy*-αγεε-*tetraphenyl*-Δ^α^-*pentinene* (IV), m.p. 135°, the structure of which is proved thus. With O_3 (IV) gives (II) and $BzCO_2H$; with MgMeI it gives 1 mol. of CH_4 and with NaOMe yields αγεε-*tetraphenyl*-Δ^α^-*pentinene* γδ-*oxide*, m.p. 87·5—88·5°, hydrolysed by an excess of NaOMe to γ- (or δ-) *hydroxy*-δ-(or γ-)*methoxy*-αγεε-*tetraphenyl*-Δ^α^-*pentinene*, m.p. 119°; with I (IV) affords HI and *Ph* γ-*bromo*-α-*iodo*-βδδ-*triphenyl*-Δ^α^-*butenyl ketone*, m.p. 160°, which with 2 mols. of MgPhBr gives *Ph* βγδδ-*tetraphenyl*-Δ^α^-*butenyl ketone*, m.p. 133°, oxidised by CrO_3–AcOH to $CHPh_2\cdot CHPh\cdot COPh$. (III) and CBr_2Bz_2 afford, by two consecutive reactions, stereoisomeric *forms*, m.p. 159° and 120°, respectively, of *Ph* α-*bromo*-β-*hydroxy*-βδ-*diphenyl*-Δ^γ^-*butenyl ketone*. A solution of $3:5\text{-}C_6H_3Me_2\cdot C({:}CH_2)\cdot OMgBr$ (V) [obtained from MgEtBr and $C_6H_3Me_2Ac$; also obtained solid] with (II) at 35° gives a mixture of *mesityl* γ-*bromo*-β-*hydroxy*-βδδ-*triphenylbutyl ketone* (VI), *forms*, m.p. 137° and 147°, respectively, and α-*mesityl*-δεε-*triphenylpenta*-αγ-*dione* (VII), m.p. 180—181° (*Br*-, m.p. 171°, and *Br*~2~-, m.p. 121°, derivatives). With Zn dust and AcOH (VI) is dehydrated and reduced to *mesityl* βδδ-*triphenylbutyl ketone* (VIII), m.p. 93°, synthesised as follows : (*a*) (V) and CHPh$_2$·CH$_2$·COPh give *mesityl* β-*hydroxy*-βδδ-*triphenylbutyl ketone*, m.p. 96°, which with Zn–AcOH yields a mixture of (VIII) and *mesityl* βδδ-*triphenyl*-Δ^{α}-*butenyl ketone*, m.p. 120° ; (*b*) the Grignard reagent from CPh$_2$:CHBr, m.p. 48° (best prepared from CPh$_2$Me·OH and Br), with C$_6$H$_3$Me$_2$·CO·CH$_2$Bz gives, by condensation and dehydration, *mesityl* βδδ-*triphenyl*-$\Delta^{\alpha\gamma}$-*butadienyl ketone*, m.p. 102°, reduced by Zn–AcOH to (VIII). (VII), obtained as sole product from (V) and (II) in Et$_2$O–C$_6$H$_6$ at 78°, is a by-product, since it is also formed from (VI) and MgMeI; the mechanism of migration of the Ph is not clear, but the structure is established by cleavage (40% KOH–MeOH at 150—160°) to C$_6$H$_3$Me$_2$Ac and CHPh$_2$·CHPh·CO$_2$H. (VI) and hot K$_2$CO$_3$–aq. MeOH afford *mesityl* βγ-*oxido*-βδδ-*triphenylbutyl ketone* (IX), m.p. 151°, which with NaOMe or 1% HCl–MeOH gives γεε-*triphenyl*-α-*mesitylbuta*-αδ-*dione* (X), m.p. 125°, and is hydrogenated (PtO$_2$) in EtOAc to *mesityl* γ-*hydroxy*-βδδ-*triphenylbutyl ketone* (XI), m.p. 126°. (X), obtained also by oxidation (CrO$_3$) of (XI), with HBr–AcOH gives 3-*phenyl*-5-*mesityl*-1-*benzhydrylfuran* (XII), m.p. 128°, formed also from (IX), along with (X), by NaOMe; (X) is, however, stable to NaOMe and is thus not the precursor of (XII) in the last-mentioned reaction. (V) reacts with CH$_2$Br·COPh as with (II), giving at 35° a mixture of δ-*bromo*-γ-*hydroxy*-γ-*phenyl*-3 : 5-*dimethylbutyrophenone*, m.p. 115°, and δ-*phenyl*-α-*mesitylbuta*-αγ-*dione*, b.p. 161—164°/10^{-4} mm. (*monooxime*, m.p. 140°), whilst at 78° the latter is the sole product. CPh$_2$:CBr·COPh with (V) similarly gives *mesityl* γ-*bromo*-β-*hydroxy*-βδδ-*triphenyl*-Δ^{γ}-*butenyl ketone*, m.p. 133°, but with MgMeI or MgPhBr gives a Mg compound, which with BzCl affords as-*dibenzoyldiphenylethylene*, m.p. 152°, reduced to CHPh$_2$·CHBz$_2$. CH$_2$(SO$_2$Ph)$_2$ (XIII) [best, 88%, prepared from CH$_2$(SPh)$_2$ and H$_2$O$_2$–AcOH–Ac$_2$O], m.p. 119—120°, is stable to Br in CHCl$_3$ or CCl$_4$, but in EtOH, AcOH, or aq. NaOH gives the *Br*$_2$-derivative (XIV), m.p. 158°, which with (XII) (1 mol.) affords the *Br*-derivative, m.p. 120°, not obtainable from (XIII) and Br. These Br-compounds react by metathesis with all Grignard reagents. (XIV) gives a (*OMgBr*)$_2$-derivative (not obtained pure), only one MgBr of which is, however, replaceable; thus, BzCl and CHPh$_2$Br lead to ββ-*diphenylsulphonylacetophenone*, m.p. 180°, and as-*diphenylsulphonyldiphenylethane*, m.p. 193°.

R. S. C.

Androsterone.—See this vol., 413.

Autoxidation processes. VIII. Steric hindrance in oxidation and racemisation of α-ketols. A. Weissberger. **IX. Electrolytic dissociation of α-ketols.** A. Weissberger and H. Bach (J.C.S., 1935, 223—225, 226—229; cf. A., 1933, 611).—VIII. A relation exists between the rates of autoxidation, oxidation with Fehling's solution, and racemisation of α-ketols R·CH(OH)·CO·R′ in alkaline solution, and the electrolytic dissociation consts. of the RCO$_2$H and R′CO$_2$H. Autoxidation rates of *m*-substituted benzoins are linked without individual deviations to the dissociation consts. of the carboxylic acids but the same substituents in the *o*-position cause large deviation from the relationship; the variation is due to steric hindrance. The rates of autoxidation of *mm*′-dimethoxy-, -diethoxy-, and -dichloro-, m.p. 75—76° (lit. 65—67°), *oo*′-dimethyl-, -dimethoxy-, -diethoxy-, and -dichloro-, m.p. 63—64°, and *o*′-*methyl*-, m.p. 74—75° (substance previously described, m.p. 108—109°, is the *p*-compound), *o*-methyl-, *o*′- and *o*-ethoxy-, and *o*-*chloro-benzoin*, m.p. 82·5—83·5°, are recorded. The following m.p. are corr. : *p*-methylbenzoylphenyl-, m.p. 110—111°, benzoyl-*p*-tolyl-, m.p. 118—119°, *p*-chlorobenzoylphenyl-, m.p. 89·5—90·5°, benzoyl-*p*-chlorophenyl-, m.p. 114—115°, benzoyl-*o*-ethoxyphenyl-, m.p. 82—83°, and benzoyl-*o*-tolyl-carbinol, m.p. 68·5—69·5°.

IX. The dissociation of the α-ketols has been determined by measurements of decrease in conductivity which 0·01*N*-NaOH in 90% EtOH undergoes on addition of the ketols to a concn. of 0·02*M*. The measurements show a relation to the dissociation const. of the similarly substituted carboxylic acids except in the *o*-substituted compounds. The oxidation (and racemisation) velocities, however, in all cases ∝ the dissociation const. of the ketols. Theoretical conclusions are reached from these results.

F. R. S.

Positively activated hydrogen atoms. VIII. Saponification of benzil. W. Dilthey and P. Scheidt (J. pr. Chem., 1935, [ii], **142**, 125—134; cf. A., 1932, 514).—In the presence of CN′ the conversion of benzil (I) into benzilic acid (II) with KOH–EtOH is completely inhibited, even at a [CN′] of 1 : 8 × 10^5 [at 1 : 32 × 10^5, traces of (II) were formed], and instead PhCHO (III) and BzOH (IV) are produced (cf. A., 1883, 805). (I) heated with CH$_2$R·CN (V) (R=Ph, H, Me, CO$_2$Et) and KOH–EtOH gives (IV) and CHPh:CR·CN (VI) [with α-phenylcinnamonitrile, (IV) and traces of (II) were produced]. The production of (IV) does not occur when anhyd. NaOEt–EtOH is used. (I) with KOH–EtOH and carefully purified aromatic nitriles (PhCN and C$_6$H$_4$Me·CN) gave only (II) [C$_6$H$_4$Me·CN was hydrolysed to the amide; amides do not inhibit the formation of (II)]. Detectable amounts of CN′ were not formed during these reactions, but CN′ was detected after prolonged hydrolysis by KOH–EtOH of aliphatic but not of aromatic nitriles. Experiments to prepare COPh·CPh:CPh·CN from (I), CH$_2$Ph·CN, and P$_2$O$_5$, with and without solvents, failed. The formation of (VI) is due to the interaction of (V) with (III) formed by the hydrolysis of (I) by CN′. A possible mechanism for the hydrolysis of (I) by CN′ is discussed.

CH$_2$Ph·CN with 4-methoxybenzil and KOH–EtOH gave anisic acid and phenylcinnamonitrile, but with 4 : 4′-dibromobenzil and diphenylbenzil only the corresponding acid and not the corresponding nitrile could be obtained. With Ac$_2$ and phenanthraquinone complex results were obtained. Camphorquinone and acenapthenequinone (VII) were not saponified, but condensed with CH$_2$Ph·CN (1 mol.). From (VII) two isomeric *nitriles* were obtained.

H. G. M.

Reactions with 2-methyl-α-naphthaquinone. J. Madinaveitia (Anal. Fís. Quím., 1933, **31**, 750—759).—2-Methyl-α-naphthaquinone (I) with HBr in

Ac_2O gives 3-bromo-2-methyl-α-naphthaquinone (II) (cf. A., 1922, i, 29), whereas with $Ca(OCl)_2$–H_2O it gives 2-*methyl*-1 : 4-*diketodihydronaphthalene* 2 : 3-*oxide* (III), m.p. 102°, converted by warm dil. H_2SO_4 into 3-*hydroxy*-2-*methyl*-α-*naphthaquinone*, m.p. 172° (*Ac*, m.p. 106°, *Ba*, *Ag*, and *OMe*, m.p. 93°, derivatives), which is reduced (Zn–Ac_2O) and acetylated to 1 : 3 : 4-*triacetoxy*-2-*methylnaphthalene*, m.p. 130°. (III) with HBr affords (II), but with MeOH affords no 3-OMe-compound. (III) with NH_2Ph in boiling EtOH–H_2O gives 3-*anilino*-2-*methyl*-α-*naphthaquinone*, m.p. 163° (cf. A., 1895, i, 615). (I) polymerises in sunlight by virtue of its reactive 2 : 3-double linking to a *dimeride* (IV), m.p. 235°, which is depolymerised by sublimation in vac. (IV) does not react with Ac_2O, but it affords a *tetraoxime*, m.p. 76°, and a *monodinitrophenylhydrazone*, m.p. 242°. J. L. D.

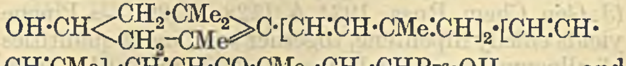
Anthraquinone series. P. C. MITTER, S. DAS-GUPTA, and S. BACHHWAT (J. Indian Chem. Soc., 1934, **11**, 893—897).—1-*Acetoxy*-6-*methylanthraquinone*, m.p. 172°, is oxidised (H_2CrO_4) to 1-*hydroxyanthraquinone*-6-*carboxylic acid*, m.p. 297°, the *Ac* derivative, m.p. 242°, of which forms 1-*acetoxyanthraquinone*-6-*carboxyl chloride*, m.p. 182°, which with H_2 (Pd–$BaSO_4$) gives 1-*hydroxy*-6-*aldehydoanthraquinone*, m.p. 194°, reduced to 1-*hydroxyanthraquinonyl*-6-*carbinol*, m.p. 160—162°. Similar reactions give 1-*acetoxy*-3-*methylanthraquinone*, m.p. 156°, 1-*hydroxyanthraquinone*-3-*carboxylic acid*, m.p. 282—284° (*Ac* derivative, m.p. 276°), 1-*acetoxyanthraquinone*-3-*carboxyl chloride*, m.p. 162—163°, and 1-*hydroxyanthraquinone*-3-*aldehyde*, m.p. 214°, and -*carbinol*, m.p. 197—199°. F. R. S.

Manufacture of 1-amino-4-hydroxy- and amino-dihydroxy-anthraquinones.—See B., 1935, 219.

Atractyligenin. IV. Halogenated derivatives. T. AJELLO (Gazzetta, 1934, **64**, 938—947).—Although atractyligenin (I) does not give an additive compound with Br (cf. A., 1934, 528), it is degraded by the latter in AcOH to a *compound*, $C_{12}H_{17}O_3Br$ (II), m.p. 145°, $[\alpha]_D^{20}$ −82·79° in EtOH. (II) yields an *Ac*, m.p. 174—176°, and a *Bz* derivative, has an acid reaction, and is reduced (Zn+AcOH) to a *substance*, $C_{12}H_{18}O_3$, m.p. 223°, which with PhNCO forms the *compound* $C_{12}H_{18}O_3$·CO·NHPh. (II) with KOH gives a *substance*, m.p. 219°, containing Br. (I) with HCl and HBr in AcOH yields halogenated *substances* of m.p. 201° and 208°, respectively. E. W. W.

Oxidation product of γ-elemic acid, and its oxime. M. MLADENOVIĆ (Bull. Soc. Chim. Yougoslav., 1934, **5**, 57—62).—γ-Elemic acid and CrO_3 in AcOH at 60° yield γ-*elemonic acid*, $C_{30}H_{48}O_3$, m.p. 295° (*oxime*, m.p. 273°). R. T.

Paprika colouring matter. VIII. Constitution of capsanthin and capsorubin. L. ZECHMEISTER and L. VON CHOLNOKY (Annalen, 1935, **516**, 30—45; cf. A., 1934, 657).—Results of perhydrogenation and determinations of mol. wt. of capsanthin (I) indicate 10 C:C linkings which from the spectroscopic behaviour must be completely conjugated. Comparison with β-carotene or zeaxanthin necessitates the co-operation of conjugated CO, since CHO and CO_2H are absent. Attempted oximation was unsuccessful, but reduction of perhydrogenated (I) with Na and EtOH raises the no. of OH groups from 2 to 3. Empirical formula, function of O atoms, and no. of double linkings show the presence of a ring system in (I) which is supported by the optical activity ($[\alpha]_{C}$ −61° for the dioctoate in hexane). Microhydrogenation of capsorubin (II), m.p. 201° (corr.) [*diacetate*, m.p. 179° (decomp.)], indicates 9 double linkings and 2CO. Spectroscopic and adsorptive behaviour require CO to be at each end of the chromophore and the structure of (II) to be otherwise analogous with that of (I). (II) is considered therefore to have a purely aliphatic, symmetrically arranged structure, whereas one end of (I) is cyclic. Considerations of carotenoid structure indicate the choice of ·CH:CH·CO·CMe_2·CH_2·$CHPr^{\alpha}$·OH or OH·$CHBu^{\beta}$·CH_2·CHMe·CO·CH:CH· for the open terminal group in (I) or 2 groups in (II). Two OH groups cannot be present, since this would lead to a β-ionone ring at the other end of (I) which is not reconcilable with the absence of provitamin-*A* properties and the failure of (I) to afford geronic acid. Negative results of the titration with $Pb(OAc)_4$ show that 2OH cannot be attached to vicinal C atoms. Oxidation of (I) with $KMnO_4$ gives CO_2H·CMe_2·CH_2·CO_2H and $CMe_2(CO_2H)_2$, possibly derived from the ring portion of the mol. Similar oxidation of (II) gives a trace of cryst. acid and much colourless oil. Since ozonisation of (I) does not produce $COMe_2$ and (I) and (II) contain 4·2 and 4·4 Me groups (titrated as AcOH), respectively, the structures



$$OH\cdot CH{<}\begin{matrix}CH_2\cdot CMe_2\\ CH_2{-}CMe\end{matrix}{\geqslant}C\cdot[CH{:}CH\cdot CMe{:}CH]_2\cdot[CH{:}CH\cdot CH{:}CMe]_2\cdot CH{:}CH\cdot CO\cdot CMe_2\cdot CH_2\cdot CHPr^{\alpha}\cdot OH$$

and ([:CH·CH:CMe·CH]$_2$:CH·CO·CMe_2·CH_2·$CHPr^{\alpha}$·OH)$_2$ are assigned to (I) and (II). The constitutions are compatible with spectroscopic behaviour of (I) and (II) in comparison with that of bixin dialdehyde, semi-β-carotenone, and β-carotenone. H. W.

Acids of pine oleoresin and rosin. S. PALKIN (J. Chem. Educ., 1935, **12**, 35—39).—A summary of the classification, properties and reactions, and constitution of resin and rosin acids. L. S. T.

Pigments of *Lactarius deliciosus*, L. I. H. WILLSTAEDT (Ber., 1935, **68**, [*B*], 333—340).—The fungus is extracted with EtOH and the extract is treated with Et_2O and H_2O, when the pigments pass into the Et_2O. The lyochromes remain in EtOH–H_2O and in them the presence of lactoflavin is established by the colour reaction with $FeCl_3$ after energetic alkaline hydrolysis and the displacement of the fluorescence colour towards blue by irradiation in neutral solution. The pigments are purified by adsorption by Al_2O_3 from light petroleum (I), development by C_6H_6–(I) (1 : 5), followed by elution with MeOH–(I). Reddish-violet *lactaroviolin* (II) $C_{15}H_{14}O$, m.p. 53°, is thus isolated which is devoid of acidic properties. With HCl in (I) it affords an oxonium *hydrochloride*, decomp. 83—84°, resolved into its components by H_2O. (II) becomes decolorised after absorption of $1H_2$ (Pd-sponge), but blue when treated with Zn dust in C_5H_5N containing a little AcOH and green when treated with 5*N*-HCl and warm $SnCl_2$.

It is rapidly decolorised by Zn and HCl. Cryst. products are not obtained by distillation with Zn dust. The chromatogram discloses the presence of 5 other pigments in minor amount. H. W.

Properties of densipimaric acid, a natural resin acid. K. Suzuki (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1935, 26, 98—107).—" Densipimaric acid," m.p. 141—142° (J. Pharm. Soc. Japan, 1925, **49**, 367, 888) [*dihydro-acid* $C_{20}H_{32}O_2$, m.p. 198—199°; HBr additive *compound* $C_{20}H_{32}O_2Br_2$, decomp. 174—175°; *Me*, b.p. 222—224°/10 mm., and *Et*, b.p. 228—229°/15 mm., esters; *alcohol* $C_{20}H_{32}O$, b.p. 212—214°, by reduction of the Me ester (Bouveault), converted by PCl_5 and treatment of the chloride with quinoline at 250° into a *hydrocarbon* $C_{20}H_{30}$, b.p. 194—196°/6 mm. (dehydrogenated by S to methylretene)], when heated at 165—170° in CO_2 undergoes a sudden change from *l*- ($[\alpha]_D^{22}$ −70·80°) to *d*-rotation, reaching a max. val. $[\alpha]_D^{20}$ +29° at 2 hr., the rotation then gradually decreasing until (18 hr.) it reaches a small, const. *l*-rotation. The m.p. similarly decreases through a min. (76—78° at 7 hr.) to approx. 90°. Similar mutarotation is observed in acid and alkaline solutions, and in $COMe_2$, EtOH, EtOAc, ligroin, C_6H_6, and CCl_4 at 19—21°, the $[\alpha]_D$-time curves showing two max. and a min. The final product in all solvents has m.p. 139—141°. No such changes are observed with abietic acid. Mutarotation is probably due to isomerisation and racemisation. J. W. B.

Chinese perilla.—See this vol., 420.

Isomerisation of α-pinene. T. K. Gaponenkov (J. Gen. Chem. Russ., 1934, **4**, 1128—1129).—α-Pinene yields chiefly dipentene, together with small quantities of allocymene, when heated at 250° for 20 hr. with Al, $HgCl_2$, and I. R. T.

Optical rotatory dispersion of terpenes. R. Padmanabhan and S. K. K. Jatkar (J. Amer. Chem. Soc., 1935, **57**, 334—338).—The dispersions of *d*-α-pinene, *d*-limonene, *d*-Δ^3- and -Δ^4-carene, *d*-α-thujene (I), *d*-sabinene (II), and *d*-camphene are recorded. That of (I) is complex and of (II) anomalous. Those of the other substances are simple. R. S. C.

***epi-iso*Borneol. I.** M. Lipp and E. Bund (Ber., 1935, **68**, [*B*], 249—255).—*epi*Camphor (I) is reduced (H_2–Pt-sponge–AcOH) to an epi*bornyl ether*, m.p. 163°, and epi-iso*borneol* (II), m.p. 194·5°, $[\alpha]_D^{20}$ +13·2° in PhMe (3 : 5-*dinitrobenzoate*, m.p. 120°, $[\alpha]_D^{21}$ +35° in PhMe; *phenylurethane*, m.p. 94—98°, $[\alpha]_D^{21}$ +33° in PhMe). Oxidation of (II) with $K_2Cr_2O_7$ and H_2SO_4 in AcOH affords (I). (II) is isomerised by Na in PhMe at 230° to *epi*borneol (III). The allocation of (II) to the *iso*-series is strengthened by comparison of the mol. refraction of (II) and (III), borneol and *iso*borneol, and the rates of hydrolysis of their acetates. epi-iso*Bornyl acetate* has $[\alpha]_D^{15}$ +27·93°. H. W.

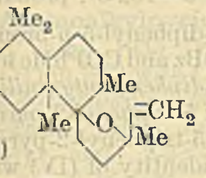
Synthetic production of camphor from pinene. B. G. S. Acharya and T. S. Wheeler (J. Univ. Bombay, 1934, **3**, No. 2, 163—171).—The pinene (I) used is obtained by heating American turpentine with 2% of $CaCl_2$ at 100° for 2 hr. and has b.p. 158—161°. Treatment of it with dry HCl (pumice–H_2SO_4) at 9—12° give an 80% yield of the hydrochloride (II), stabilised by washing, agitation with alkali solution, washing, and final treatment with 10% HNO_3 at 60—70°. Treatment of (II) with boiling cresol and Na tolyloxide during 6—8 hr. gives camphene (III) (yield 80—83%). (I) and (II) are unsuitable for the direct production of borneols. (III) and AcOH in presence of 50% H_2SO_4 at 70—80° for 4—6 hr. afford *iso*bornyl acetate, b.p. 100°/14 mm., hydrolysed to *iso*borneols [yield 64% calc. on (III)] which are oxidised by HNO_3 (1 : 1) containing H_2SO_4 (1 : 1) at 80—85° for 9—10 hr. to camphor (IV), m.p. 172—173° (over-all yield 42%). Alternatively, (III) in AcOH is oxidised to (IV) by $K_2Cr_2O_7$–H_2SO_4–H_2O at 110—120° for 28—30 hr. [yield 50%; over-all yield from (I), 33%]. The following transformations could not be successfully achieved: (I) to (III); (I) to borneol; (II) to *iso*borneol (V); (III) to (V); (I) to (IV); (II) to (IV); esters to (IV). H. W.

Degradation of camphor and of diketocamphane in the animal organism. F. Reinartz, W. Zanke, and M. Kürschgen (Ber., 1935, **68**, [*B*], 310—315).—" Biological *p*-hydroxycamphor " after purification with boiling 10% aq. KOH and recrystallisation from ligroin shows the typical camphor effect at greater dilution. Vita camphor, freed from the bulk of π-aldehyde by $NaHSO_3$ and hence consisting essentially of biological 5-ketocamphor, has generally a weak but distinct physiological action. Treatment of biological *p*-diketocamphane, obtained by oxidation of the hydroxycamphor mixture with CrO_3 and subsequently by air and alkali, with $p\text{-}NO_2\cdot C_6H_4\cdot COCl$ and C_5H_5N in PhMe gives a small amount of a (?) 4-*hydroxycamphor* p-*nitrobenzoate*, m.p. 120·5—122°; if $KMnO_4$ replaces O_2 for oxidation, a compound, $C_8H_{10}O_2$, m.p. 131—132·5°, possibly a further degradation product, is obtained. Metabolic products of camphor other than the previously isolated hydroxycamphors are therefore present in urine.

The identity of the acids obtained by the oxidation of *p*-diketocamphane and *cyclo*camphanone (A., 1934, 1225) is established. H. W.

New alkylammonium salt (tetramethylammonium camphorsulphonate). P. Sillani and (Signa.) L. Curti (Boll. Chim. farm., 1935, **74**, 77—81).—The action and toxicity of NMe_4 *camphorsulphonate*, decomp. 280—330°, on the guinea-pig and the rabbit are investigated; it is suggested as a cardiac tonic. E. W. W.

Diterpene oxides of the resin of *Dacrydium Colensoi*. III. Ketomanoyl oxide. J. R. Hosking and C. W. Brandt (Ber., 1935, **68**, [*B*], 286—290; cf. A., 1934, 897).—Treatment of ketomanoyl oxide (I) with HCl in Et_2O at 0° affords a *trihydrochloride*, $C_{20}H_{33}OCl_3$, m.p. 144—145°. The semicarbazone of (I) is transformed by NaOEt (Wolff-Kishner) into manoyl oxide (II), identified as manoene trihydrochloride. (I) therefore differs from (II) solely by the presence of CO vicinal to CH_2 since (I) with HCO_2Alk yields a *formyl* derivative. (I) or its H_2-derivative is converted by excess of MgMeI in boiling Et_2O into the *carbinol* (III), $C_{21}H_{36}O_2$, b.p. 151°/0·2 mm., catalytically reduced (PtO_2–EtOAc) to a *substance*, b.p. 143—145°/0·1 mm. Dehydrogenation of (III) by Se gives only small amounts of aromatic hydrocarbons. Successive treatment of (III) with HCl–Et_2O at 0° and with NH_2Ph at 100° gives the *hydrocarbon*, $C_{21}H_{34}$, b.p. 135°/0·2 mm., dehydrogenated (Se; 240—350°) to 1 : 2 : 5 : 7-$C_{10}H_4Me_4$, b.p. 155—158°/12 mm. [picrate, m.p. 144—145°; styphnate, m.p. 145°; additive *compound* with $C_6H_3(NO_2)_3$, m.p. 167—168°], and (?) 1:2:6:8-tetramethylphenanthrene (picrate, m.p. 177°). (I) is probably *A*. H. W.



(*A*)

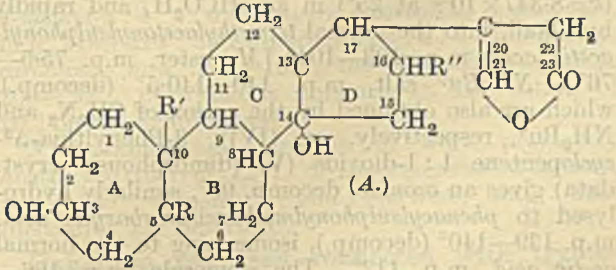
Preparation of alkoxymethylfurfuraldehydes and alkyl lævulates from carbohydrates. II. R. Weidenhagen and B. Korotkyj (Z. Wirts. Zuckerind., 1935, **85**, 131—136; cf. A., 1934, 1205).—The following *alkyl lævulates* (*A*) and *5-alkoxymethylfurfuraldehydes* (*B*) are obtained from sucrose, the alcohol, and HCl in a modified autoclave at about 160°: (*A*), Me (I) [semicarbazone, m.p. 150—151° (lit. 142—145°)], Pr^{β}, b.p. 88—90°/12 mm. [semicarbazone, m.p. 144° (lit. 141—142°)], and Bu^{a}, b.p. 80—90°/0·13 mm.; (*B*), Me (II), *Pr*$^{\beta}$, b.p. 117—120°/12 mm. (*semicarbazone*, m.p. 188—189°), and *Bu*^{a}, b.p. 93—125°/0·13—0·55 mm. (*semicarbazone*, m.p. 169—170°). (I) and (II) are obtained also from fructose. R. S. C.

Condensation of mercaptals with 5-ketomethylpentonic acids. E. Votoček and F. Valentin (Coll. Czech. Chem. Comm., 1935, **7**, 44—48).—5-Ketorhamnonolactone, the appropriate mercaptan, and conc. HCl give *3-ethyl-* (I), m.p. 71—72° (*Ba salt*, $+H_2O$), *-methyl-*, m.p. 140—141°, *-n-propyl-* (II), m.p. 98—99°, and *-n-butyl-*, m.p. 68—69°, *-thiol-2-methylfuran-5-carboxylic acid*. (I) and (II) are obtained similarly from the oil obtained by oxidation of fuconolactone with HNO_2. The compounds are stable to hot *N*-HCl. R. S. C.

Phototropy. Three new phototropic compounds. A. P. de Carvalho (Compt. rend., 1935, **200**, 60—62).—$CPh_2(CH_2{\cdot}COPh)_2$ (I), 2 : 4 : 4 : 6-tetraphenyl-1 : 4-dihydropyridine (II), and 3 : 5-dibenzoyl-2 : 4 : 4 : 6-tetraphenyltetrahydropyran (III) are colourless in the dark but become violet on exposure to light, especially of short λ, returning to the colourless state after some hr. or days in darkness. (I) can also show tints from yellow-green to violet according to its crystal size. (II) in particular shows fatigue and after 10 reversible changes it loses its phototropic properties and its m.p. falls from 235—236° to 225°. Solutions of these compounds are insensitive to light, and solution of the coloured forms yields colourless solutions. The coloured forms lose their colour instantaneously at about 80°. $(p\text{-}C_6H_4Br)_2C(CH_2{\cdot}COPh)_2$ and 2 : 4 : 4 : 6-tetraphenyl-γ-pyran, closely related to (I) and (III) respectively, are not phototropic. J. W. S.

Xanthane group. A. C. Sircar and S. C. Dutt (J. Indian Chem. Soc., 1934, **11**, 877—881).—Diazotised 3-aminoxanthone is converted into *xanthone-3-azophenol*, *xanthone-3 : 1′-azo-2′-naphthol*, *-4′-hydroxy-3′-benzoic acid*, *-2′-hydroxy-3′-naphthoic acid*, *-2′-naphthol-6′ : 8′-disulphonic acid*, *-2′-naphthol-3′ : 6′-disulphonic acid*, *-2 : 4′-resorcinol*, and *-4′-dimethylaniline*. *3-Benzamidoxanthone*, m.p. 212°, and *2-nitro-7-benzamidoxanthone*, *oxaldi-3-xanthonylamide*, *3-benzylideneaminoxanthone*, m.p. 153°, *3-iodoxanthone*, m.p. 173°, and *2-iodo-7-nitroxanthone*, m.p. 235°, are described. Azomethines are prepared from 3-aminoxanthone: o-, m.p. 256°, p-, m.p. 264°, and m-*hydroxy-*, m.p. 275°; 2 : 4-*dihydroxy-*; p-*hydroxy-*m-*methoxy-*, m.p. 241°; p-*dimethylamino-*; p-*acetamido-benzylideneaminoxanthone* and *3′-cinnamylideneaminoxanthone*. M.p. not given are above 300°. F. R. S.

Structure of the cardiac aglucones. W. A. Jacobs and R. C. Elderfield (J. Biol. Chem., 1935, **108**, 497—513).—Oxidation (of the *sec.*-OH) of digitoxanoldiacid with CrO_3–90% AcOH affords *digitoxanondiacid*, $C_{23}H_{34}O_5$, m.p. 213—215° (decomp.), reduced (Clemmensen) to *digitoxandiacid*, $C_{23}H_{36}O_4$, softens 210°, m.p. 218° (decomp.), the *Me*$_2$ ester, m.p. 103°, of which, with MgPhBr, gives a carbinol, oxidised (CrO_3–AcOH) to ætiocholanic acid (direct comparison of the acid and its Me and Et esters). This result definitely proves the presence of the sterol

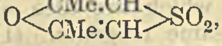


(*A*.)

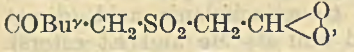
ring-system in the cardiac aglucones, and revised structures for strophanthidin (*A*, R=OH, R′=CHO, R″=H), periplogenin (*A*, R=OH, R′=Me, R″=H), digitoxigenin (*A*, R=R″=H, R′=Me), and gitoxigenin (*A*, R=H, R′=Me, R″=OH) are given, and the evidence in their favour is summarised. Possible interpretations of other (earlier) data are discussed on the basis of these structures, especially the formation of oxide bridges with the OH at C_{14}, and the isomerisations, and spatial relationships of the various OH groups and the lactone side-chain (at C_{17}) resulting from the interconversion of the *cis-* and *trans-*configurations of rings *B* and *C* (cf. also Tschesche, this vol., 396). J. W. B.

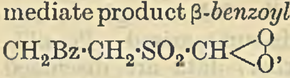
Plant cardiac poisons.—See this vol., 396.

Root of *Peucedanum decursivum*, Maxim.—See this vol., 420.

Structure of cyclic sulphones derived from butadienes. H. J. Backer and J. Strating (Rec. trav. chim., 1935, **54**, 170—186).—The erroneous structures previously assigned to certain cyclic sulphones (A., 1934, 662; compounds there marked *) are corr. on the basis of their products of ozonolysis. 3 : 4-Dimethylthia-Δ³-*cyclo*pentene 1 : 1-dioxide (I), m.p. 135° (*loc. cit.*, *cyclo* omitted) with O_3–AcOH affords 3 : 5-*dimethyl-4-oxathia-*Δ$^{2:5}$-cyclo*hexadiene* 1 : 1-*dioxide*  $O{<}^{CMe:CH}_{CMe:CH}{>}SO_2$, m.p. 119—120°. The Br_2 additive compound of (I) with hot *N*-NaOH gives

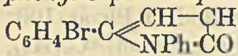
4-*methyl*-3-*methylenethia*-Δ4-cyclo*pentene* 1 : 1-*dioxide*, m.p. 107° (II), since ozonolysis affords 4-*methylthia*-Δ4-cyclo*penten*-3-*one* 1 : 1-*dioxide*, m.p. 163° (yellow *enol* form) (*oxime*, m.p. 146—148°). (II) with Br–AcOH gives the corresponding 3-*bromo*-3-*bromomethyl* derivative, m.p. 158—159°. The 3-bromo-4-acetoxy-derivative of (I) is converted by KOAc into 4-*acetoxy*-4-*methyl*-3-*methylenethia*cyclo*pentane* 1 : 1-*dioxide*, m.p. 102—103°, since CH_2O is obtained by ozonolysis. Ozonolysis of 2 : 3 : 4 : 5-tetramethylthia-Δ3-*cyclo*pentene 1 : 1-dioxide (III), m.p. 58—59°, gives *di*-(β-*acetylethyl*)*sulphone*, m.p. 145·5—146°. The unsaturated sulphone obtained by the action of NaOH on the Br_2 additive compound of (III) is 2 : 4 : 5-*trimethyl*-3-*methylenethia*-Δ4-cyclo*pentene* 1 : 1-*dioxide*, m.p. 93—95°, converted by Br–AcOH into the corresponding 3-*bromo*-3-*bromomethyl* derivative, m.p. 125—126°. 3-*tert*.-Butylthia-Δ3-*cyclo*pentene 1 : 1-dioxide (crystallographic data by Terpstra) gives an *ozonide*, decomp. 133—134°, hydrolysed to α-*trimethylacetonylsulphonylethyl* β-*peroxide* (IV)


$\mathrm{COBu^{\gamma}{\cdot}CH_2{\cdot}SO_2{\cdot}CH_2{\cdot}CH}<\genfrac{}{}{0pt}{}{\mathrm{O}}{\mathrm{O}}$, decomp. 145°, which liberates I from HI, and is converted unimolecularly ($k=8{\cdot}347\times10^{-2}$ at 25°) in aq. HCO_2H, and rapidly by alkali, into the normal *trimethylacetonylsulphonylacetic acid*, m.p. 103—104° [*Me* ester, m.p. 75·5—76°; *NH_2Bu^{γ}* salt, m.p. 140—140·5° (decomp.), which are also obtained by the action of CH_2N_2 and NH_2Bu^{γ}, respectively, on (IV)]. 3-Phenylthia-Δ3-*cyclo*pentene 1 : 1-dioxide (V) (dimorphous; cryst. data) gives an *ozonide*, decomp. 99°, similarly hydrolysed to *phenacylsulphonylmethane*iso*carboxylic acid*, m.p. 139—140° (decomp.), isomerising to the normal *acetic acid*, m.p. 112°. The isomeride, m.p. 166—167° (cryst. data), formed by irradiation of (V) is not a stereoisomeride, but is the Δ2-*isomeride*, since ozonolysis affords mainly β-*benzoylethanesulphonic acid*, m.p. 132° (*Ba* salt), formed from the intermediate product β-*benzoylethylsulphonylmethyl peroxide*


$\mathrm{CH_2Bz{\cdot}CH_2{\cdot}SO_2{\cdot}CH}<\genfrac{}{}{0pt}{}{\mathrm{O}}{\mathrm{O}}$, decomp. 118·5—119°, which is isolated in small yield. 3 : 4-Diphenylthia-Δ3-*cyclo*pentene 1 : 1-dioxide (cryst. data) affords *di*-(*benzoylmethyl*)*sulphone*, m.p. 124°, upon ozonolysis.

J. W. B.

Synthesis of pyrrolones from acetophenone and benzoylformanilide. T. T. Bashour and H. G. Lindwall (J. Amer. Chem. Soc., 1935, 57, 178—180).—NHPh·COBz and *p*-C_6H_4BrAc with $NHEt_2$ or dil. NaOH in dry EtOH give α-*hydroxy*-γ-*keto*-α-*phenyl*-γ-p-*bromophenylbutyranilide* (I), m.p. 133—135° (*phenylhydrazone*, m.p. 179—180°; does not give a semicarbazone; contains 2 active H), decomposed into its components by hot 2·5% NaOH–aq. EtOH. With HCl in dry C_6H_6–Et_2O (I) gives 5-*hydroxy*-1 : 3-*diphenyl*-5-p-*bromophenyl*-2-*pyrrolone*, m.p. 195—196° (reduces $KMnO_4$, but stable to Br–CCl_4; contains 1 active H), which with HCl–MeOH–Et_2O or HCl–EtOH–Et_2O gives 5-*methoxy*- (II), m.p. 139—140 (no active H; does not add Br), or 5-*ethoxy*-1 : 3-*diphenyl*-5-p-*bromophenyl*-2-*pyrrolone* (III), m.p. 148—149·5°, respectively, which are also obtained directly from (I) by the same reagents. (II) with HCl–EtOH–Et_2O gives (III), and the reverse transformation is effected by HCl–MeOH–Et_2O. (II) and (III) are reduced by Zn dust and AcOH to 1 : 3-*diphenyl*-5-p-*bromophenyl*-2-(Δ4)-*pyrrolone*,


$\mathrm{C_6H_4Br{\cdot}C}<\genfrac{}{}{0pt}{}{\mathrm{CH{-}CHPh}}{\mathrm{NPh{\cdot}CO}}$, m.p. 151·5—152·5°, probably by way of the 5-alkoxy-1 : 3-diphenyl-5-*p*-bromophenyl-2-pyrrolidone. NHPh·COBz and COPhMe lead similarly to α-*hydroxy*-γ-*keto*-αγ-*diphenylbutyranilide*, m.p. 143—145°, 5-*ethoxy*-1 : 3 : 5-*triphenyl*-2-*pyrrolone*, m.p. 106—107°, and 1 : 3 : 5-triphenyl-2-pyrrolone (IV), m.p. 197—198°. The identity of (IV) with Almström's substance (A., 1913, i, 1240) establishes the structures of the other compounds.

R. S. C.

Pyridine. XVIII. 3-Aminopyridine and its derivatives. A. Binz and O. von Schickh [with M. Gehring] (Ber., 1935, 68, [*B*], 315—324).—6-Chloropyridine-3-arsinic acid (I) is reduced by Zn dust and dil. H_2SO_4 at 0° to 3′ : 5-arsenopyridine (II) (yield 73%), oxidised by H_2O_2 to pyridine-3-arsinic acid, m.p. 154°; the electrolytic reduction of (I) to (II) at a Pb cathode is described. 6-Chloro-3-nitropyridine (III) is dehalogenated and reduced by Zn dust and boiling dil. H_2SO_4 to 3-aminopyridine (IV), m.p. 64°, in 43% yield, a similar result being obtained with 6-chloro-3-aminopyridine (V). Electrolytic reduction of (III) in 20% H_2SO_4 at a Cu cathode at 15—20° yields (V) in 53% yield; at 75° some dehalogenation occurs. Use of Pb or Sn in place of Cu or of MeOH in place of H_2O offers little advantage. (IV) is obtained in 93% yield by catalytic reduction [$Pd(OH)_2$–$CaCO_3$] of (III) in MeOH or in 86% yield from (V). An 89% yield of (IV) is obtained by catalytic reduction of 6-*bromo*-3-*aminopyridine*, b.p. 177—178°/12 mm., m.p. 77°, prepared by treating 6-*bromo*-3-*nitropyridine* (VI), b.p. 145—147°/10 mm., m.p. 138°, with Fe powder and AcOH. Hydrogenation of (III) in EtOH containing spongy Pt yields 2 : 6′-*dichloro*-5 : 3′-*azoxypyridine*, m.p. 188°, (V), and (IV) (yields 10%, 21%, and 23·5%, respectively). In MeOH (III) is converted by H_2 (Ni) at 50° into (IV) in 62% yield. Treatment of (III) with H_2 [$Pd(OH)_2$–$CaCO_3$] in MeOH–NaOH affords 3-amino-6-methoxypyridine, b.p. 135°/14 mm., in 90% yield. 3-Amino-6-ethoxypyridine, b.p. 123—124°/11 mm., stable to air, is obtained similarly. In $Pr^{\alpha}OH$ at room temp. the main identifiable product is 2 : 6′-*dipropoxy*-5 : 3′-*azoxypyridine*, m.p. 97—98°, whereas at 70° 3-*amino*-6-*propoxypyridine*, b.p. 145—147°/18 mm., is obtained in 70% yield. 3-*Amino*-6-*butoxypyridine*, b.p. 156°/16 mm., is obtained in 70% yield from (VI). 2-Chloro-3-nitropyridine in MeOH–NaOH containing $Pd(OH)_2$–$CaCO_3$ is hydrogenated to 3-*amino*-2-*methoxypyridine*, b.p. 116—118°/19 mm. (yield 75%); under similar conditions, *o*- and *p*-$C_6H_4Cl{\cdot}NO_2$ give essentially NH_2Ph (yield 83%), whilst 6-chloro-8-nitroquinoline affords 8-aminoquinoline, m.p. 70°, almost quantitatively, the production of OMe compounds not being observed. Dissolution of (IV) in 40% CH_2O results in 3-*methyleneaminopyridine*, m.p. 180°. Treatment of (IV) in *N*-H_2SO_4 with 10% CH_2O and Zn dust leads to 3-*dimethylaminopyridine* (VII), b.p. 108—110°/12 mm. (hygroscopic *dihydrochloride*, m.p. 143°), which does not react with HNO_2 or couple with

p-$SO_3H{\cdot}C_6H_4{\cdot}N_2Cl$. (IV) resembles NH_2Ph in a very limited degree and (VII) does not show the reactions characteristic of $NPhMe_2$. H. W.

Aminoalkylpyridines. III. T. Heou-Feo (Bull. Soc. chim., 1935, [v], **2**, 103—108).—2-Methylpyridine (I) in HCl with CH_2O and $NHEt_2$,HCl at 85° gives 2-β-*diethylaminoethylpyridine*, b.p. 118°/15 mm. ($+2AuCl_3,2HCl$, m.p. 190°;. $+CdBr_2,2HBr$, m.p. 164°), and 2-ββ′-*di*(*diethylamino*)iso*propylpyridine*, b.p. 153°/16 mm. [$+1{\cdot}5PtCl_4,3HCl$, m.p. 205° (decomp.); $+1{\cdot}5CdCl_2,3HCl$, m.p. 186° (decomp.); *dimethiodide*, m.p. 184°; *dipicrate*, m.p. 164°], because the Me of (I) is more reactive than that of quinaldine. Similarly, (I) with piperidine hydrochloride and CH_2O gives 2-ββ′-*dipiperidino*iso*propylpyridine*, b.p. 192°/8 mm. [$+1{\cdot}5PtCl_4,3HCl$, m.p. 230° (decomp.); $+1{\cdot}5CdBr_2,3HBr$, m.p. 200°; *dipicrate*, m.p. 148°]. 2-Ethylpyridine in HCl with 38% CH_2O and $NHEt_2$,HCl at 85° gives 2-γ-*diethylaminopropylpyridine*, b.p. 129°/18 mm. ($+2AuCl_3,2HCl$, m.p. 183°). J. L. D.

Preparation, alcoholysis, and hydrogenolysis of nicotinylacylmethanes. L. F. Kuick and H. Adkins (J. Amer. Chem. Soc., 1935, **57**, 143—147).—*Nicotinyl-acetyl-*, b.p. 134—135°/6 mm., m.p. 83·5° (*hydrochloride*, m.p. 154°), -n-*valeryl-*, b.p. 165—168°/8 mm. (*hydrochloride*, m.p. 122°), -iso*valeryl-*, b.p. 134—135°/3 mm., m.p. 44° (*hydrochloride*, m.p. 128—129°), -*trimethylacetyl-*, b.p. 135—136°/5 mm., m.p. 44·5° (*hydrochloride*, m.p. 173°), -n-*hexoyl-*, b.p. 150—152°/2 mm., m.p. 29·5° (*hydrochloride*, m.p. 114°), -*benzoyl-*, b.p. 198—200°/3 mm., m.p. 121·5° (*hydrochloride*, m.p. 211°), and -2 : 4 : 6-*trimethylbenzoyl-*, b.p. 186—190°/1 mm., m.p. 47·8° (*hydrochloride*, m.p. 218—219°), -*methanes* are prepared from Et nicotinate, the appropriate COMeR, and NaOEt in xylene. *Dinicotinylmethane* (*hydrochloride*, m.p. 240—241°) has m.p. 198°. All the above m.p. are corr. Treatment of $C_5H_4N{\cdot}CO{\cdot}CH_2{\cdot}COR$ (I) with EtOH at 200° results in the following % of nicotinyl cleavage: R=Me 41, Bu^α 42, Bu^β 42, *n*-amyl 43, Bu^γ 50, Ph 57. The C_5H_4N group, like Ph, furyl, and Bu^γ, increases the relative rate of cleavage at the more distant CO. Reduction [H_2 (150—250 atm.), Raney Ni, Et_2O, or dioxan, 150—160°] of various (I) causes hydrogenolysis; the reactions (except for the hydrogenation of the C_5H_5N ring) are of the same type as those previously found (this vol., 198) for other *as*-αγ-diketones. The following appear to be new: 3-n-*butyl-* and 3-*acetyl-piperidine hydrochlorides*, m.p. 148° and 114°, respectively; α-3-*piperidyl*-ε-*methylhexanone*, b.p. 120—129°/2 mm., m.p. 104°; α-3-*piperidyl*-δδ-*dimethyl-pentane*, b.p. 133—135°/7 mm. (*hydrochloride*, m.p. 152—153°), and -*pentanol* (?), b.p. 133—135°/7 mm. (*hydrochloride*, m.p. 164—165°); α-*phenyl*-γ-3-*piperidylpropane*, b.p. 173—175°/2 mm.; *mesityl* β-3-*piperidylethyl ketone*, b.p. 190—198°/3 mm. (*hydrochloride*, m.p. 133—136°). H. B.

Syntheses in the indole group. XI. Synthetical experiments with eserine. II. T. Hoshino and Y. Kotake. **XII. III. Synthesis of *d*- and *l*-eserethole methiodide.** T. Hoshino and T. Kobayashi (Annalen, 1935, **516**, 76—80, 81—94).—II (cf. A., 1934, 667). 2-*Nitro-5-ethoxytoluene*, m.p. 53—54°, from the $NO_2{\cdot}C_6H_3Me{\cdot}OH$ and p-$C_6H_4Me{\cdot}SO_3Et$, is converted into 2-*nitro-5-ethoxyphenylpyruvic acid*, m.p. 103—104°. 5-Ethoxyindole-2-carboxylic acid, m.p. 203—204° (decomp.), and 5-*ethoxyindole*, m.p. 35—36°, are described. 5-*Ethoxyindolylacetonitrile*, m.p. 103—104°, obtained from Mg 5-ethoxyindolyl iodide and $CH_2Cl{\cdot}CN$, is reduced by Na and EtOH to 5-*ethoxytryptamine*, m.p. 108—109°. *Et* 5-*ethoxyindole-2-carboxylate*, m.p. 156—157°, is obtained in poor yield from the *p*-ethoxyphenylhydrazone of $COMe{\cdot}CO_2Et$ and $ZnCl_2$ in cumene. *dl*-Dinoresermethole is resolved into its optical antipodes by treatment with *d*-bromocamphorsulphonic acid in EtOH and subsequently in H_2O, thus leading to the isolation of the H *d*-tartrate, m.p. 180—181°, $[\alpha]_D^{28}$ +190·7° in H_2O, and the d-*bromocamphorsulphonate*, m.p. 194—195°, $[\alpha]_D^{28}$ +232·7°, of the *d*-base and the H *d*-tartrate, m.p. 180—181°, $[\alpha]_D^{28}$ −46·3°, and normal *tartrate*, m.p. 242—242·5°, of the *l*-base. Tryptamine and MeI in C_6H_6 yield exclusively *dimethyltryptamine methiodide*, m.p. 216—217°. *Benzylidenetryptamine*, m.p. 120·5—121·5°, and MeI at 100° afford 3-*phenyl*-4-*methyl*-3 : 4 : 5 : 6-*tetrahydro*-4-*carboline methiodide*, m.p. 218—219°, and 3-*phenyl*-3 : 4 : 5 : 6-*tetrahydro*-4-*carboline*, m.p. 167—168°, the *hydrochloride*, m.p. 206—207°, of which is obtained by the action of HCl on the Schiff's base.

XII. Mainly an extension of work previously abstracted (this vol., 227). dl-*Dinoreserethole* d-*tartrate*, m.p. 235° (decomp.), and l-*tartrate*, m.p. 235° (decomp.), are described. H. W.

Oxidation reactions connected with tryptophan. G. del Guerra (Arch. Farm. sperim., 1935, **59**, 86—92).—Tryptophan, eserine, strychnine, brucine, and yohimbine all give rose colours with $K_2Cr_2O_7$–HCl, which oxidise the indole nucleus (I); the toad-venom bases and aspidospermine also give positive reactions. The da Silva and Mokragnatz reactions for eserine are also due to (I) oxidation. The rose colour produced by $K_2Cr_2O_7$–HCl with urine is due to oxidation of (I), and of phenols to phenoquinones. R. N. C.

Preparation of alkylquinolines. I. T. Heou-Feo (Bull. Soc. chim., 1935, [v], **2**, 90—95).—NH_2Ph in excess of boiling HCl containing $ZnCl_2$ with MeCHO gives quinaldine in 50% yield. 4-Methyl- and 2 : 4-dimethyl-quinoline are prepared in improved yield by Blaise's method (cf. A., 1908, i, 566) from Me β-hydroxyethyl ketone and Me β-hydroxypropyl ketone. J. L. D.

Aminoalkylquinolines. II. T. Heou-Feo (Bull. Soc. chim., 1935, [v], **2**, 96—103).—$NHEt_2$,HCl with quinaldine (I) in H_2O–EtOH gives with CH_2O at 60° 2-β-*diethylaminoethylquinoline*, b.p. 181°/12 mm. [*mono-*, m.p. 124° and *di-picrate*, m.p. 154°; *platinichloride* $+2HCl$, m.p. 185° (decomp.); *zincichloride* $+2HCl$, m.p. 230°]. Similarly, with piperidine hydrochloride (II), (I) gives 2-β-*piperidinoethylquinoline*, b.p. 181°/0·2 mm. [*mono-*, m.p. 170°, and *di-picrate*, m.p. 181°; *platinichloride* $+2HCl$, m.p. about 208° (decomp.); $+\ CdBr_2,2HBr$, m.p. 210°], and with NH_2Et,HCl it gives 2-β-*ethylaminoethyl*-

quinoline, b.p. 177—185°/12 mm. (*Bz* derivative, m.p. 130°). 4-Methylquinoline (III) with $NHEt_2$,HCl as above gives 4-β-*diethylaminoethylquinoline*, b.p. 182°/5 mm. (+$2AuCl_3$,*2HCl*, m.p. 181°; +$CdBr_2$,*2HBr*, m.p. 216°; +$ZnCl_2$,*2HCl*, m.p. 239°; *dicresol* derivative, m.p. 205°), and with (II) it gives 4-β-*piperidinoethylquinoline*, m.p. 84° [+$2AuCl_3$,*2HCl*, m.p. about 198° (decomp.); +$CdBr_2$,*2HBr*, m.p. 215°; *dipicrate*, m.p. 198°], which is stable in air in distinction to the bases described above. (III) with NH_2Et,HCl as above gives 4-β-*ethylaminoethylquinoline*, b.p. 181°/2 mm. [+H_2O, m.p. 38°; *Bz* derivative, m.p. 115°; +$AuCl_3$,*2HCl*, m.p. about 165° (decomp.); +$CdBr_2$,*2HBr*, m.p. 206°]. 2 : 4-Dimethylquinoline with a large excess of CH_2O and $NHEt_2$,HCl in EtOH–H_2O at 65° gives 2 : 4-*di*-ββ-*diethylaminoethylquinoline*, b.p. 189—192°/1 mm. [+$3AuCl_3$,*3HCl*,$10H_2O$, m.p. about 165° (decomp.); +1·$5CdBr_2$,*3HBr*, m.p. 185°]. J. L. D.

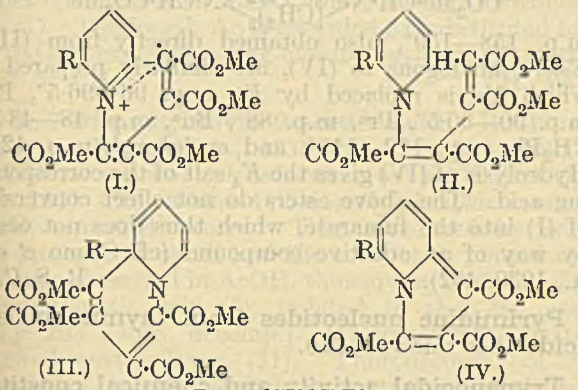
Thalleioquinine reaction. (SIGNA.) L. MONTI and (SIGNA.) V. CIRELLI (Gazzetta, 1934, **64**, 947—954).—This reaction of 6-hydroxyquinoline (cf. A., 1917, i, 51) is also given by 5- but not by 7-hydroxyquinoline. 8-Hydroxyquinoline gives a somewhat similar reaction, yielding a greenish-brown product (5 : 8-quinolinequinone ?). No hydroxyquinolines with OH in the N ring give any colour reaction, nor do 5 : 6-methylenedioxy-compounds. 5-Chloro-, 5-amino-, and 5-nitro-6-hydroxyquinoline give the reaction, the last, however, with some difficulty. It is concluded that the reaction can be given by 6- or 5-hydroxyquinoline, or by any derivative of these having the 5 or 6 position either free or occupied by an easily detached substituent. E. W. W.

8-Aminoquinoline derivatives as basic products for production of antimalarials. III. Effect of branching of the diethylaminoalkyl chain on the antimalarial effect. O. J. MAGIDSON, N. M. DELEKTORSKAJA, and I. M. LIPOVITSCH (J. Gen. Chem. Russ., 1934, **4**, 1047—1056).—8-Amino-6-methoxyquinoline (I), $NaNH_2$, and *iso*-$C_5H_{11}Cl$ in Et_2O afford 8-iso*amylamino*-, b.p. 163—165° (*hydrochloride*, m.p. 205°), and 8-*di*iso*amylamino*-6-*methoxyquinoline*, b.p. 172—183° (*hydrochloride*, m.p. 136—138·5°). Et α-diethylamino*iso*valerate and Na in EtOH yield β-*diethylamino*iso*amyl alcohol*, b.p. 87—93°/14 mm., converted by heating with $SOCl_2$ in $CHCl_3$ into the *chloride*, b.p. 85—88°/14 mm., which with (I) gives 8-(β-*diethylamino*iso*amyl*)*amino*-6-*methoxyquinoline*, b.p. 192° (therapeutic index, *I*=4). *Diethyl*-β-*hydroxy*-γ-*methyl*-n-*butylamine*, b.p. 181—184°, from $NHEt_2$ and $CH_2Cl\cdot CHPr^{\beta}\cdot OH$, or by methylating $NH_2CH_2\cdot CHPr^{\beta}\cdot OH$, is converted by heating with $SOCl_2$ in C_6H_6 into *diethyl*-β-*chloro*-γ-*methyl*-n-*butylamine*, b.p. 70—72°/12 mm., which condenses with (I) to yield 8-(β-*diethylamino*-α-iso-*propylethyl*)*amino*-6-*methoxyquinoline*, b.p. 187—191°/3 mm. (*I*=0). *Diethyl*-γ-*hydroxy*-ββ-*dimethylpropylamine*, b.p. 88—89°/8 mm., obtained from $NHEt_2$ and $CH_2Br\cdot CMe_2\cdot CH_2\cdot OH$ (140—150°, 30 hr.), affords the γ-*Cl*-derivative (II), b.p. 69—71°/11 mm. ($SOCl_2$; 100°, 5 hr.). 8-(γ-*Diethylamino*-ββ-*dimethylpropyl*)-*amino*-6-*methoxyquinoline*, m.p. 134—136° (*I*=2), is obtained from (I) and (II) (125—130°; 2 days), and 8-β-*diethylamino*iso*hexylamino*-6-*methoxyquinoline*, b.p. 195—200°/1·5 mm. (*I*=4) [*meconate*, m.p. 153—154° (decomp.)], is prepared similarly from (I) and β-*diethylamino*iso*hexyl chloride*, b.p. 69—75° (*hydrochloride*, m.p. 89—91°). R. T.

Friedel–Crafts reaction with 8-hydroxyquinoline. K. MATSUMURA (J. Amer. Chem. Soc., 1935, **57**, 124—128).—8-Hydroxyquinoline (I), EtCOCl, and $AlCl_3$ in $PhNO_2$ at 70—80° give 8-*hydroxy*-5-*propionylquinoline* [8-*hydroxy*-5-*quinolyl Et ketone*], m.p. 91° [*hydrochloride*, m.p. 279—280° (decomp.); *H sulphate*, m.p. 230—231°; *picrate*, m.p. 192°; *platinichloride*, m.p. 227—228° (decomp.); *methiodide*, m.p. 196—197°], the *oxime*, m.p. 144—145°, of which is converted by $SOCl_2$ into (probably) 8-*hydroxyquinoline*-5-*carboxylethylamide*, m.p. 193—194°. 5-*Propionamido*-8-*hydroxyquinoline* has m.p. 213—214°. (I), excess of o-$C_6H_4(COCl)_2$ (II), and $AlCl_3$ in $PhNO_2$ at 100—110° afford 8-*hydroxy*-7-o-*carboxybenzoylquinoline* (III), m.p. 226° {*hydrochloride*, m.p. 244° (decomp.); *platinichloride*, m.p. 245° (decomp.); *Me* ester, m.p. 143—144° [*hydrochloride*, m.p. 252—252·5° (decomp.)]; *hydrazide*, m.p. 326° (decomp.); *Ac₂* (IV), m.p. 147—150°, *Bz*, m.p. 195°, 5-*Br*-, m.p. 227—228° (decomp.) (prepared using NaOBr), and 5-*I*-, m.p. 224° (decomp.), derivatives}, which when heated to 300° gives (I) and *o*-$C_6H_4(CO)_2O$. (III) and Br (2 mols.) in 0·2*N*-HCl at 20° afford 5 : 7-dibromo-8-hydroxyquinoline, m.p. 197—198°. Successive treatment of (IV) [which may be a mixed anhydride of AcOH and the Ac_1 derivative of (III)] with Br (in AcOH at 16°) and EtOH–KOH affords 7-bromo-8-hydroxyquinoline. (I) and (II) (0·5 mol.) similarly give α-8 : 8′-*dihydroxydiquinolylphthalide* (V), m.p. > 360° [*hydrochloride*, m.p. > 353°; *platinichloride*, m.p. > 315°; Ac_2, decomp. 280—300°, Bz_2, m.p. 325—331° (decomp.), Br_2-, m.p. > 350°, and SO_3H (+4·5H_2O), m.p. > 350°, derivatives; Na_1 and Na_3 salts], reduced (Na–Hg, H_2O) to o-*carboxyphenyl*-α-8 : 8′-*dihydroxydiquinolylmethane*, m.p. 352° (decomp.) [*Me* ester, m.p. 330° (decomp.); Ac_3 derivative (mixed anhydride), m.p. 288—291° (decomp.)], which when heated to 350° affords (V). In one experiment only (V) was accompanied by β-8 : 8′-*dihydroxydiquinolylphthalide* (VI), m.p. 292° [*dihydrochloride* (+7H_2O), m.p. 261°; *platinichloride*, m.p. > 320°; Ac_2 derivative, m.p. 277—279° (decomp.)], which is converted by conc. H_2SO_4 at 170—180° into a *compound*, $C_{17}H_9O_4N$, m.p. > 340°. (V) and (VI) dissolve in alkali to green and indigo-blue solutions, respectively. H. B.

Compounds of vanadium with 8-hydroxyquinoline, and their analytical applications.—See this vol., 464.

Hydroaromatic series. XXIII. Diene syntheses of hetero-rings containing nitrogen. IX. Stilbazole and acetylenedicarboxylic ester. O. DIELS and F. MÖLLER (Annalen, 1935, **516**, 45—61; cf. A., 1934, 782, 1367).—Stilbazole and Me_2 acetylenedicarboxylate in Et_2O at room temp. afford a labile *adduct* (I), m.p. 187—188°, transformed when heated above its m.p. or by boiling xylene or PhOH into the "1 stable *adduct*" (II), m.p. 205—206°, which passes in boiling AcOH into the "2 stable *adduct*" (III), m.p. 192°. (I) is not converted into (III) by boiling AcOH. Changes in the reverse direction have not been observed. The reactions of (II) are similar to those observed in the C_5H_5N series. It is smoothly oxidised by CrO_3 in AcOH to the *indolizine substance* (IV), m.p. 147°, is converted by Br in boiling AcOH into the *tribromide*, $C_{25}H_{22}O_8NBr_3$, m.p. 142—145° (decomp.) [corresponding *perchlorate*, $C_{25}H_{22}O_8N{\cdot}ClO_4$, m.p. 228° (decomp.)], transformed by Na_2CO_3 into $H_2C_2O_4$ and (IV). Hydrolysis of (II) with conc. HCl affords the *chloride* of a monocarboxylic acid, whilst boiling PhOH causes loss of CO_2 and MeOH with formation of a tricarboxylic *ester*, $C_{23}H_{21}O_6N$, m.p. 157°, possibly an indolizine derivative, also obtained by the action of boiling AcOH. Catalytic hydrogenation (PtO_2) of (II) establishes the presence of 6 double linkings. The action of CrO_3, Br, H_2 (PtO_2), conc. HCl, and PhOH on (I) gives the same products as are obtained from (II), since all these reagents convert (I) into (II). Boiling conc. KOH removes the addendum from (I) with production of stilbazole. With CH_2N_2 (I) readily yields the *compound*, $C_{26}H_{25}O_8N_3$, m.p. 142—143° (decomp.), which passes at 145—150° into the *substance*, $C_{26}H_{25}O_8N$, m.p. 180°; (II) and (III) do not react with CH_2N_2. The basicity of (III) is so much > that of (II) that it dissolves readily in cold conc. HCl (this property causes difficulty in its formulation). Hydrogenation (PtO_2) of (III) causes absorption of only $5H_2$. (III) in boiling AcOH is transformed by Br into a *pentabromide*, $C_{25}H_{22}O_8NBr_5$, m.p. 156—157° (decomp.), converted by boiling MeOH into the *dibromide* (V), $C_{25}H_{23}O_8NBr_2$, m.p. 214—215° (decomp.). (V) is transformed by 35% $HClO_4$ into the colourless *perchlorate*, $2[C_{25}H_{22}O_8NBr_2ClO_4],HClO_4,6H_2O$, m.p. 145—147° (decomp.), which passes in boiling MeOH into (V) and a second *perchlorate*, m.p. 160° (decomp.). (III) is converted by boiling conc. HNO_3 into the *nitrate*, $C_{25}H_{23}O_9N,HNO_3$, m.p. 194° (decomp.), which is not hydrolysed by boiling H_2O; the corresponding free base could not be isolated. H. W.



(R = ·CH:CHPh)

Synthesis of β-naphthoxindole derivatives. E. Zrike and H. G. Lindwall (J. Amer. Chem. Soc., 1935, 57, 207—208).—β-Naphthisatin (I), COPhMe, and $NHEt_2$ in EtOH give 3-*hydroxy*-3-*phenacyl*-β-*naphthoxindole*, m.p. 179—180°, dissociates when heated, which with warm HCl–AcOH yields 3-*phenacylidene*-β-*naphthoxindole*, m.p. 224—226°, converted by hot conc. HCl into 3-*phenyl*-β-*naphthoquinoline*-1-*carboxylic acid*, m.p. 296°, and by $Na_2S_2O_4$ into 2-*phenacyl*-β-*naphthoxindole*, m.p. 233—235°. (I) with $COMe_2$ and $NHEt_2$ gives 3-*hydroxy*-3-*acetonyl*-, m.p. 204—205° (decomp. from about 170°) (*oxime*, m.p. 241—242°), and with $MeNO_2$ 3-*hydroxy*-3-*nitromethyl*-β-*naphthoxindole*, m.p. 246—248° (decomp.). R. S. C.

Synthesis of 5-phenyl-5-alkylbarbituric acids. J. S. Chamberlain, J. J. Chap, J. E. Doyle, and L. B. Spaulding (J. Amer. Chem. Soc., 1935, 57, 352—354).—$CN{\cdot}CHPh{\cdot}CO_2Et$ (I) is best (70·3%) prepared from $CH_2Ph{\cdot}CN$ and Et_2CO_3 by NH_2Na in dry Et_2O; a little *di*-(α-*cyanobenzyl*) *ketone*, m.p. 260—262°, is also obtained, but in larger amount if H_2O is present or if heating is prolonged. (I), NH_2Na, and the appropriate alkyl iodide give *Et cyanophenylethyl*-, b.p. 147°/11 mm., -iso*propyl*-, b.p. 165°/25 mm., -iso*amyl*-, b.p. 169°/11 mm., -n-*hexyl*-, b.p. 182—184°/10 mm., and -n-*heptyl-acetate*, b.p. 190°/9 mm., which with NaOEt and carbamide give 4-*imino*-5-*phenyl*-5-*ethyl*-, m.p. 264°, -5-iso*propyl*-, m.p. 290°, -5-iso*amyl*-, m.p. 251°, -5-n-*hexyl*-, m.p. 235—238°, and -5-n-*heptyl-barbituric acid*, m.p. 259°, hydrolysed by *N*-HCl to 5-*phenyl*-5-*ethyl*-, m.p. 172°, -5-iso*propyl*-, m.p. 169°, -5-iso*amyl*-, m.p. 181°, -5-n-*hexyl*-, m.p. 152—155°, and -5-n-*heptyl-barbituric acid*, m.p. 150°. R. S. C.

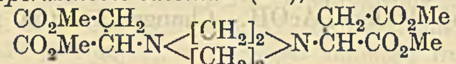
Preparation of methylglyoxaline from carbohydrates. I. R. Weidenhagen and R. Herrmann (Z. Wirts. Zuckerind., 1935, 85, 126—130).—A 44% yield of methylglyoxaline (I) is obtained by heating glucose (100 g.), $Zn(OH)_2$ (60 g.), 40% aq. CH_2O (85 c.c.), and 25% aq. NH_3 (600 c.c.) (autoclave; 5—7 atm.) at 90° for 5 hr. Fructose or invert sugar may also be used. The crude Zn salt of (I) usually contains > 0·5Zn. (I) is purified by distillation at 120—125°/0·02 mm. R. S. C.

Reaction between aminoantipyrine and phenylhydrazine. M. Passerini and M. Ridi (Gazzetta, 1934, 64, 931—933).—This, at 180—190°, gives rise to 4-benzeneazo-1-phenyl-3-methyl-5-pyrazolone. E. W. W.

3-Carbethoxy-4-hydroxy-1-nitrotolylpyrazoles. F. D. Chattaway, D. R. Ashworth, and M. Grimwade (J.C.S., 1935, 117—120).—The action of Br on substituted Et tolueneazoacetates (I) (obtained from diazotised nitro- and bromonitro-toluidines and $CH_2Ac{\cdot}CO_2Et$) causes in cold AcOH replacement of Ac by Br, and the formation of Et α-bromoglyoxylate nitrotolylhydrazones (II) [which with NH_3 in EtOH give the NH_2-compounds (III)], and in hot AcOH bromination to bromo- (IV) and dibromo- (V) -acetoacetates. KOAc in boiling EtOH converts (IV) and (V) into 3-carbethoxy-4-hydroxy-1-nitrotolylpyrazoles (VI) and their 5-Br-derivatives (VII), also obtained by bromination of (VI), which with Cl_2 in $CHCl_3$ yield 5:5-Cl_2-compounds (VIII). These are reduced (HI) to 5-chloropyrazoles (IX), and converted by AlkOH into alkyl diketosuccinnate hydrazones (X). Chlorination of (VI) containing

Br in the tolyl nucleus yields only Cl_1-derivatives (XI). The following are prepared (I): *Et 2-nitro-*, m.p. 142°, 3-*nitro-*, m.p. 104°, 6-*bromo-2-nitro-*, m.p. 92°, 6-*bromo-3-nitro-*, m.p. 126°, and 2 : 6-*dibromo-3-nitro-*, m.p. 102°, -p-*tolueneazo-*, and 5-*nitro-*, m.p. 128°, 4-*nitro-*, m.p. 131°, 6-*nitro-* (XII), m.p. 81°, 4-*bromo-5-nitro-*, m.p. 182°, 4-*bromo-6-nitro-* (XIII), m.p. 84°, 6-*bromo-4-nitro-*, m.p. 146°, -o-*tolueneazo-acetoacetates.* (II): *Et α-bromoglyoxylate 2-nitro-*, m.p. 160°, 3-*nitro-*, m.p. 142°, 6-*bromo-2-nitro-*, m.p. 99°, 6-*bromo-3-nitro-*, m.p. 153°, and 2 : 6-*dibromo-3-nitro-*, m.p. 99°, -p-*tolyl-*, and 5-*nitro-*, m.p. 150°, 6-*nitro-*, m.p. 132°, 4-*bromo-5-nitro-*, m.p. 164°, 4-*bromo-6-nitro-* [from (XIII) or (XII)], m.p. 127°, and 4 : 6-*dibromo-5-nitro-*, m.p. 116°, -o-*tolylhydrazones.* (III): *Et α-aminoglyoxylate 5-nitro-*, m.p. 152°, 4-*bromo-5-nitro-*, m.p. 174°, and 4 : 6-*dibromo-5-nitro-*, m.p. 160°, -o-*tolylhydrazones.* (IV): *Et 2-nitro-*, m.p, 139°, 3-*nitro-*, m.p. 113°, 6-*bromo-2-nitro-*, m.p. 121°. 6-*bromo-3-nitro-*, m.p. 137°, and 2 : 6-*dibromo-3-nitro-*, m.p. 133°, -p-*tolueneazo-*, and 5-*nitro-*, m.p. 136°, 6-*nitro-* (prep. in $CHCl_3$), m.p. 117°, 4-*nitro-*, m.p. 145°, 4-*bromo-5-nitro-*, m.p. 144°, 4-*bromo-6-nitro-*, m.p. 122°, 6-*bromo-4-nitro-*, m.p. 157°, and 4 : 6-*dibromo-5-nitro-*, m.p. 139°, -o-*tolueneazo-γ-bromo-acetoacetates.* (V): *Et 2-nitro-*, m.p. 141°, 3-*nitro-*, m.p. 143°, 6-*bromo-2-nitro-*, m.p. 156°, 6-*bromo-3-nitro-*, m.p. 157°, and 2 : 6-*dibromo-3-nitro-*, m.p. 130°, -p-*tolueneazo-*, and 5-*nitro-*, m.p. 170°, 6-*nitro-*, m.p. 88° (prep. in $CHCl_3$), 4-*bromo-5-nitro-*, m.p. 161°, 4-*bromo-6-nitro-*, m.p. 104°, and 4 : 6-*dibromo-5-nitro-*, m.p. 163°, -o-*toluene-γγ-dibromo-acetoacetates.* (VI): 3-*Carbethoxy-4-hydroxy*-1-(2′-*nitro-*, m.p. 119°, 3′-*nitro-*, m.p. 182°, 6′-*bromo-2′-nitro-*, m.p. 165°, and 2′ : 6′-*dibromo-3′-nitro-*, m.p. 184°, -p-*tolyl*)-, and 5′-*nitro-*, m.p. 114°, 6′-*nitro-*, m.p. 99°, 4′-*nitro-*, m.p. 177°, 4′-*bromo-6′-nitro-*, m.p. 162°, 6′-*bromo-4′-nitro-*, m.p. 183°, and 4′ : 6′-*dibromo-5′-nitro-* (XIV), m.p. 219°, -o-*tolyl*)-*pyrazoles.* The *Ac* derivative of (XIV) has m.p. 196°. (VII): 5-*Bromo-3-carbethoxy-4-hydroxy*-1-(3′-*nitro*-p-*tolyl*)-, m.p. 143°, and 5′-*nitro-*, m.p. 133°, and 6′-*nitro-*, m.p. 146°, -o-*tolyl*)-*pyrazoles.* (VIII): 5 : 5′-*Dichloro-3-carbethoxy*-1-(4′-*nitro*-o-*tolyl*)-4-*pyrazolone*, m.p. 124°, and its 2′-*nitro-* and 3′-*nitro*-p-*tolyl*, and 5′-*nitro-* and 6′-*nitro*-o-*tolyl* analogues, oils. (IX): 5-*Chloro-3-carbethoxy-4-hydroxy-*(4′-*nitro*-o-*tolyl*)-*pyrazole*, m.p. 181°, and its 3′-*nitro*-p-*tolyl*, m.p. 128°, and 5′-*nitro-*, m.p. 101°, and 6′-*nitro-*, m.p. 135°, -o-*tolyl* analogues. (X): Using MeOH, 2-*Me* 1-*Et diketosuccinate*-1-(4′-*nitro-*, m.p. 145°, and -1-(5′-*nitro-*, m.p. 139°, -o-*tolyl*)- and -1-(2′-*nitro*-p-*tolyl*)-, m.p. 132°, -*hydrazones*; using EtOH, Et_2 *diketosuccinate-2-nitro*-p-*tolylhydrazone*, m.p. 97°. (XI): 5-*Chloro-3-carbethoxy-4-hydroxy-4-hydroxy*-1-(6′-*bromo-2′-nitro-*, m.p. 168°, and -(2′ : 6′-*dibromo-3′-nitro-*, m.p. 169°, p-*tolyl*)- and (6′-*bromo-4′-nitro-*, m.p. 202°, (4′-*bromo-6′-nitro-*, m.p. 164°, and (4′ : 6′-*dibromo-5′-nitro-*, m.p. 165°, -o-*tolyl*)-*pyrazoles.* E. W. W.

Derivatives of piperazine. III. Reactions with unsaturated esters. I. C. B. Pollard, J. P. Bain, and D. E. Adelson (J. Amer. Chem. Soc., 1935, **57**, 199—200; cf. A., 1934, 1112).—Me_2 maleate (I) (2 mols.) is immediately converted by anhyd. piperazine (II) (1 mol.) into a mixture of (II) and Me_2 fumarate (III), which at 100° gives *Me_4 NN′-piperazinobis-succinate* (IV),



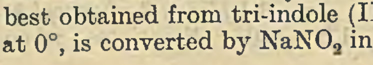
$$\begin{array}{l}\mathrm{CO_2Me{\cdot}CH_2}\qquad\qquad\qquad\qquad\mathrm{CH_2{\cdot}CO_2Me}\\ \mathrm{CO_2Me{\cdot}CH{\cdot}N}<\begin{smallmatrix}[CH_2]_2\\ [CH_2]_2\end{smallmatrix}>\mathrm{N{\cdot}CH{\cdot}CO_2Me}\end{array}$$

m.p. 158—159°, also obtained directly from (III). *Esters*, analogous to (IV), are similarly prepared in which Me is replaced by *Et*, m.p. 96—96·5°, $Pr^β$, m.p. 90—90·5°, $Pr^α$, m.p. 88°, $Bu^α$, m.p. 48—48·5°, CH_2Ph, m.p. 112—113°, and cyclo*hexyl*, m.p. 121°. Hydrolysis of (IV) gives the K_4 salt of the corresponding acid. The above esters do not effect conversion of (I) into the fumarate, which thus does not occur by way of an additive compound (cf. Clemo *et al.*, A., 1930, 452). R. S. C.

Pyrimidine nucleotides from thymus-nucleic acid.—See this vol., 510.

Trypanocidal activity and chemical constitution. IV. Derivatives of benziminazole-5-arsinic acid. J. G. Everett (J.C.S., 1935, 155—157).—Action of $CH_2Cl{\cdot}CO_2H$ and $CH_2Cl{\cdot}CO{\cdot}NH_2$ on benziminazole-5-arsinic acid yields 1(or 3)-*carboxymethyl-* (I) and 1(or 3)-*carbamylmethyl-* (II) -*benziminazole-5-arsinic acids.* These are reduced ($Na_2S_2O_4$), respectively, to 5 : 5′-*arseno*-1(or 3)-*carboxymethyl-* (III) and -*carbamylmethyl-* (IV) -*benziminazoles.* Data on therapeutic action are given; (II) has the advantage over its analogue tryparsamide that its derivative (IV) is sol., and can be injected. E. W. W.

Schiff's bases of 2 : 4 : 6-trinitro- and 2 : 4-dinitro-benzaldehyde. S. Secareanu and I. Lupas (Bull. Soc. chim., 1935, [v], **2**, 69—76; cf. A., 1934, 904, 905).—2 : 4 : 6-$C_6H_2(NO_2)_3{\cdot}CHO$ (I) and *p*-$NH_2{\cdot}C_6H_4{\cdot}OEt$ give a compound which with boiling EtOH containing Na_2CO_3 gives 4 : 6-*dinitro-3-hydroxy*-2-p-*ethoxyphenylindazole 1-oxide*, m.p. 209° (*Ag* and *OEt-*, m.p. 170°, derivatives). Similarly, the Schiff's base from (I) and *p*-$C_6H_4Me{\cdot}NH_2$ (II) gives 4 : 6-*dinitro-3-hydroxy*-2-p-*tolylindazole 1-oxide*, m.p. 215° (*Ag* and *OEt-*, m.p. 150°, derivatives). 2 : 4-$C_6H_3(NO_2)_2{\cdot}CHO$ with (II) in AcOH gives 2 : 4-*dinitrobenzylidene*-p-*toluidine*, m.p. 152°, converted as above into 6-*nitro-3-hydroxy*-2-p-*tolylindazole*, m.p. 240° (decomp.) (*Ac* derivative, m.p. 225°), and 6-*nitro-3-hydroxy*-2-p-*tolylindazole 1-oxide*, m.p. 216° (*Ag* and *OEt-*, m.p. 141°, derivatives). Similarly prepared, 4 : 6-*dinitro-3-hydroxy*-2-p-*dimethylaminophenylindazole 1-oxide* has m.p. 217° (cf. A., 1903, i, 425) (*hydrochloride*). The bases from (I) with β-$C_{10}H_7{\cdot}NH_2$ and *p*-C_6H_4MeBr give no definite compounds with boiling EtOH–Na_2CO_3. J. L. D.

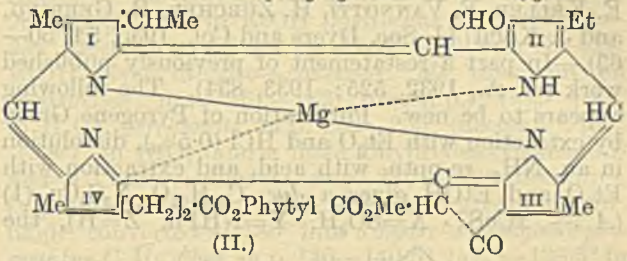
Polymeric indoles. O. Schmitz-Dumont and J. ter Horst (Ber., 1935, **68**, [*B*], 240—243).—Diacetyldi-indole, m.p. 186—187°, from di-indole, NaOAc, and boiling Ac_2O, does not react with $NaNO_2$ and is hydrolysed by boiling KOH–H_2O–EtOH to acetyldi-indole, m.p. 157—158°; contrary to Oddo it is therefore regarded as  $\mathrm{C_6H_4}<\begin{smallmatrix}-CH=\\ NAc\end{smallmatrix}>\mathrm{C{\cdot}CH}<\begin{smallmatrix}CH_2-\\ C_6H_4\end{smallmatrix}>\mathrm{NAc}$, both Ac being attached to N. Acetyltri-indole (I), m.p. 202°, best obtained from tri-indole (II) and Ac_2O in $CHCl_3$ at 0°, is converted by $NaNO_2$ in AcOH into *dinitroso-*

acetyltri-indole, m.p. 150—151° (decomp.). (II) is converted by prolonged boiling with NaOAc and Ac_2O into *tetra-acetyltri-indole*, m.p. 210—211°, which does not react with $NaNO_2$ and is readily hydrolysed to (I). The fourth Ac is regarded as substituted in a *tert.*-OH formed by ring-closure between CO and a CH or CH_2. H. W.

6 : 7-Dimethylflavin-9-acetic acid. R. Kuhn and H. Rudy (Ber., 1935, 68, [*B*], 300—302).—5-Nitro-4-amino-*o*-xylene is converted by $CH_2Br{\cdot}CO_2H$ at 130° into 2-*nitro*-4 : 5-*dimethylphenylaminoacetic acid*, m.p. 204° (corr.). This is reduced by $SnCl_2$ in presence of alkali and the solution is poured into alloxan dissolved in AcOH, thus giving 6 : 7-*dimethylflavin*-9-*acetic acid* (I), isolated in the *Me* ester, m.p. 293° (corr., decomp.). (I) passes when heated into lumilactoflavin (II). Photodecomp. of (I) occurs in diffused daylight in neutral or slightly acid solution with production of (II) and 6 : 7-dimethylalloxazine. In alkaline solution (I) is tolerably stable to light and hence is not an intermediate product of the photochemical production of (II) from lactoflavin (III). (I) and its *glyceryl* ester (*Ac_2* derivative) do not promote growth in rats. The tetrahydroxybutyl group therefore plays an essential part in the physiological activity of (III). H. W.

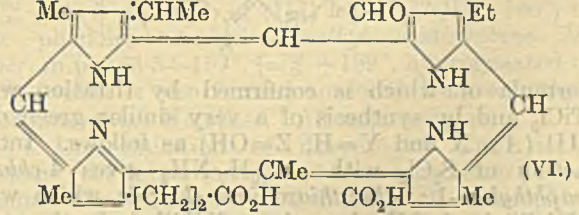
Purine derivatives from glyoxalines. P. C. Mitter and N. Chatterjee (J. Indian Chem. Soc., 1934, 11, 867—871).—5(or 4)-Aminomethylglyoxaline hydrochloride is brominated to a *Br_3*-compound, m.p. 214°, which loses Br to give 2 : 4-*dibromo*-5-*aminomethylglyoxaline*, m.p. 230° (decomp.). The Br_3-compound and KCNS form 2 : 4-*dibromo*-5-*thiocarbamidomethylglyoxaline* (I), m.p. 252° (decomp.), methylated to the 5-*Me* derivative, m.p. 220° (decomp.), which with EtOH–C_5H_5N forms 8-*bromo*-2-*methylthiol*-1 : 6-*dihydropurine*, m.p. 198—200° (I), and EtOH–C_5H_5N yield the *thiazolinoglyoxaline* derivative, m.p. 165°. F. R. S.

Chlorophyll. LIII. Chlorophyll-*b*. VI. Identification of the 3-position of the formyl group. H. Fischer and S. Breitner (Annalen, 1935, 516, 61—75; cf. A., 1934, 907).—Short reduction of rhodin-*g* Me_3 ester to rhodinporphyrin-g_7 Me_3 ester is accompanied by considerable change in the structure of pyrrole nucleus I since oxidation leads to methylethylmaleinimide (I) but not hæmatic acid, thus affording the first instance of the isolation of (I) from chlorophyll-*b* (II). The Fe salt of rhodinporphyrin-g_7 (III) is converted by HI in a current of air into rhodinporphyrin-g_8 (IV) in which the CHO group of (III) is replaced by CO_2H. Total reduction of (IV) by AcOH–HI yields hæmopyrrolecarboxylic acid. (IV) is converted by anhyd. Na_2CO_3 in boiling C_5H_5N into *phæoporphyrin*-b$_7$ (V), $C_{37}H_{38}O_7N_4$, m.p. 271° (*oxime*). Removal of the nuclear CO_2H from (V) by HBr–AcOH is accompanied by reduction of CO to CH_2 and leads to 3-demethyldeoxyphylloerythrin ester (cf. A., 1934, 1370). CO_2H and consequently CHO from which it arose was present in position 3. (II) is therefore provisionally formulated as shown, which accounts for the non-formation of (I) but not of hæmatic acid. Rhodin-g_7 oxime, which contains CHO in position 3, is smoothly transformed by boiling C_5H_5N into rhodin-g_5 oxime



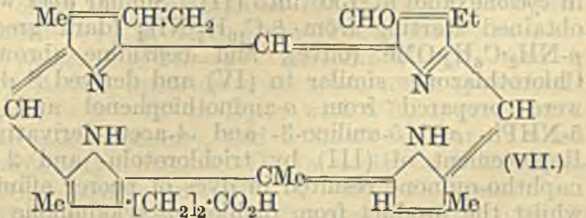
(II.)

(*Me* ester $C_{35}H_{39}O_5N_5$, m.p. 211°), converted by boiling HCl into rhodin-g_5 (*Me_2* ester, m.p. 189°), the constitution (VI) of which is placed beyond doubt



(VI.)

by its degradation by HI to rhodinporphyrin-g_5. The possibility of subjecting (II) and its derivatives to Perkin's reaction has been examined in the case of rhodin-*g* Me_3 ester and $CH_2(CO_2Me)_2$, whereby the expected *Me_5* ester, $C_{42}H_{46}O_{10}N_4$, m.p. 205°, is



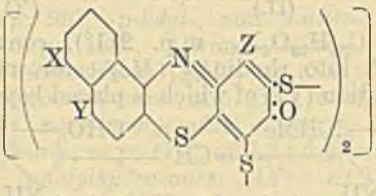
(VII.)

obtained; the union of the components is loose, thus probably accounting for the failure to reduce the compound to the corresponding saturated substance. The amended structure (VII) is assigned to neorhodinporphyrin-g_3. H. W.

Chlorophyll. Anon. (Nature, 1935, 135, 275—276).—A summary of recent work. L. S. T.

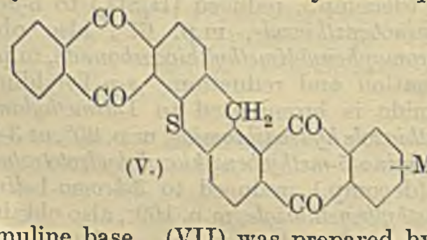
Formation and stability of polybromide derivatives of heterocyclic compounds. IV. Hydrodibromides and hydrotetrabromides of some 1-dimethylaminobenzthiazoles. M. W. Bukhsh, R. D. Desai, and R. F. Hunter (J. Indian Chem. Soc., 1934, 11, 863—866).—Bromination of *s*-phenyldimethylthiocarbamide gives 1-*dimethylaminobenzthiazole hydrodibromide*, m.p. 91—93° (decomp.), or 5-*bromo*-1-*dimethylaminobenzthiazole hydrotetrabromide*, m.p. 100° (decomp.), reduced (H_2SO_3) to 5-*bromo*-1-*dimethylaminobenzthiazole*, m.p. 67°, also obtained from s-p-*bromophenyldimethylthiocarbamide*, m.p. 159°, by bromination and reduction. *s*-*p*-Tolyldimethylthiocarbamide is brominated to 1-*dimethylamino*-5-*methylbenzthiazole hydrodibromide*, m.p. 90°, or 3-*bromo*-1-*dimethylamino*-5-*methylbenzthiazole hydrotetrabromide*, m.p. 95° (decomp.), reduced to 3-*bromo*-1-*dimethylamino*-5-*methylbenzthiazole*, m.p. 169°, also obtained by bromination and reduction of s-o-*bromo*-p-*tolyldimethylthiocarbamide*, m.p. 158°. F. R. S.

Chemistry of blue, green, and yellow sulphur dyes. H. E. Fierz-David [with E. Bernasconi, E. Keller, F. Vannotti, H. Zürcher, R. Geering, and J. Koch] (J. Soc. Dyers and Col., 1935, **51**, 50—63).—In part a restatement of previously published work (cf. A., 1932, 525; 1933, 834). The following appears to be new. Purification of Pyrogene Green by extraction with Et_2O and HCl (0·5%), dissolution in aq. NH_3, re-pptn. with acid, and extraction with Et_2O and EtOH gives a *dye*, $C_{44}H_{24}O_{10}N_4S_9Cu$ (I) (*A* + *x*CuS; X=SO_3H, Y=NHPh, Z=H), the


(*A*.)

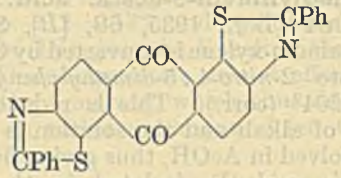
formula of which is confirmed by titration with $TiCl_3$ and by synthesis of a very similar green dye (II) (*A*; X and Y=H, Z=OH) as follows. Interaction of S_2Cl_2 with α-$C_{10}H_7·NH_2$ gives 4-*chloronaphthylene*-1 : 2-*thiazthiazonium chloride*, which with NH_2Ph in AcOH gives the 4-*NHPh*-derivative (red on tannin-mordanted cotton), reduced ($Na_2S_2O_4$) to 1-*amino*-4-*anilino*-2-*naphthylthiol*. Condensation of this with chloranil (III) gives a blue cotton *dye* (IV) ($Na_2S_2O_4$ or Na_2S vat), converted by Na_2S_5 in *cyclo*hexanol at 150° into (II). Similar *dyes* were obtained starting from β-$C_{10}H_7·NH_2$ (dark green), *p*-$NH_2·C_6H_4·OMe$ (olive), and benzidine (brown). Chlorothiazones similar to (IV) and derived S dyes were prepared from *o*-aminothiophenol and its 5-NHPh- and 5-anilino-3- and -4-aceto-derivatives. Replacement of (III) by trichlorotolu- and 2 : 3-naphtho-quinone resulted in dyes of poorer affinity, whilst the product from dichloro-*p*-xyloquinone did not give a S dye.

Purification of Cibanone Yellow R and Cibanone Orange R by Bernasconi's method (A., 1932, 525) gave dyes of formulæ $C_{30}H_{16}O_4S$ (V) and $(C_{15}H_6O_2S)_x$ (VI), respectively; some 2-methylanthraquinone was also isolated in each case. (V) has mol. wt. 495 (f.-p. depression in perylene) and on oxidation with CrO_3–H_2SO_4 gives anthraquinone-2-carboxylic acid; attempts at milder oxidation, *e.g.*, with H_2O_2, failed. lin.-*Diphthaloyldiphenylenemethane sulphide* was prepared by condensing diphenylenemethane sulphide (VII) with *o*-$C_6H_4(CO_2)O$ ($AlCl_3$) and cyclising the intermediate acid (H_2SO_4 at 120—124°). It is very similar to (V) but weaker in its dyeing properties and affinity for cotton; (V) is probably the *trans-bisang.* compound. The relation of (V) to (VI) is probably the same as that of dehydrothio-*p*-toluidine


(V.)

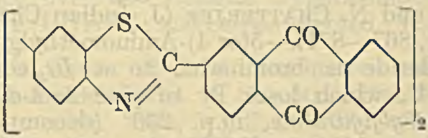
to primuline base. (VII) was prepared by condensation of diazotised *o*-$NH_2·C_6H_4·CO_2H$ with PhSH, cyclisation of the *o*-$SPh·C_6H_4·CO_2H$ formed (H_2SO_4), and reduction (HI–P_4) of the resulting thioxanthone.

Algol Yellow GCN (IX) is synthesised from 2 : 6-diaminoanthraquinone (VIII), S, and $CPhCl_3$ in $C_{10}H_8$ at the b.p. or, preferably, by conversion of the Bz_2 derivative of (VIII) into its *iminochloride* (PCl_5), which with KHS in EtOH gives the corresponding *(SH)*$_2$-compound; this is oxidised smoothly


(IX.)

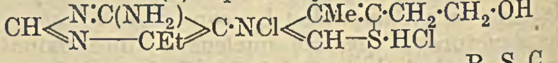
to the dithiazole (IX) by H_2SO_4 (+MnO_2) or alkaline $K_3Fe(CN)_6$. The corresponding dye from 2 : 7-diaminoanthraquinone is not of technical interest.

Products very similar to Indanthrene Yellow GF (X) but not identical with it (ultimate analysis) were obtained (*a*) by fusion of β-methylaminoanthraquinone with benzidine (XI) and S at 250°, and (*b*) from anthraquinone-2-aldehyde, (XI), and S in $C_{10}H_8$ and oxidation of the products with NaOCl. Replacement of (XI) by *p*-$C_6H_4(NH_2)_2$ gave a similar product. Fusion of 2-trichloromethylanthraquinone with (XI) and S gave non-homogeneous products. In spite of the analytical results the similarity of


(X.)

(X) to the products from (XI) is so close that it is assumed to be 2 : 2′-β-anthraquinonyl-4 : 4′-bisthiazole. H. A. P.

Structure of vitamin-*B*. R. R. Williams (J. Amer. Chem. Soc., 1935, **57**, 229—230).—Vitamin-*B* (I) and Na_2SO_3 give 6-*amino*-(?)4-*ethylpyrimidine*-(?)5-*sulphonic acid* and a (?) thiazole *base*, C_6H_9ONS [containing a free OH, also present in (I)], which gives no CHI_3 reaction and is oxidised to the substance $C_5H_5O_2NS$ of Windaus (A., 1934, 1415), probably 4-methylthiazole-5-carboxylic acid. The hydrochloride of (I) is probably



$$CH{\lessdot}\genfrac{}{}{0pt}{}{N{:}C(NH_2)}{N\text{——}CEt}{\gtrdot}C·NCl{\lessdot}\genfrac{}{}{0pt}{}{CMe{:}C·CH_2·CH_2·OH}{CH\text{—}S·HCl}.$$

R. S. C.

(*a*) **Ergot alkaloids. IV. Cleavage of ergotinine with sodium and butyl alcohol.** (*b*) **Structure of the ergot alkaloids.** W. A. Jacobs and L. C. Craig ([*a*] J. Biol. Chem., 1935, **108**, 595—606; [*b*] J. Amer. Chem. Soc., 1935, **57**, 383—384; cf. A., 1934, 1116).—(*a*) Ergotinine (*A*), Na, and BuOH give NH_3 (1 mol.), α- (*B*), m.p. 282°, sublimes at 210—220°/0·15 mm., $[\alpha]_D^{25}$ −92° in C_5H_5N [*sulphate*, m.p. 202° (decomp.), +H_2O (lost only at 150°/0·2 mm.); *Ac* derivative, m.p. 200°, basic], and β-*dihydrolysergol* (*C*), $C_{15}H_{17}ON·NMe$, m.p. 190°, sublimes (*sulphate*, m.p. 305°; *Ac* derivative, m.p. 129°) [Keller test (*K*) positive with (*B*) and (*C*)], *base II*, ? $C_{14}H_{20}N_2$, m.p. 246°, sublimes at 160°/5 mm. [no NMe; no (*K*)], *base IV*, ? $C_{10}H_{20}N_2$ (*dipicrate*, m.p. 226°) [no NMe; (*K*) negative], *base V*, $C_6H_{13}ON$ [*di-p-*

bromobenzoyl derivative, m.p. 149°; no NMe; (*K*) negative], *base VI*, ? $C_9H_{13}ON$, possibly an aromatic OH-amine (*di-*p*-bromobenzoyl* derivative, m.p. 204°), and α-hydroxy*iso*valeric acid. Lysergic acid (*D*), similarly reduced, gives (*B*), (*C*), and amorphous material only. Bases II—VI originate from the part of the mol. which is not (*D*); the two parts are probably joined by *iso*butyrylformic acid or its precursor. Base VI is probably a phenylpropanolamine and with HNO_3 gives *p*-NO_2·C_6H_4·CO_2H.

(*b*) Proline Me ester (*E*) is also formed by the action of Na–BuOH or HCl–MeOH on (*A*). Base VI may be phenylalanine (*F*), base IV a substituted piperazine formed by reduction of proline anhydride, and base II a piperazine derivative from prolylphenylalanine anhydride. Base V is probably α-pyrrolidylcarbinol, formed by reduction of (*E*) or proline. It is probable that (*A*) is formed from (*D*) or ergine, joined by *iso*butyrylformic acid to a polypeptide from proline and (*F*). R. S. C.

Fluorescence of quinine salts. E. Canals, (Mlle.) S. Perrottet, and P. Peyrot (Bull. Soc. chim., 1935, [v], **2**, 21—26).—As little as 8·5×10^{-9} g. per c.c. of quinine (I) in H_2SO_4 at p_H 2 has been detected by determining the "factor of depolarisation" of the light scattered perpendicularly to the incident beam of unpolarised light. The intensity of fluorescence ∝ the concn. of (I) at low concns. in H_2SO_4 at p_H 2, but is diminished by rise of p_H and by replacing H_2SO_4 with HCl. J. G. A. G.

Veratrine alkaloids. I. Constitution of veratridine. II. Cevine. B. K. Blount (J.C.S., 1935, 122—124, 124—125).—I. Veratridine (improved isolation through nitrate and sulphate; cf. J.C.S., 1878, **33**, 341) is hydrolysed (KOH) to cevine and veratric acid. The "verine" of Wright and Luff (*loc. cit.*) is therefore cevine.

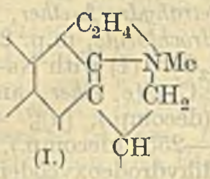
II. Cevine (A., 1899, i, 464) is dehydrogenated (Se at 320—330°) to *cevanthridine*, $C_{23}H_{25}N$ (a phenanthridine derivative ?), m.p. 207° [*hydrochloride*, m.p. 245°; *picrate*, decomp. 230—240°; *methiodide*, m.p. 254—256° (decomp.)], and a *hydrocarbon*, m.p. 139—143°. E. W. W.

Reduction studies in the morphine series. V. Dihydro- and tetrahydro-ψ-codeine methyl ethers. L. Small and R. E. Lutz. **VI. Hydrogenation of α- and β-*iso*morphines.** L. Small and B. F. Faris (J. Amer. Chem. Soc., 1935, **57**, 361—363, 363—366; cf. this vol., 99).—V. ψ-Codeine Me ether (I) resembles ψ-codeine when reduced catalytically. Hydrogenation (PtO_2) in AcOH of the hydrochloride of (I) (modified prep.; stable to Zn dust in hot EtOH) gives non-phenolic *dihydro-ψ-codeine-*A *Me ether* (II) (77%), m.p. 127°, $[\alpha]_D^{25}$ +35° in EtOH [*perchlorate*, m.p. 243—244° (decomp.), $[\alpha]_D^{27}$ −6·5° in H_2O], and *tetrahydro-ψ-codeine Me ether* (III) (15%), m.p. 125—130°, $[\alpha]_D^{30}$ −5° in EtOH [*hydriodide*, m.p. 251—252° (decomp.), $[\alpha]_D^{27}$ +6° in H_2O]. Use of Pd–$BaSO_4$ in H_2O gives more (III), which is the principal product in 10% AcOH. The amorphous methiodide of (I) with 25% NaOH gives non-phenolic *dihydro-ε-methylmorphimethine-*A *Me ether*, m.p. 102·5°, $[\alpha]_D^{27}$ +202° in EtOH (*hydrochloride*, +H_2O, m.p. 219—220°, $[\alpha]_D^{27}$ +157° in H_2O; *perchlorate*, +H_2O, double m.p. 85—87° and 155—156°, $[\alpha]_D^{27}$ +136° in H_2O), hydrogenated (PtO_2) in 7·5% AcOH to the corresponding *tetrahydro-*A*-ether*, m.p. 98·5, $[\alpha]_D^{27}$ +54° in EtOH [*hydrochloride*, m.p. 251—252° (decomp.), $[\alpha]_D^{27}$ +42° in H_2O]. (I) with Na–abs. EtOH gives *dihydro-ψ-codeine-*C *Me ether*, an oil [*hydriodide*, m.p. 161—162° (decomp.), $[\alpha]_D^{27}$ +48° in H_2O; *perchlorate*, m.p. 252—255° (decomp.), $[\alpha]_D^{27}$ +38·7° in H_2O] (and a little dihydrodeoxycodeine-*B* and -*C*), the *methiodide*, m.p. 230—232° (decomp.), $[\alpha]_D^{30}$ +43° in H_2O, of which with TlOH gives the hydroxide, converted at 180° into *dihydro-ε-methylmorphimethine-*C *Me ether*, m.p. 140—140·5°, $[\alpha]_D^{25}$ +138·5° in EtOH, hydrogenated (PtO_2) in AcOH to the corresponding *hexahydro-ether* (IV), m.p. 138°, $[\alpha]_D^{25}$ +17·4° in EtOH. The *methiodide*, m.p. 250—255° (decomp.), $[\alpha]_D^{27}$ +25·5° in H_2O, of (III) leads (TlOH; 180°) to the phenolic *tetrahydro-ε-methylmorphimethine Me ether*, m.p. 156·5—157°, $[\alpha]_D^{25}$ +199°, hydrogenated to (IV), which is also formed similarly from ε-methylmorphimethine Me ether. All m.p. are corr.

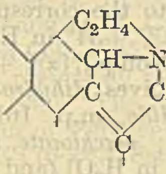
VI. Demethylation of dihydro-*iso*- and -*iso*-ψ-codeine (the latter only feasible at high temp.) gives resins. Hydrogenation (Pd–$BaSO_4$) of *iso*morphine in EtOH gives *dihydro-*α-iso*morphine*, non-phenolic, m.p. 224—226°, $[\alpha]_D^{19}$ −125·8° in MeOH (gives dihydro*iso*codeine with CH_2N_2) (*hydrochloride*, $[\alpha]_D^{23}$ −112° in H_2O; *hydrobromide*, $[\alpha]_D$ −97·9° in H_2O; *H oxalate*, $[\alpha]_D^{22}$ −91·9° in H_2O; *methiodide*, $[\alpha]_D^{23}$ −80·4° in H_2O; all cryst.). β-*iso*Morphine in EtOH or its hydrochloride (V) in H_2O gives (PtO_2) *tetrahydro-*β-iso*morphine*, m.p. 245—247° (decomp.), $[\alpha]_D^{22}$ −60·4° in 10% AcOH, unstable in air when moist (*perchlorate*, cryst., $[\alpha]_D^{19}$ −76° in H_2O; with CH_2N_2 gives tetrahydro*allo*-ψ-codeine), and a small amount of tetrahydrodeoxymorphine. (V) in AcOH or *N*-HCl gives (PtO_2) equal amounts of *dihydro-*β-iso*morphine*, +H_2O, m.p. 202—203°, $[\alpha]_D^{22}$ (anhyd.) −104° in MeOH (gives with CH_2N_2 dihydro*allo*-ψ-codeine; *hydrochloride*, $[\alpha]_D^{23}$ −98·7° in H_2O; *hydrobromide*, $[\alpha]_D^{23}$ −87° in H_2O; *H fumarate*, $[\alpha]_D^{22}$ −81·3° in H_2O; all cryst.), and tetrahydro-β-*iso*morphine. R. S. C.

[Substituted] benzoates of codeine. C. F. Poe and J. G. Strong (J. Amer. Chem. Soc., 1935, **57**, 380—381).—The following are prepared: *codeine* benzoate, m.p. about 79°, o-, m.p. 139°, m-, m.p. 99°, and p-*bromo*-, m.p. 166°, o-, m.p. 134°, m-, m.p. 96°, and p-*chloro*-, m.p. 162°, o-, m.p. 185°, m-, m.p. 173°, and p-*nitro*-, m.p. 159°, m-, m.p. 148°, and p-*hydroxybenzoate*, m.p. 140°, and *salicylate*, m.p. about 221°. All m.p. are "block." R. S. C.

***Strychnos* alkaloids. LXXXV. Experiments with derivatives of neobrucidine and neostrychnidine. Constitution of neo-forms.** H. Leuchs and H. Beyer (Ber., 1935, **68**, [*B*], 290—296; cf. Perkin *et al.*, A., 1927, 888).—Reasons are advanced for considering the position of the double linking in neo-isomerides to be as in (I) instead of as in (II) as assumed by Robinson *et al.* (A., 1934, 788). Oxidation of dihydroxymethoxymethyldihydroneobrucidine *Y* (A., 1933, 1176) gives little if any of the cryst. compound $C_{19}H_{26}O_2N_2$ when oxidised with CrO_3, whereas it is produced in 50% yield from *Z*; isomerisation of *Y* to *Z* under the action of acids is therefore excluded. As ether, dihydroxymethoxymethylneodiketobrucidine is hydrolysed by 8·8*N*-HBr at 100°



(I.)



(II.)

to *dihydroxy(hydroxymethyl)dihydroneodiketonucidine* (III), $C_{18}H_{24}O_6N_2$, m.p. 309—312° (decomp.), $[\alpha]_D^{20}$ +156·1° in H_2O [which does not unite with mineral acids or give an oxime, semicarbazone, Br or :CHPh derivative but yields an *Ac* compound, $C_{20}H_{26}O_7N_2$, m.p. 261—262° (decomp.), $[\alpha]_D^{20}$ +230° in H_2O], and small amounts of a *substance*, $C_{19}H_{23}O_5N_2Br$. Hydrogenation of (III) (PtO_2–H_2O) affords *dihydroxy(hydroxymethyl)dihydroneohydroxyketonucidine*, m.p. 271—272°, $[\alpha]_D^{20}$ +112·8° in H_2O (*diacetate*, m.p. 232—233°, $[\alpha]_D^{20}$ +136° in H_2O, +141·4° in AcOH), hydrolysed by HBr to the *anhydride*, $C_{18}H_{24}O_5N_2$, m.p. 301—303°, $[\alpha]_D$ +119·5° in H_2O, also obtained by similar treatment of dihydroxymethoxymethyldihydroneohydroxyketonucidine; it does not combine with H_2 and gives an *Ac* derivative, m.p. 245—247° (decomp.), $[\alpha]_D^{20}$ +136·4° in H_2O, +134° in AcOH. Oxidation of (III) with CrO_3 in 3·6*N*-H_2SO_4 yields a *compound*, $C_{17}H_{26}O_6N_2$, m.p. 273—275° (decomp.), prisms, $[\alpha]_D^{20}$ +65·2° in H_2O, platelets, $[\alpha]_D^{20}$ +63·0° in H_2O. H. W.

Alkaloid of the seeds of *Leonurus sibiricus*.—See this vol., 422.

Dissociation constants of some aliphatic arsinic acids.—See this vol., 446.

Electrolysis of liquid ammonia solutions of sodium triphenylgermanide. L. S. FOSTER and G. S. HOOPER (J. Amer. Chem. Soc., 1935, **57**, 76—78).—Electrolysis of $NaGePh_3$ in liquid NH_3 gives Ge_2Ph_6, $GeHPh_3$, and N_2. With a Pt anode the N_2 is approx. equiv. to the $GeHPh_3$, but is considerably less with a Hg anode. E. S. H.

Reaction of pyridine with Cleve's and Gerard's salts. I. I. TSCHERNIAEV and A. M. RUBINSCHTEIN (Ann. Inst. Platine, 1935, **12**, 103—114).—C_5H_5N yields $Pt(C_5H_5N,Cl)_2Cl_2$ with Cleve's salt, and $[2NH_3,2C_5H_5N,PtCl_2]Cl_2$ (I) with Gerard's salt. The prep. of three geometrical isomerides of (I) is described. R. T.

Replacement of tin, lead, arsenic, and antimony in organic compounds by mercury. K. A. KOTSCHESCHKOV and A. N. NESMEJANOV (J. Gen. Chem. Russ., 1934, **4**, 1102—1113).—$HgCl_2$ or HgO reacts in neutral media with various aryl compounds of Pb, Sn, and Sb to yield HgPhCl, and in alkaline media with Pb, Sn, Sb, and As to yield $HgPh_2$. The mechanism of the reactions involved is discussed. R. T.

Optical rotation and dissociation of caseinogen. D. C. CARPENTER (J. Amer. Chem. Soc., 1935, **57**, 129—131).—Caseinogen (*M* 96,000) (A., 1931, 855) has $[\alpha]_D^{20}$ −99° in 0·9—1·5% solution in phosphate buffer (p_H 6·8); the val. increases to −105° in dil. (0·181%) solution (*A*). Ultracentrifugal analysis of the various solutions shows that in (*A*) dissociation of the original mol. (I) into fragments of *M* 32,000 occurs. The dissociation is reversible since increase in the concn. from 0·1 to 1% gives a solution containing (I) only. H. B.

Binding of bromine by casein. I. S. JAITSCHNIKOV (J. Gen. Chem. Russ., 1934, **4**, 1114—1116).—Casein absorbs 37·5% of its wt. of Br vapour. The product does not contain free Br. R. T.

Combination of ovalbumin and casein with tyrosine. Z. KERESZTES (Magyar chem. Fol., 1934, **40**, 1—13; Chem. Zentr., 1934, ii, 2538).—The combination of ovalbumin (I) and casein with tyrosine (II) in solutions of different p_H proceeds in steps. No disruption of the protein mol. occurs; the reaction between (I) and (II) is reversible. H. N. R.

Thiol and disulphide groups of proteins. I. Determination. A. E. MIRSKY and M. L. ANSON (J. Gen. Physiol., 1935, **18**, 307—323).—SH groups in proteins (I) are determined directly by treatment with cystine (II) followed by determination of the cysteine (III) formed, or indirectly by treatment with oxidising agents or $CH_2I·CO_2H$, removal of excess of reagent, hydrolysis of (I), and comparison of (III) in (I) and hydrolysate. The S·S groups in unhydrolysed (I) are determined by reduction to SH with $SH·CH_2·CO_2H$, (II) and (III) being determined colorimetrically by phosphotungstate. The Folin–Marenzi method for (II) in (I) (A., 1929, 1093) requires modifying [by denaturation of (I) and oxidation of SH by H_2O_2 before hydrolysis] owing to incomplete reduction of (II) by SO_3''. Data for the (II) and (III) contents of some (I) are given. F. O. H.

Hydrolysis of ovalbumin with various mineral acids and alkalis in the autoclave. V. S. SADIKOV, V. A. VADOVA, and R. G. KRISTALLINSKAJA (Biochem. Z., 1935, **276**, 168—173).—The influence of the nature (HCl, H_2SO_4, HNO_3, H_3PO_4) and concn. of mineral acid and of its time of action on the yield of *cyclo*peptides obtained by autoclaving albumin at 180° and the distribution of N in the hydrolysis products are investigated and the results tabulated. P. W. C.

Graphical application of barometer corrections in the volumetric determination of carbon. J. I. USATENKO and N. D. AVERKIEV (Zavod. Lab., 1934, **3**, 1125).—The C content is read directly from a rotating scale which automatically applies temp. and pressure corrections. R. T.

Ter Meulen's methods of organic analysis. J. GAUTHIER (Bull. Soc. chim., 1935, [v], **2**, 322—327).—Simplifications (*e.g.*, hard glass tubes instead of SiO_2) and improvements in ter Meulen's methods are suggested. Determination of S is accurate only if Pt–pumice is used as a catalyst, and with sulphonates or sulphites conc. HCl is added (H_2 stream maintained) to the boat after the initial heating to redness. Determination of O is untrustworthy when liquid or solid products pass into the absorbent, *e.g.*, C_6H_6 from CPh_3 peroxide. Determination of N is satisfactory except when the substance chars rapidly (*e.g.*, adrenaline) and occludes N_2: with $(NH_2)_2$·

derivatives precautions (*e.g.*, slow initial heating) are essential for accuracy. The determination of halogens is satisfactory. J. W. B.

Assay methods for salts of organic acids. R. M. Hitchins (J. Amer. Pharm. Assoc., 1935, **24**, 11—15).—Henville's method (B., 1927, 315) may be used with any H_2O-sol. salt of the type MA where HA is moderately insol. in H_2O and appreciably sol. in a solvent immiscible with H_2O, and where the apparent dissociation const. of HA is $< 2{\cdot}5 \times 10^{-3}$ and that of MOH $>10^{-6}$. H. T.

Application of drop reactions to the identification of organic compounds. VIII. F. Feigl, V. Anger, and O. Frehden (Mikrochem., 1935, **17**, 29—37; cf. A., 1934, 1240).—Dicarboxylic acids of which the CO_2H groups are separated by $\ngtr$ 2 C atoms, their anhydrides, amides, imides, and esters yield intense and characteristic yellowish-green fluorescent solutions after heating with m-$C_6H_4(OH)_2$ and conc. H_2SO_4 at 130° for 5 min., cooling, and making alkaline with aq. NaOH. Dicarboxylic acids with a $\cdot CH(OH)\cdot CO_2H$ group lose HCO_2H with H_2SO_4, yielding β-keto-carboxylic acids, the enolic forms of which react with m-$C_6H_4(OH)_2$ as above forming umbelliferones, which fluoresce blue in ultraviolet light. The characteristic fluorescence colours given by many compounds are tabulated. Citric acid can be detected by successive treatment with $SOCl_2$, NH_3, and H_2SO_4. The citrazinic acid formed shows a blue fluorescence on addition of excess NH_3. J. W. S.

Potentiometric titration of non-aqueous solutions applied to amino-acids.—See this vol., 450.

Determination of morphine, particularly in opium. C. Mannich [with K. Handke and G. Baumgarten] (Arch. Pharm., 1935, **273**, 97—113).—Morphine (I) gives quantitatively the 2 : 4-*dinitrophenyl ether*, decomp. 200—260° (*hydrochloride*, decomp. about 220°; *nitrate*, decomp. 110°), which can be titrated by addition of much NaCl and an excess of $0{\cdot}1N$-HCl and back-titration. (I) can be thus determined (gravimetrically or volumetrically) alone or in drugs (after removal of most of the narcotine). An aq. $Ca(OH)_2$ extract of opium is treated with $K_2C_2O_4$ and the (I) determined in the filtrate, the results agreeing with those given by the "International" method and requiring no correction. R. S. C.

Biochemistry.

Composition of alveolar air on Everest, 1933. R. Greene (J. Physiol., 1934, **82**, 481—485).—At 23,000 ft., at a pressure of 339 mm., alveolar CO_2 of a normal acclimatised person is 6·62% and O_2 13·3%, the R.Q. thus being 0·83. R. N. C.

Determination of gaseous pressures and their fluctuations in the organism. I. Micro-methods for alveolar air, blood, and tissues in man. II. Mechanism of intermediary gaseous metabolism. F. Meyer (Arch. exp. Path. Pharm., 1935, **177**, 693—713, 714—725).—I. Apparatus for micro-gas analysis and its applications are described. The O_2 and CO_2 tensions of subcutaneous tissue in man average 37 and 41 mm. Hg, respectively.

II. The interpretation of analytical data of respiratory, alveolar, and tissue gases is discussed with reference to the diffusion of O_2 and CO_2 in the organism. F. O. H.

Blood-gas analysis apparatus with a filter-cell. J. Plesch (Biochem. Z., 1935, **276**, 198—214).—An apparatus and its manipulation are described which permits the absorption under Hg by filter-paper of small amounts of body-fluids, the liberation by evacuation of dissolved gases and H_2O vapour, and the passage of these gases to a pipette for analysis in absence of the remaining constituents of the body-fluid. P. W. C.

Fœtal blood. IV. Oxygen and carbon dioxide dissociation curves. N. J. Eastman, E. M. K. Geiling, and A. M. De Lander (Bull. Johns Hopkins Hosp., 1933, **53**, 246—254; cf. A., 1933, 85).—At pressures of 25—60 mm. fœtal blood (I) absorbs O_2 more effectively than that of the mother, and at all pressures releases CO_2 more readily. The CO_2 tension of (I) at the first respiration (II) varies widely. Other factors are responsible for initiating (II). Ch. Abs. (*p*)

Approximate determination of the carbon monoxide content of blood. H. Becker and E. Łempicki (Wiadom. farmac., 1934, **61**, 45—47, 77—79; Chem. Zentr., 1934, ii, 2562).—Wetzel's method (A., 1890, 1200) has been developed. The sample is diluted with normal blood until the limit is reached [26·5% of carboxyhæmoglobin (I)] at which reduction with $(NH_4)_2S$ gives the absorption spectrum of hæmoglobin (II). With $<$ 26·5% of (I) a sample is first saturated with CO, and then diluted with the main sample until the spectrum of (II) is observed on reduction. H. J. E.

Reduction of the volume of the red corpuscles under the influence of fat solvents and the protective action of calciomimetic anions. B. Sekla, P. Pelnar, and O. Horak (Compt. rend. Soc. Biol., 1935, **118**, 277—280).—The vol. of red corpuscles (I) is reduced approx. 30% by 3% Et_2O or $COMe_2$, but only by 7% EtOH. (I) reduction increases progressively with concn. to the hæmolytic val., which is 5·5% for Et_2O, 7·5% for $COMe_2$, and 15% for EtOH. (I) reduction is influenced by temp., and by the time that has elapsed since the blood was drawn. The reduction does not occur in presence of C_2O_4'' or other calciomimetic anions. R. N. C.

Fragility and maturation of reticulocytes. C. Mermod and W. Dock (Arch. Int. Med., 1935, **55**, 52—60).—Reticulocytes (I) are more resistant to hæmolysis by certain agents, *e.g.*, hypotonic NaCl solution, than are normal erythrocytes, but are less resistant to others, *e.g.*, saponin, at 37° either *in vitro* or *in vivo*. The maturation of (I) in circulating blood probably does not occur appreciably. W. O. K.

Hæmoglobin. G. Bruynoghe (Compt. rend. Soc. Biol., 1935, **118**, 824—826).—Hæmoglobin (I) does not produce sp. precipitins, either when injected alone or together with serum; benzoylated or iodinated (I) is also inactive. R. N. C.

Determination of bilurubin in serum samples containing hæmoglobin, by Van den Bergh's method. L. Katzilambros (Praktika, 1933, 8, 323—324; Chem. Zentr., 1934, ii, 2257).—The original method may be used for hæmolysed sera, by working with $COMe_2$ instead of 96% EtOH. A. G. P.

Glutathionæmia in children. R. Delétang, J. Desbordes, and S. B. Briskas (Compt. rend. Soc. Biol., 1935, **118**, 768—770).—Reduced glutathione (I) is high in fœtal blood and falls slowly after birth, becoming steady at the 6th year. Corpuscle-(I) behaves similarly. There is no difference between the sexes. R. N. C.

[Non-]existence of free choline in the blood. E. Sasso (Boll. Soc. ital. Biol. sperim., 1934, 9, 856—859).—The choline/P ratio in normal blood or serum shows that free choline is not present in measurable quantities. R. N. C.

Variations of ammonia in blood and urine after introduction of urease by different routes. L. Stanoyévitch and S. Petkovitch (Compt. rend. Soc. Biol., 1935, **118**, 345—348).—Oral administration of fresh or inactivated soya-bean meal has no action on blood-NH_3 (I), but urinary NH_3 varies. Subcutaneous injection of urease (II) raises (I), the increase being larger if urea is injected simultaneously, whilst intravenous injection of (II) alone trebles (I). Inactivation of (II) destroys its effect on (I) when injected either way. R. N. C.

Variations in blood composition. S. J. Folley and G. L. Peskett (J. Physiol., 1934, **82**, 486—495).—Blood concn. does not necessarily increase during stasis caused by experimental compression of the jugular vein of the cow, but increases in samples taken after release. Plasma-protein of bovine venous blood is unaffected by shaking with air. The composition of consecutive samples from the same vein under identical conditions often shows marked variations. R. N. C.

Protein content and osmotic pressure of blood-serum and lymph from various sources in the dog. M. E. Field, O. C. Leigh, jun., J. W. Heim, and C. K. Drinker (Amer. J. Physiol., 1934, **110**, 174—181).—The albumin–globulin ratio of lymph is always > that of the corresponding serum, and total protein in lymph is < in serum, the two apparently bearing a definite relation to one another. The sp. osmotic pressures of lymph and serum are similar, except for liver-lymph. R. N. C.

Ultracentrifugal investigation of serum-proteins. A. S. McFarlane (Biochem. J., 1935, **29**, 407—429).—By means of a modification of Lamm's refractive index method of following protein (I) sedimentation in the ultracentrifuge (cf. A., 1929, 129, 1234) satisfactory sedimentation photographs were obtained with very conc. (I) solutions. Native horse serum (II) contains two mol. fractions, and the lighter fraction, representing nearly 80% of the total (I), cannot be chemically identical with serum-albumin (III) obtained by pptn. methods in approx. the same amount as globulin (IV). Ultracentrifugal analysis reveals that the analytical (III)/(IV) ratio of 1 is approached on simple dilution of (II), and that the mol. wts. of the two fractions in native (II) are probably the same as those of (III) and (IV). Recryst. (III) [unlike repptd. (IV)] exists in a monodisperse state over a wide concn. range, but artificial mixtures of (III) and (IV) behave like an ideal solution only at very low concns., the interaction of (III) and (IV) involving a reduction in the mol. size of part of the (IV) to approx. that of (III), until, in undiluted native (II), the (III)/(IV) ratio is 4. This phenomenon is not affected by the p_H, or by salts present in solution. A. E. O.

Flocculation of serum in distilled water or in presence of melanin. V. Chorine (Compt. rend. Soc. Biol., 1935, **118**, 335—338).—The photometric flocculation curve obtained by adding $(NH_4)_2SO_4$ to serum in H_2O containing melanin lies above that for serum in H_2O alone, and macroscopic flocculation begins at a higher $(NH_4)_2SO_4$ concn. The mechanism of flocculation is the same in both cases. R. N. C.

(A) Formation of gels in normal human serum by addition of lactic acid. (B) Formation in syphilitic sera. W. Kopaczewski (Compt. rend. Soc. Biol., 1934, **116**, 869—870, 932—933).—(A) Addition of 10% lactic acid causes gel formation (I) in normal serum in 100—245 min. at 20°. In cancer [serum-globulin (II) high] (I) is more rapid. In diseases causing low (II), (I) is very slow or does not occur.

(B) In syphilis (II) is > normal, but the rate of (I) is not appreciably increased. Ch. Abs. (*p*)

Serum gelation and animal species. W. Kopaczewski (Compt. rend. Soc. Biol., 1935, **118**, 339—341).—The rapidity of gelation of a sp. serum by acids depends on its globulin content and buffering power. R. N. C.

Biuret method of determining albumin and globulin in serum and urine. J. Fine (Biochem. J., 1935, **29**, 799—803).—Modifications of the method are described. The violet colour developed by equal amounts of albumin and globulin is practically the same, and serum diluted to contain 0·24% of protein, which keeps for several months in presence of $CHCl_3$, is advocated as the standard solution for determination of both total protein and albumin. $(NH_4)_2SO_4$ ($2M$ finally) is used for separation of globulin. The results are usually higher when Na_2SO_4 ($1{\cdot}5M$) is used. P. W. C.

Crystallisation of human serum-albumin. M. E. Adair and G. L. Taylor (Nature, 1935, **135**, 307).—Microscopic fine needles have been obtained. L. S. T.

Vacate oxygen and oxidation quotient of serum. I. Determination of vacate oxygen of serum. W. Roman (Biochem. Z., 1935, **276**, 57—60).—A method for determination of "residual vacate O" vals. for serum is described depending on the oxidation of deproteinised (tungstate) serum with

KIO_3–H_2SO_4 and titration of the excess HIO_3. The mean error is ±5%. P. W. C.

Determination of lipin-phosphorus in blood. S. Fiandaca (Boll. Soc. ital. Biol. sperim., 1934, 9, 809—811).—Blood or serum is extracted twice with Bloor's EtOH–Et_2O (3 : 1) mixture, cooled, filtered, and the filtrate evaporated to dryness. The residue is incinerated with HNO_3 and H_2SO_4 and neutralised with NaOH. The PO_4''' is pptd. with $MgCl_2$, NH_4Cl, and NH_3, dissolved in HNO_3, pptd. with NH_4MoO_4, dissolved in 0·001*N*-NaOH, and the excess NaOH titrated with 0·001*N*-HCl. The accuracy of the results is comparable with that of Bloor's method. R. N. C.

Sodium fluoride as a blood anticoagulant in blood-phosphorus determinations. J. C. J. Burkens (Biochem. J., 1935, 29, 796—798).—The inorg. P content of serum (I) and plasma (II) to which oxalate, citrate, or hirudin has been added and of the $CCl_3{\cdot}CO_2H$ protein-free filtrate of blood (III), (I), or (II) increases on keeping. The increase can be prevented by addition of 10 mg. NaF per 5 ml. of (III), NaF preventing both clotting and all phosphatase action. This amount of NaF does not interfere with the later determination of P by the colorimetric method. P. W. C.

Determination of phosphorus fractions in blood-serum. R. R. Roepke (Ind. Eng. Chem. [Anal.], 1935, 7, 78).—Total, lipoid, and total acid-sol. P are determined colorimetrically (Denigès reagent) on samples ashed with $Mg(NO_3)_2$. Green's ashing technique (cf. A., 1928, 1051) is untrustworthy. J. L. D.

Calcium in the human organism. Physiology and metabolism. H. G. Otte (Semana Med., 1934, II, 1013—1033).—Distribution of blood-Ca is discussed and data for the umbilical cord and newly born infants are given. Ch. Abs. (*p*)

Blood-magnesium in normal and pathological conditions. A. Aguilar (Semana Med., 1934, II, 691—720).—The intake, distribution, and elimination of Mg are considered. Ch. Abs. (*p*)

Determination of blood-sodium. I. Torres and A. S. Ruiz (Anal. Fís. Quím., 1934, 32, 246—253).—The gravimetric method of Grigaut and Boutroux (A., 1931, 641) gives the best val. for serum-Na, which in normal cases is 0·305%. F. R. G.

Copper and iron in human blood. A. Sachs, V. E. Levine, and A. A. Fabian (Arch. Int. Med., 1935, 55, 227—253).—The blood (I) of normal men and women contains 0·132±0·0008, 0·131±0·0012 mg. Cu per 100 c.c. and 50·13±0·15, 43·42±0·19 mg. Fe per 100 c.c., respectively. The hæmoglobin content is 14·96±0·045 and 12·96±0·06 g. per 100 c.c., respectively. In cases of anæmia, Cu increases as Fe decreases and, in tuberculosis, high Cu vals. (0·182 and 0·195 for men and women, respectively) are found. In pregnancy, Fe is 40·44 and Cu 0·195. Cu in maternal is 2—4 times that of the fœtal (I), whilst Fe is slightly lower. H. G. R.

Effect of salinity variations on the alkaline reserve of the blood of Crustacea. A. Drilhon (Compt. rend. Soc. Biol., 1935, 118, 770—771).—The alkaline reserve rises in marine Crustacea in H_2O the salinity (I) of which is decreased slowly, and falls in fresh-H_2O Crustacea as (I) is increased. R. N. C.

Chlorine content of capillary and venous whole blood and serum in infancy. G. Török and L. Neufeld (Arch. Kinderheilk., 1934, 102, 217—223).—The lowest vals. are found in infants < 3 months. The relatively large variations in blood-Cl in healthy infants are more marked in the serum than in the whole blood. Nutr. Abs. (*m*)

Hydrogen-ion concentration of the umbilical blood of the human new-born, compared with the maternal blood. T. Mikawa (Japan J. Obstet. Gynecol., 1934, 17, 2—9).—Blood-p_H in the umbilical vein was 7·326 and that of the artery 7·288. In asphyxial new-born both vals. were lower. Retro-placental blood had p_H 7·344 and venous blood (cubital) of the same mother immediately after parturition 7·320. Ch. Abs. (*p*)

Hagedorn–Jensen micro-method for determining blood-sugar. G. di Macco (Boll. Soc. ital. Biol. sperim., 1934, 9, 1008—1009).—The technique is slightly modified. R. N. C.

Sexual differences in fasting blood-sugar. E. M. Greisheimer (Proc. Soc. Exp. Biol. Med., 1934, 31, 1067—1069).—Decline in blood-sugar during fasting was more marked in women (I) than in men. Ketosis developed earlier in (I). Ch. Abs. (*p*)

Difference between the disappearance of sugar and the formation of lactic acid in blood-glycolysis. Z. Dische and C. Rand (Biochem. Z., 1935, 276, 132—146).—Whereas the formation of lactic acid (I) in citrated blood at p_H 8—9 runs parallel with the disappearance of sugar, it remains considerably behind the latter with suspensions of washed red cells in physiological saline at p_H 7·2. The discrepancy is largely accounted for in terms of difference of p_H and is the greater the smaller is the concn. of red cells in the suspension. The sugar not accounted for as (I) is not lost by oxidation or by conversion into non-reducing carbohydrate, but is probably transformed into diphosphoglyceric acid. P. W. C.

Oxygen pressure and fermentation. G. Leiner (Biochem. Z., 1935, 276, 186—189).—When red cells of rabbits in $NHPh{\cdot}NH_2$-anæmia (large metabolism and uninjured by shaking) are saturated with O_2 at varying pressures in Ringer's solution +0·2% glucose, fermentation is inhibited as the pressure increases until the max. val. of respiration is attained, the pressure of O_2 thereafter having no effect on fermentation. P. W. C.

Kephalins and blood coagulability. G. Spagnol (Rev. Sudamer. Endocrinol. Immunol. Quimioterap., 1934, 17, 619—633).—A substance resembling kephalin (I), extracted from tissues, increases coagulability. It is sol. in Et_2O and repptd. by EtOH and $COMe_2$, forms a colloidal solution in H_2O, and differs from (I) only in physiological action. Ch. Abs. (*p*)

Hæmolysis from hypotonia proceeds according to a chromatic scale. IV. A. Manai (Boll. Soc. ital. Biol. sperim., 1934, 9, 1017—1019). R. N. C.

Hæmolysis from physico-chemical causes and corpuscular resistance. III. Fractionation of hæmolysis from hypotonia. A. Manai (Boll. Soc. ital. Biol. sperim., 1934, 9, 1020—1022).—The amount of hæmolysis in a hypotonic solution (I), measured colorimetrically, ∝ the time of hæmolysis and the vol. of (I), and inversely ∝ the concn. of the salts etc. present in (I). R. N. C.

Oxygen consumption of rabbit red cells during lysis: oxygen consumption of plasma. R. Ramsey and C. O. Warren (Quart. J. Exp. Physiol., 1934, 24, 153—160).—Cells suspended for some hr. in saline lose a substance which inhibits the "bursts" (I). Plasma (II) of normal rabbits consumes small amounts of O_2 probably through autoxidation of lipins and proteins. The O_2 consumption (III) of (II) is increased to show (I) when cells are hæmolysed in it or when non-respiring hæmolysed cells are added. The (I) are heat-stable and only slightly sensitive to CN′. When cells are suspended in (II) the (III) is the sum of that of cells and (II). Ch. Abs. (p)

Antibodies and carbohydrates. II. Experiments with glucose, glucosamine, amygdalin, cathartic acid, and a denitrified gum-arabic preparation. P. Uhlenhuth and E. Remy (Z. Immunitäts., 1934, 82, 229—240).—Injection of amygdalin, glucosamine, cathartic acid, or glucose does not produce antibodies; $Al(OH)_3$ adsorbates or collodion maskings are equally ineffective. Gum-arabic (I) is denitrified by pptn. from HCl solution with EtOH, washing, pptn. with $COMe_2$, drying, dissolving in cold H_2O, adding $NaNO_2$, pptn. with AcOH, washing with EtOH and $COMe_2$, pptn. with $CCl_3{\cdot}CO_2H$, washing with $COMe_2$, and drying; the dry substance (II) contains 0·122% N. (II) also does not produce antibodies; hence the antigenic properties of (I) are due to a glucosidic constituent containing N. R. N. C.

Chemistry of anti-bodies and serum-proteins. L. F. Hewitt (Biochem. J., 1934, 28, 2080—2087).—The abstract of Part I (this vol., 256) should read as follows. Cryst. albumin and globulin were readily distinguishable in respect of the Hausmann no. and cystine, tyrosine, and tryptophan content, but antitoxins and diphtheria toxin–antitoxin floccules were indistinguishable from serum-globulin fractions.

Biological effects of high pressures. Change in the antigenic specificity of serum under the influence of very high pressures. J. Basset, M. Machebœuf, and J. J. Perez (Compt. rend., 1935, 200, 496—498).—Horse serum maintained for 30 min. at 4500 atm. produces anaphylaxis in guinea-pigs sensitised with the same serum, but not normal serum, which indicates that although the sp. antigenic property of the serum is destroyed under high pressures, it acquires a new specificity. At pressures $<$ 4000 atm., the original specificity is maintained, and no new one appears. Since pressure does not significantly modify the arrangement of acidic and basic groups in the protein mol. (I) (cf. A., 1933, 1181), specificity probably depends on the spatial relationships in (I). J. L. D.

Serological studies of moth-proteins with special reference to their phylogenetic significance. S. Martin and F. B. Cotner (Ann. Entom. Soc. Amer., 1934, 27, 372—383).—An EtOH-insol. substance reacting with its homologous antiserum was isolated from moths. The substance is not hydrolysable to reducing sugars. The precipitin reaction serves to determine phylogenetic relationships between genera and sub-families of the *Phalœnidœ*. Ch. Abs. (p)

Solid components of pupa oil. I. H. Kaneko and K. Yamamoto (Bull. Sericult. Japan, 1934, 7, No. 2, 2).—The mixed solid fatty acids consist essentially of 80% of palmitic and 20% of stearic acid; they also contain a small proportion of a higher saturated acid. P. G. M.

Composition of ringed snake fat. G. Lode (Z. Unters. Lebensm., 1935, 69, 89—90).—The *d*, m.p., *n*, sap., Reichert–Meissl, Polenske, and I vals., acidity, and % of unsaponifiable matter of the fat of *Natrix natrix* are compared with those of other reptilian fats. E. C. S.

Protoporphyrin in the yolk of birds' eggs. B. Gouzon (Compt. rend. Soc. Biol., 1934, 116, 925—926).—Protoporphyrin was detected by its fluorescence spectrum in the yolk of the egg of the fowl, duck, and gull. Its presence may be connected with subsequent hæmoglobin formation. Nutr. Abs. (b)

Nuclein metabolism. XXXV. Pyrimidine nucleotides from thymus-nucleic acid. W. Klein and S. J. Thannhauser. **XXXVI. Enzymic study of the constitution of the polynucleotide molecule.** W. Klein and A. Rossi. **XXXVII. Nucleosidase.** W. Klein (Z. physiol. Chem., 1935, 231, 96—103, 104—114, 125—148; cf. A., 1934, 922). —XXXV. The products of enzymic fission of thymus-nucleic acid were divided into EtOH-sol. and -insol. portions. The sol. fraction, purified by way of the brucine and Ba salts, afforded ribodeoseadenylic acid and thymosinephosphoric acid (*Ba* salt, $C_{10}H_{13}O_8N_2Ba$, sinters 225—230°, $[\alpha]_D^{21}$ $-4{\cdot}4°$), yielding thymosine by enzymic fission. The more sol. brucine salts afforded *ribodeosecytidylic acid*, m.p. 183—187° (decomp.), $[\alpha]_D^{21}$ $+35°$ (sec. *Ba* salt, $[\alpha]_D^{19}$ $+14{\cdot}4°$), affording by enzymic fission cytosinedeoxyriboside (*picrate*, sinters 191°).

XXXVI. The prep. of a diphosphoesterase (I)-free monoesterase by the method of Kurata (A., 1932, 305) was not accomplished, the ratio of the rates of fission of Ph_1 and Ph_2 phosphate being const. and independent of the origin and purity of the prep. A pure (I) was not obtained. The toxic principle of "Habu" (*Trimeresurus flavoviridis*) hydrolyses both Ph esters and yeast-nucleic acid. The inhibition by AsO_4''' observed in the fission of the natural esters is negligible in the fission of the Ph esters. The ring structure postulated for nucleic acid by Takahashi (A., 1933, 426) is not confirmed.

XXXVII. A micro-method for control of enzymic fission of ribosides and deoxyribosides depends on the use of the Willstätter–Schudel determination of sugars, allowance being made for I absorption by free purines. By drying frozen organs active and const. enzyme material is obtained. The organs richest in purine-nucleosidase (I) are spleen, lung, liver, and heart-muscle. Highly active preps. are obtained by adsorption on $Al(OH)_3$ and elution with neutral AsO_4''' and PO_4''' solutions. Purine nucleosides are the substrates of (I); pyrimidine nucleosides, nucleotides, and nucleic acid are not hydrolysed. AsO_4''' and PO_4''' activate, guanine and hypoxanthine inhibit strongly, adenine less, and deoxyribose weakly. There is a special pyrimidine-nucleosidase differing from (I), which is more abundant in kidney than in spleen and red marrow. J. H. B.

Reduced glutathione in thymus gland and testicles of young and full-grown rabbits. F. Murata (Sei-i-Kwai Med. J., 1933, **52**, 42—45).—Vals. for young rabbits were 0·201% in thymus and 0·0778% in testicles; and, in adults, 0·0898 and 0·1285, respectively. Ch. Abs. (*p*)

Determination of oxidised and reduced glutathione content of tissue. W. Quensel and K. Wachholder (Z. physiol. Chem., 1935, **231**, 65—74).—The method of Woodward and Fry (A., 1932, 1053) is the most trustworthy for micro-determination of glutathione in tissue. J. H. B.

Chemical constitution of the cornea. A. C. Krause (Amer. J. Ophthalmol., 1932, **15**, 422—424).—Analytical data are given. Ch. Abs. (*p*)

Lipins of the sclera, cornea, choroid, and iris. A. C. Krause (Amer. J. Physiol., 1934, **110**, 182—186).—The lipins consists largely of phosphatide (I) in all the tissues except the sclera and corneal substantia propria, where fat and (I) are present in equal amounts. Cholesterol and cerebrosides increase with (I). Carotenoids are present only in min. quantities. R. N. C.

Iodine content of the human pituitary. G. F. Koppenhöfer (Z. ges. exp. Med., 1934, **94**, 57—62; Chem. Zentr., 1934, ii, 2405).—The pituitaries of persons who have died suddenly contain approx. 10^{-3} g. of I. In chronic patients pituitary-I is considerably lower, whilst in liver disease and pregnancy it is zero. In males it is always > in females. R. N. C.

Effect of temperature on the total iodine content of the thyroid. E. Vallesi (Arch. internat. Pharmacodyn., 1934, **48**, 174—179).—The I content of the thyroid of guinea-pigs (I) kept for 20—40 days at 20—22° does not differ significantly from the val. (13·9 mg. per 100 g. of fresh gland) obtained from (I) kept at 0—5°. Thus the transitory rise in I found at high altitudes must be attributed to some influence other than low temp. Nutr. Abs. (*m*)

Chemistry of normal human thyroids. H. von Kolnitz and R. E. Remington (Endocrinol., 1933, **17**, 563—568).—The wt. and total I content of thyroids increase rapidly up to 20 years of age and then more slowly to a max. at middle age, and subsequently decline. Summer glands are relatively heavier but the % of I remains practically const. Ch. Abs. (*p*)

Comparative distribution of organic phosphates in the skeletal and cardiac muscles of *Limulus polyphemus*. G. L. Engel and I. Chao (J. Biol. Chem., 1935, **108**, 389—393).—Total P and all the P fractions, particularly the phosphoarginine-P, are higher in skeletal than in cardiac muscle, the ratios, ranging from 3 to 16, being const. for each fraction. H. G. R.

Sodium, potassium, calcium, magnesium, and phosphorus contents of skeletal and cardiac muscle, bladder, and uterus. W. Wilkins (Proc. Soc. Exp. Biol. Med., 1934, **31**, 1117—1118).—In cattle, among all tissues examined, the uterus (I) contained the most Na and least K. The total P of (I) and bladder was < that of skeletal and heart-muscle. Ch. Abs. (*p*)

Presence of iron in enamel-keratin. T. Rosebury (J. Dental Res., 1934, **14**, 269—272).—Fe is an intrinsic component of the enamel-keratin. Ch. Abs. (*p*)

Analysis of tooth samples composed of enamel, dentine, and cementum. C. D. Crowell, jun., H. C. Hodge, and W. R. Line (J. Dental Res., 1934, **14**, 251—268).—Composition is not influenced by sex or by morphological type of tooth and only slightly by age. The inorg. residue [after extraction of org. matter by KOH in $(CH_2{\cdot}OH)_2$] corresponds with $3Ca_3(PO_4)_2,CaCO_3,Ca(OH)_2$. Ch. Abs. (*p*)

Crystal orientation in tooth enamel. J. Thewlis (Phil. Mag., 1935, [vii], **19**, 291—297).—The apatite crystals are oriented so as to have the 011 axes in common. C. W. G.

Histochemical significance of metachromasia. L. Lison (Compt. rend. Soc. Biol., 1935, **118**, 821—824).—Metachromasia is exhibited by mono-esters of polysaccharides and other substances of high mol. wt. with H_2SO_4; the effect decreases with mol. wt. R. N. C.

Aqueous extract of the domestic cocoon. XVIII. Effects of heating and enzyme on sericin. H. Kaneko and Y. Nakazawa (J. Agric. Chem. Soc. Japan, 1934, **10**, 356—359).—The quantity of sericin-*A* (I) is diminished by drying and steaming the cocoons; in solution it decreases with the time of heating. (I) is converted into -*B*, which is less readily sol. By the action at p_H 8·0 at 30° of bacteria isolated from the spun silk, the quantity of (I) is unaffected, although its colloidal properties are modified; the quantity of -*B* is reduced. Ch. Abs.

Effect of diet on the yield and composition of human milk. U. S. Ružičić (Monatsschr. Kinderheilk., 1934, **60**, 172—181).—In healthy mothers (I) in full lactation (4th—7th month) mixed diets give the greatest flow of milk. All other diets diminish secretion. Hunger almost halves the amount in (I) with large secretions and diminishes the flow much less markedly in (I) with smaller secretions. Lactose % is unchanged by all diets. Meat alone, and meat and bread or butter, raise the N content very slightly, none of the other diets having any effect. Bread and meat halve the fat content; bread alone lowers it still further, whilst meat alone has no effect. Butter alone or with meat, and fasting increase the fat by about 50%, bread and butter having a similar but less marked influence. Nutr. Abs. (*m*)

Resazurin reductase test [in milk]. O. Waldbauer (Kisérlet. Kozl., 1931, **34**, 128; Bied. Zentr., 1934, **A**, **5**, 133).—Pesch's method is simpler and more rapid than the methylene-blue test. A. G. P.

Micro-determination of copper in milk. L. W. Conn, A. H. Johnson, H. A. Trebler, and V. Karpenko (Ind. Eng. Chem. [Anal.], 1935, **7**, 15—23).—A comparison of different methods has been made. Colorimetric determination of Cu by Na diethyldithiocarbamate, after separation by H_2S or micro-electrolysis, is recommended for 25- to 200-c.c. samples containing $>0{\cdot}002$ mg. Cu. Cu contents found are: raw milk 0·051—0·132, pasteurised milk 0·088—0·741, dried milk 1·37—17·15 p.p.m. E. S. H.

Micro-determination of the different fractions of phosphorus and lipins in milk. D. Torrisi (Boll. Soc. ital. Biol. sperim., 1934, **9**, 1011—1013).—Total P is determined by the Neumann–Flatter micro-method. The milk is then treated with NaOH–EtOH and extracted with Et_2O. The H_2O solution, containing P compounds, is acidified, and caseinogen separated by filtration. Inorg. P is pptd. as $MgNH_4PO_4$, dissolved in H_2SO_4, and determined by the micro-Neumann method, whilst total acid-sol. P (I) is determined by the same method after incineration of org. matter, org. acid-sol. and acid-insol. P being calc. by difference. Total lipin is determined in the Et_2O extract by evaporation and weighing, and cholesterol extracted from the residue with $COMe_2$ and determined colorimetrically with Ac_2O and H_2SO_4 in $CHCl_3$. The $COMe_2$ residue is extracted with EtOH, and lecithin and kephalin are determined in the sol. and insol. fractions, respectively, as P by the same method as (I). R. N. C.

Biology of the cerebrospinal fluid. V. Calcium content. E. Vogt (Arch. Gynäkol., 1934, **158**, 60—61).—In healthy, diseased, and pregnant women the Ca content (I) of the fluid varies from 4·0 to 7·1 mg. (average about 6·0 mg.) per 100 ml. (I) varies very little despite considerable changes in blood-Ca. Nutr. Abs. (*m*)

Micro-determination of the fat-soluble ester glycerol contained in lymph. S. Freeman and T. E. Friedemann (J. Biol. Chem., 1935, **108**, 471—478).—The fatty material of lymph extract (cf. A., 1928, 662) after extraction by ligroin is saponified, and the glycerol in the H_2O-sol. constituents not pptd. by $HgCl_2+CuSO_4$ reagent is oxidised by $0{\cdot}02N$-$KMnO_4$. A. E. O.

Hydrogen carbonate elimination through salivary glands under nervous and chemical stimulation. H. H. McClanahan, jun., and W. R. Amberson (J. Pharm. Exp. Ther., 1935, **53**, 189—197).—The CO_2 content of submaxillary saliva is increased, at the expense of the blood-plasma, by stimulation with pilocarpine and to a smaller extent with adrenaline. H. G. R.

Saliva and gastric juice. R. V. de Ipola (Revista Médica Córdoba, 1934, **22**, 675—682).—Mixtures of saliva and dil. HCl show a diminution in free HCl and rise of p_H. The fixing action is dependent on a const. factor for each saliva, which increases with rise of temp. R. N. C.

Relation of the secretion of mucus to acidity of the gastric juice. O. L. Helmer (Amer. J. Physiol., 1934, **110**, 28—36).—Stimulation of gastric secretion in man by histamine produces an increase in acid and Cl, with a decrease of total base, N, P, and mucus-sugar, in the gastric juice. Pepsin and rennin are also increased. The increase in acid $\propto$ that of Cl. Mucus is present in the gastric contents throughout in sufficient concn. to account for the main variations in acid by neutralising and diluting the secreted HCl of the parietal cells. The [HCl] in this secretion, calc. from the Na : P ratio of the gastric contents, is 161 milliequivs. per litre, which is approx. isotonic with blood. R. N. C.

Chloride concentration of gastric secretion from fundic pouches and from the intact whole stomach. C. M. Wilhelmj, L. C. Henrich, I. Neigus, and F. C. Hill (Amer. J. Physiol., 1934, **109**, 112).—In dogs, fluid enters the stomach from the fundus, where the secretion has a high, practically const. [Cl′] from the pyloric glands (I), and from the duodenum (II). The secretion from (I) and (II) has a relatively low [Cl′]. Nutr. Abs. (*m*)

Acid–base ratio of gastric juice, blood, and urine before, and at intervals after, stimulation of the gastric juice by histamine. L. Martin, E. Steigerwald, M. L. Carroll, and M. Morgenstern (Bull. Johns Hopkins Hosp., 1934, **55**, 57—80).—Changes in electrolyte concn. of gastric juice (I), blood (II), and urine (III) following administration of histamine were much greater in cases able to secrete HCl into (I) than in those unable to do so. In the former, Cl′, PO_4''', and CO_2 in (II) and (III) decreased and serum-protein increased. The (III) became alkaline and base and NH_3-N contents declined. In achlorohydrias changes were similar but smaller and (III) became more acid in most cases. Ch. Abs. (*p*)

Effect of continued oral administration of histaminase and pancreatin on gastric secretion. F. Biguria and A. Canzanelli (Amer. J. Physiol., 1934, **110**, 243—245).—The acidity of the gastric juice is unaffected by continued oral administration of histaminase or pancreatin for long periods. R. N. C.

Analysis of small amounts of bile. A. G. Douglas-Sauermann (Z. physiol. Chem., 1935, **231**, 92—95). J. H. B.

Influence of bile acid on the excretion of salts in the liver-bile. III. Excretion of phosphoric acid by cholic acid with addition of amino-acids or lactic acid. Y. Kawada (Arb. Med. Fak. Okayama, 1934, **4**, 196—205; cf. A., 1934, 1383).—Increased excretion of P, ash, and dry matter following feeding of glycine or alanine is intensified by feeding cholic acid (I). Decreased excretion due to *dl*-lactic acid is also counteracted by (I). Ch. Abs. (*p*)

Urobilin excretion of infancy and childhood: relation to blood destruction and formation. H. W. Josephs (Bull. Johns Hopkins Hosp., 1934, **55**, 154—168).—The ratio of urobilin excreted (I) to total hæmoglobin in the body is const. for different ages. Stimulation of blood formation results in an increase in (I). Ch. Abs. (*p*)

Chemical changes in blood and intestinal juice produced by loss of intestinal juice. R. C. Herrin (J. Biol. Chem., 1935, **108**, 547—562).—The electrolyte content of succus entericus (I) is similar to that of serum; the secretion of (I) proceeds independently of the extrinsic nerves to the intestine. Continuous distention of the jejunum decreases the Cl′ and fixed base (II) and increases the HCO_3' and NH_3 concns. in (I), whilst the serum-(II), -Cl′, -HCO_3', and plasma-vol. decrease and the serum-Ca, -P, and -protein increase. The η of the blood increases, whilst its O_2 content decreases. H. D.

Average composition of human duodenal secretion. C. M. Wilhelmj, L. C. Henrich, I. Neigus, and F. C. Hill (Amer. J. Physiol., 1934, **109**, 112—113).—The average alkalinity of the secretion is equiv. to 0·056*N* and the average Cl′ content is 272 mg. per 100 ml. Nutr. Abs. (*m*)

Hydrogen-ion concentration of the contents of the small intestine. C. S. Robinson (J. Biol. Chem., 1935, **108**, 403—408).—A survey of the whole length of intestine in rats and dogs indicates that each portion of the gut wall contains a definite physiological control mechanism for regulating the p_H of the intestinal contents in contact with it, whereby the p_H is caused to vary regularly from about 6·5 in the duodenum to 7·5—8 at the ileocæcal valve. A. E. O.

Relationship of the pancreas to the hydrolysis of nitrogenous substances in fæces. Relationship of disease of the pancreas to hydrolysable carbohydrates in fæces. K. Sekikawa (Tohoku J. Exp. Med., 1934, **24**, 51—71, 72—99).—In dogs, ligature of the pancreatic ducts causes a transitory increase in the muscle-fibre content of the fæces. The carbohydrate content is slightly increased. Formation of a permanent pancreatic fistula and extirpation of the pancreas lead to the appearance of much more undigested protein and starch. Nutr. Abs. (*m*)

Acidity and physical characteristics of urine. C. Mitchell (J. Amer. Inst. Homeopath., 1934, **27**, 523—526).—Urinary acidity is detected by use of the Na salt of Ruby S (red coloration). Ch. Abs. (*p*)

Renal excretion of creatinine. II. Volume of distribution. III. Utilisation constant. R. Dominguez (Proc. Soc. Exp. Biol. Med., 1934, **31**, 1146—1149; cf. A., 1934, 554).—II. When a substance disappears exponentially from the body and the rate of excretion by the kidneys $\propto$ the concn. in the plasma (I), the rate of utilisation of the unexcreted portion also $\propto$ the concn. in (I).

III. The excretion const. loses part of its significance in renal physiology in the case of substances (xylose, creatinine) which are partly utilised and partly excreted. Ch. Abs. (*p*)

Urine infection and detection of nitrite in urine. K. Machold (Med. Klin., 1934, **30**, 1097—1098; Chem. Zentr., 1934, ii, 2425).—The method depends on the liberation of I by NO_2' and its extraction with $CHCl_3$. A. G. P.

Silver nitrate reaction with urine. T. Iio and K. Tsushima (J. Chosen Med. Assoc., 1934, **24**, 1027—1036).—Urines containing $<$ 0·7% of Cl′ gave positive tests with Buscaino's $AgNO_3$ reagent. In general samples with lower [Cl′] give the more intense tests, but no quant. relationship is apparent. Ch. Abs. (*p*)

Nature of the reducing substances in normal dog urine. E. P. Laug and T. P. Nash, jun. (J. Biol. Chem., 1935, **108**, 479—486).—Acid pptg. agents are liable to give rise to extra fermentable sugar (I) by hydrolysis of non-nitrogenous, non-fermentable (I) in the urine. A. E. O.

Sodium nitroprusside and [determination of] acetone in urine. F. E. R. Sas (Anal. Fís. Quím., 1934, **32**, 185—232).—A modification of Engfeldt's test (A., 1925, i, 1490) is described, the limiting concn. being 16 mg. per litre with 0·08 mg. of $COMe_2$ (I). The colours given by Na nitroprusside with other possible constituents of urine (II) are described, confusion with (I) or $CH_2Ac{\cdot}CO_2H$ (III) occurring only with sulphides (IV), mercaptans (V), and glutathione (VI). Methods are given for the colorimetric determination in (II) of (I) and (III) together, (IV) and (V) together, and also of (VI), the limiting concn. for (I) in presence of (IV), (V), and (VI) being 35 mg. per litre with 0·175 mg. of (I). F. R. G.

Dissolved constituents of human sweat. A. G. R. Whitehouse (Proc. Roy. Soc., 1935, **B**, **117**, 139—153).—The constituents are present in the following amounts (I): Cl $>$ 0·15, K 0·014—0·022 (4—11% as KCl), SO_4'' 0·004, lactic acid (not derived from the blood) 0·068—0·122, and urea (probably derived from the blood) 0·023—0·046%. The Cl content is increased by severe muscular work, but the increase is $<$ that caused by the same rise in body temp. induced by atm. conditions. The ash consists chiefly of NaCl and KCl. The ratio org. matter : ash in sweat (II) varies with duration and intensity of sweating. Fresh (II) is slightly alkaline, but rapidly acquires acidity from the skin surface. Different individuals exhibit great differences as regards (I). W. McC.

Comparative efficacy of substances employed in prevention of intraperitoneal adhesions. C. E. Rea and O. H. Wangensteen (Proc. Soc. Exp. Biol. Med., 1934, **31**, 1060—1063).—The (decreasing) order of efficiency was: Na ricinoleate, papain, amfetin, defibrinated rabbit blood. Ch. Abs. (*p*)

Influence of various diets on experimental amyloidosis in mice. D. Y. Ku and M. A. Simon (Arch. Path., 1934, **18**, 245—251).—Production of amyloidosis (I) by injection of nutrose was greatest in mice receiving a normal diet, less with a high-protein diet, and least with a diet rich in maize starch. Low incidence of (I) in Chinese is not attributable to soya-bean diets. Ch. Abs. (*p*)

Preparation and stability of food allergen extracts. G. A. Alles, G. Piness, and H. Muller (J. Allergy, 1933, **5**, 5—11).—Antigenic extracts of wheat, eggs, and milk made with KH_2PO_4–K_2HPO_4–glycerol were stable after 7 years (cold). Ch. Abs. (*p*)

Urinary proteose in allergy. J. H. Black (J. Allergy, 1934, 5, 373—382).—The activity and specificity of the proteose from urine of allergic patients may be due to unchanged antigen. Ch. Abs. (*p*)

Treatment of hay fever and asthma with viosterol. B. Z. Rappaport, C. I. Reed, M. L. Hathaway, and H. C. Struck (J. Allergy, 1934, 5, 541—553).—The action of viosterol in increasing the efficiency of pollen injections is not related to its ability to mobilise Ca. Ch. Abs. (*p*)

New-formed hæmoglobin and protein catabolism in the anæmic dog. F. S. Daft, F. S. Robscheit-Robbins, and G. H. Whipple (J. Biol. Chem., 1935, 108, 487—496).—The total urinary N is the same for both the anæmic and the non-anæmic dog. The anæmic dog produces less new hæmoglobin when "salmon bread" (Amer. J. Physiol., 1925, 72, 395) is fed daily than when the latter is fed after a period of protein fasting. A. E. O.

Reaction and carbon dioxide content of the venous plasma in pernicious anæmia. C. P. Emerson, jun., and O. M. Helmer (Arch. Int. Med., 1935, 55, 254—261).—The acid–base equilibrium in anæmia is normal, although there is a slight tendency to a deficiency in alkali. H. G. R.

Iron and copper contents and the hæmopoietic activities of stomach and liver preparations. H. Jackson, L. Klein, and J. F. Wilkinson (Biochem. J., 1935, 29, 330—337).—Modifications of existing methods are used for determination of Fe and Cu in clinically tested preps. of stomach and liver used in treatment of pernicious anæmia. No obvious relationship could be detected between the Fe and Cu contents and the hæmopoietic potency of these preps. P. W. C.

Arteriosclerotic lesions in the human aorta. D. R. Meeker and J. W. Jobling (Arch. Path., 1934, 18, 252—257).—With increasing severity of lesions there is an increase in total fat and total cholesterol (I), the proportion of phospholipins being unchanged. In late lesions the ratio of free to ester-(I) also increases. Ch. Abs. (*p*)

Uric acid content of blood. G. Schmidt (Z. ges. exp. Med., 1934, 94, 76—83).—The blood-uric acid of healthy subjects averages 3·53 mg. per 100 ml. (standard error ±0·161 mg.: range 2·085—4·967). Vals. are high in disorders of renal function, gout, and arteriosclerosis, especially coronary sclerosis, normal in pyogenic diseases of the urinary tract and rheumatic arthritis, and lowest in acromegaly and liver atrophy. The method of Morris and Macleod gives vals. about 30% > those given by Thannhauser's method. Nutr. Abs. (*m*)

Nature of the filterable tumour-exciting agent in avian sarcomata. J. C. G. Ledingham and W. E. Gye (Lancet, 1935, 228, 376—377).—The infective "agent" from potent filtrates of avian tumours can be separated by centrifuging at 15,000 r.p.m. The infective agents in deposits of filtrates exist as elementary bodies of much smaller size than those of vaccinia. Agglutinins for the corresponding elementary bodies are present in the serum of tumour-bearing fowls. L. S. T.

Ammonia production by sarcoma. Sparing effect of carbohydrate. W. T. Salter and P. B. Robb (Amer. J. Cancer, 1934, 22, 87—95).—Sugars most readily glycolysed by sarcoma-tissue (I) (glucose, mannose) are the most effective in decreasing NH_3 production (II) by (I), but have no effect on (II) by liver-tissue. Iodoacetates inhibit glycolysis and the NH_3-sparing effect, but CN′ has no influence on either process. Elimination of non-protein-N is not affected by the presence of the sugars. Ch. Abs. (*p*)

Utilisation of simple derivatives of sugars by mouse sarcoma. O. O. Meyer, C. McTiernan, and W. T. Salter (Amer. J. Cancer, 1934, 22, 76—86).—Normal and tumour (I) tissues utilise the same sugars and derivatives. Actively growing (I) tissues produce slightly larger amounts of acid. *d*-Mannose and *d*-glucose are glycolysed to similar extents. Pentoses and hexose derivatives containing the hexylene oxide ring are not acted on. Triose derivatives, hexoses containing the butylene oxide ring, and saccharides containing glucose are less utilised than glucose (II). Acid production from (II) persists for some time, whereas that from 3-methylglucose ceases after 2—3 hr. Glycolysis is inhibited by iodoacetates, but is not affected by CN′. Ch. Abs. (*p*)

Peculiarity in carbohydrate metabolism of cancer. F. H. Scharles, D. Baker, and W. T. Salter (J. Clin. Invest., 1934, 13, 687).—Saline extract of mouse sarcoma (I) incubated with glycogen produces lactic acid (II) only when hexose di- or mono-phosphate is present. It is concluded that (I) extract is unable to synthesise a precursor of (II), possibly a hexose phosphate. Nutr. Abs. (*m*)

Enzymes in uterine cancer. I. Amylase. K. Nakahori (Japan J. Obstet., 1934, 17, 215—223).—The amylase (I) contents of normal and cancerous tissues are recorded. Optimum p_H for (I) in all tissues was 6·8—7·4. Ch. Abs. (*p*)

Coagulant action of tissue extracts in cancerous guinea-pigs. P. Mendeléeff (Compt. rend., Soc. Biol., 1935, 118, 364—369).—Coagulation of guinea-pig plasma by extracts of the thymus, pancreas, lymphatic ganglia, adrenals, and liver of cancerous guinea-pigs is quicker than that by similar extracts from normal animals. On the other hand, rate of coagulation by extracts of spleen, bone and spinal marrow, and of rabbit plasma by extract of leucocytes (I) is decreased in cancerous animals, the decrease for (I) becoming greater if it is kept 48 hr. in the dark. R. N. C.

Histochemistry of organs of tumour-bearing rats by the micro-incineration method. W. C. Hueper (J. Lab. Clin. Med., 1934, 19, 1286—1293).—Ash of healthy human cells consists largely of Na and K. Disintegrated tumour cells contain higher proportions of Ca. Degeneration and necrosis of kidney and heart cells following excessive administration of parathormone and viosterol is due to toxic action of intracellular accumulations of Ca. Ch. Abs. (*p*)

Effect of methylene-blue and other oxidation–reduction indicators in experimental tumours. M. M. Brooks (Univ. Calif. Pub. Zool., 1934, 39, 293—302).—Of a no. of oxidation–reduction indicators injected into tumours of rats and mice only methylene-blue produced regression. Ch. Abs. (*p*)

Colchicine and tumour growth. E. C. Amoroso (Nature, 1935, **135**, 266—267).—Colchicine effects regression of tumours in mice, and has been effective in treating a spontaneous tumour in a dog. L. S. T.

Reproduction and cancer. J. A. Campbell (Nature, 1935, **135**, 396).—Evidence that under normal conditions œstrin may be responsible for providing immunity from cancer is discussed. L. S. T.

Alleviation of pain in cancer by snake venom. J. Körbler (Klin. Woch., 1934, 13, 1185—1187; Chem. Zentr., 1934, ii, 2551).—Injection of poskok (*Vipera ammodytes*) venom alleviated pain considerably in 26 cases. The toxin is apparently superior to cobra toxin for this purpose. R. N. C.

Morphological studies on lipin antagonism: experimental cerebrosidosis. P. Kimmelstiel and E. Laas (Beitr. path. Anat., 1934, 93, 417—440).—Parenteral injection into mice of cerebroside (I), cholesterol, and lecithin separately or together showed that storage occurred, that the composition of the intracellular lipoid complexes was correspondingly altered, and that the absorption of lipin by the cell was dependent on the colloidal nature and not on the chemical constitution of the injected material. The antagonistic action of these lipins is not very marked. A storage of (I) in rabbits was produced which closely resembled human Gaucher's disease. Nutr. Abs. (*b*)

Cystinuria in two sisters. E. M. Hickmans and W. C. Smallwood (Biochem. J., 1935, 29, 357—370).—Two cases of cystinuria (I) in sisters and results of examination for (I) in other members of the family are recorded. The urine has an abnormally high p_H, does not contain tyrosine, leucine, putrescine, or cadaverine, but contains a precursor of cystine (II) from which (II) is later liberated. Excretion of large amounts of (II) may lead to damaged kidney and albuminuria. Administration of (II) or of foodstuffs with a high (II) content by mouth did not lead to increased excretion of (II). A high animal protein diet increases (I) by stimulating tissue metabolism with liberation of more endogenous (II). P. W. C.

Diabetes mellitus and the pituitary gland. A. Lyall and J. A. Innes (Lancet, 1935, **228**, 318—321).—In a case of severe diabetes in man, marked improvement in the diabetic condition took place with the development of a pituitary lesion. The condition was clinically analogous to that of an experimental animal in which both pancreas and pituitary had been destroyed. L. S. T.

Effect of spleen extracts in diabetes. F. Rathery, I. Cosmulesco, and C. E. Grignon (Presse méd., 1934, **42**, 953—955).—In man the results of injecting 2 ml. of extract indicate that the spleen produces a hormone which augments the action of insulin. Nutr. Abs. (*m*)

Neuropathy in diabetes mellitus. Lipin constituents of the nerves correlated with the clinical data. W. R. Jordan, L. O. Randall, and W. R. Bloor (Arch. Int. Med., 1935, **55**, 26—41).—The femoral and tibial nerves of diabetics contain less phospholipin, cholesterol, and cerebroside than do corresponding nerves from non-diabetics. The lipin abnormality appears before clinical evidence of neuropathy. W. O. K.

Changes in intermediary protein metabolism in the liver in experimental diabetes. H. Elias and B. Zemplén (Z. ges. exp. Med., 1934, 94, 199—216).—The concns. of various N compounds were determined in arterial blood (I) and in (I) of portal and hepatic veins and the vena cava in depancreatised dogs. Increased protein destruction in the liver was demonstrated by (1) increase of polypeptide in the liver, although there was little difference in its concn. in afferent and efferent (I), and (2) increase in the urea and residual N in the liver and efferent (I). The absence of any increase of NH_2-acid is due to efficient deamination and urea synthesis. The rise of NH_2-acid in the systemic (I) is due to increased protein breakdown in other organs. Similar but less marked changes were observed after partial pancreatectomy. After insulin treatment the vals. were practically normal. Nutr. Abs. (*b*)

Changes in protein-bound sugar in diabetics following simultaneous or separate administration of glucose and insulin. F. Rathery and I. Cosmulesco (J. Physiol. Path. gén., 1934, 32, 425—431).—Whilst the free sugar of the blood-plasma of the diabetic varies markedly with ingestion of glucose and injection of insulin, the sugar combined with protein (measured after hydrolysis with mineral acid) exhibits no predictable change. Nutr. Abs. (*m*)

Excretion of creatinine and glucose in diabetics. P. Govaerts and P. Cambier (Acta Med. Scand., 1934, **83**, 317—327).—From measurements of glucose (I), creatinine (II), and urea (III) of the blood and urine of a fasting diabetic, before and after the ingestion of 2 g. of (II), it is concluded that with const. blood-sugar the urinary elimination of (I) runs parallel with the excretion of (II) and is independent of the intensity of diuresis and excretion of (III). This observation is in keeping with the view that whilst in the normal subject (I) and (II) pass through the glomerulus [(I) being reabsorbed and (II) excreted], in the diabetic subject the reabsorption of (I) still proceeds but is unable to cope with the increased concn. of (I) in the glomerular filtrate. Nutr. Abs. (*b*)

Hypoglycæmic phase of the glucose tolerance curve. S. Soskin and M. D. Allweiss (Amer. J. Physiol., 1934, **110**, 4—7).—Continuous injection of glucose solution, both in normal dogs and in diabetic dogs with blood-sugar (I) kept const. by insulin and glucose, produces a rise in (I) followed by a fall, which begins before the cessation (II) of glucose injection. After (II), (I) continues to fall for some time before returning to normal. R. N. C.

Diabetic hyperpyrexia. H. E. Himwich, J. F. Fazikas, L. H. Nahum, D. du Bois, and A. Gilman (Amer. J. Physiol., 1934, **110**, 19—27).—In diabetic hyperpyrexia (I) in dogs with polyuria as basis, rectal temp. (II), *d* and osmotic pressure of serum, O_2 capacity and lactic acid content of the blood are directly, and p_H and alkaline reserve inversely, ∝ the blood concn. If insulin and glucose are not given, (II), *d* of serum, and blood-lactic acid all behave similarly, whilst blood-sugar ∝ H_2O ingestion. Serum-base, -Cl, and -lactic acid all increase, and $NaHCO_3$ falls, with serum concn. HSO_3'-binding substances increase in fever, falling again when H_2O ingestion dispels it. R. N. C.

Variations in potassium content of the blood in diabetes mellitus. F. Rathery and J. Bertoliatti (Compt. rend. Soc. Biol., 1934, **116**, 1346—1349).—In advanced diabetes blood-K increases (up to 35%). Insulin causes a partial return to normal. Ch. Abs. (*p*)

Blueberry in diabetes. N. K. Edgars (Drug and Cosmetic Ind., 1934, **35**, 479—480).—*Neomyrtillin* (I), $C_{24}H_{36}O_{18}$, a methoxydigalloylglucose, occurring to the extent of 2·05% in air-dried blueberry leaves, reduced the blood-sugar level of rabbits having artificial hyperglycæmia from 210 to 110 mg. per 100 c.c. in 30 min. The reactions of (I) are given and the analyses of the fruit and leaves. (I) forms insol. compounds with most alkaloids. E. H. S.

Protective action of sodium thiocyanate against dysentery toxin (Shiga) in dogs and cats. P. E. Reid, M. X. Anderson, H. I. Stubblefield and A. C. Ivy (J. Infect. Dis., 1934, **55**, 112—122).—Intravenous injection of NaSCN affords protection in some dogs but not in rabbits. Ch. Abs. (*p*)

Effects of infectious ectromelia, starvation, exposure to heat, and cholesterol feeding on the cortical lipin of the adrenals in mice. R. Whitehead (Brit. J. Exp. Path., 1934, **15**, 279—286).—A decrease of lipin occurs in the adrenal cortex (I) of mice with infectious ectromelia and after starvation for 2 days at 13° but not at 37°. (I) of mice fed at 35—38° for 3 days and of mice receiving powdered cholesterol for periods up to 165 days contains normal amounts of lipin. Nutr. Abs. (*m*)

Creatine content of the myocardium of normal and abnormal human hearts. D. W. Cowan (Amer. Heart J., 1934, **9**, 378—385).—The average creatine content (*C*) of the left ventricular myocardium of normal hearts was 194 mg. per 100 g. of tissue. Vals. were lower for decompensated and still lower for abnormal but not decompensated hearts. Septicæmia did not affect *C*. Ch. Abs. (*p*)

Therapeutic effect of total ablation of normal thyroid on congestive heart failure and angina pectoris. IX. Post-operative parathyroid function. Serum-calcium and -phosphorus. D. R. Gilligan, D. D. Berlin, M. C. Volk, B. Stern, and H. L. Blumgart (J. Clin. Invest., 1934, **13**, 789—806).—Of 73 thyroidectomised patients, only 12 showed parathyroid deficiency; in 10 of these the symptoms rapidly disappeared. Post-operative tetany was more frequent in the group with slightly subnormal serum-Ca prior to operation. The symptoms are attributed to injury to, rather than to removal of, parathyroid glands. The serum-Ca is not so markedly reduced nor the serum-P so much raised as in chronic hypoparathyroidism of either idiopathic or post-operative origin. Nutr. Abs. (*b*)

Blood-lactic acid in patients with hepatic diseases. Basal value. Induced variations. F. Kayser and N. Masius (Compt. rend. Soc. Biol., 1935, **118**, 207—210).—Ingestion of Na lactate by normal subjects (I) causes a rise of blood-lactic acid (II) to a max. 40 min. after ingestion, followed by a fall to approx. zero in 2 hr. In cirrhotics (III), (II) rises steadily for 2 hr. after ingestion, and a similar curve is obtained in catarrhal icterus. Intravenous injection in both (I) and (III) produces a rapid rise of (II) to a max. in 10 min., which is higher in (III) than in (I), followed by a steady fall at approx. the same rate in each case. (II) is > normal only in serious cases of hepatic disease. R. N. C.

Blood-chloride after administration of sodium chloride in subjects with healthy or diseased liver. P. Vegh (Orvosi Hetilap, 1934, **78**, 874—876).—In liver diseases the rise in blood-Cl following injection into the duodenum of 15 g. of NaCl in 200 ml. of H_2O is less marked than in cases with healthy liver. Nutr. Abs. (*m*)

Use of galactose in the differential diagnosis of jaundice. K. A. Owen (J. Lab. Clin. Med., 1934, **19**, 1311—1319).—The level of urinary galactose following ingestion of 40-g. doses serves to indicate the nature of biliary affections. Ch. Abs. (*p*)

Phosphatase in obstructive jaundice. A. R. Armstrong, E. J. King, and R. I. Harris (Canad. Med. Assoc. J., 1934, **31**, 14—20).—Obstruction of the bile duct results in large increases of serum-phosphatase, vals. for dogs being much > in man. Hæmolytic jaundice causes only slight changes. Ch. Abs. (*p*)

Porphyrins appearing in chloroma and myeloid leucæmia. J. Thomas and E. J. Bigwood (Compt. rend. Soc. Biol., 1935, **118**, 381—383).—An Et_2O–AcOH aq. extract of a chloromatous tumour contained a porphyrin fraction showing all the properties of protoporphyrin, which was also isolated and identified from an extract of the green aortic and mesenteric ganglia in a case of myeloid leucæmia. R. N. C.

Field and laboratory tests for detection of mastitis. J. M. Rosell (Sci. Agric., 1934, **15**, 169—175).—Chemical and bacteriological tests are examined. A. G. P.

Therapeutic value of bismuth-violet. G. R. Kitchen and F. E. Kitchen (North Amer. Veterinarian, 1934, **15**, 12—16).—Bi-violet is lethal to Gram-positive organisms and is effective in treatment of metritis and mastitis in cows. Ch. Abs. (*p*)

Chlorides in meningitis. L. O. Finkelstein and F. S. Merson (Rev. franç. Pédiat., 1934, **10**, 204—217).—A study of the Cl′ content of blood, cerebrospinal fluid, tissue-lymph, urine, and gastric

uice indicates a demineralisation during meningitis. he diet must counteract this tendency.
Nutr. Abs. (*b*)

Actual reaction of cerebrospinal fluid in eningeal affections. Ceruti and Maestri (Boll. oc. ital. Biol. sperim., 1934, **9**, 896—899).—Cerebrospinal fluid in the different types of meningitis and uræmic coma shows a fall of p_H, which oscillates etween well-defined limits. R. N. C.

Blood-manganese in some nerve diseases. . L. Urechia, G. Pamfil, and Retzeanu (Paris éd., 1934, **24**, 330—331).—Serum-Mn varies from ·01—0·03 mg. per 100 ml. of serum, and shows no elation in amount to the nature of the disease. here is less Mn in red cells than in serum.
Nutr. Abs. (*m*)

Diets low in calories containing varying mounts of protein. Their effect on loss in veight and on the metabolic rate in obese atients. R. W. Keeton and D. D. Bone (Arch. nt. Med., 1935, **55**, 262—270).—Sp. dynamic action f protein is lowered in the obese. H. G. R.

Blood-fat tolerance tests in malnutrition and besity. H. Blotner (Arch. Int. Med., 1935, **55**, 21—130).—In fasting thin persons the plasma-holesterol following administration of 500 c.c. of 0% cream shows the normal small rise, but after a eriod of insulin therapy much higher and prolonged ost-absorptive cholesterolæmia (I) is produced. bese persons and patients suffering from diabetes nsipidus showed marked hypercholesterolæmia following administration of cream but (I) was prevented y administration of pituitary extract. W. O. K.

Blood-fat and blood-fat reaction in obesity. V. Raab (Z. ges. exp. Med., 1934, **94**, 284—292).—bese do not differ from normal subjects as regards asting blood-fat or the blood-fat curve after ingestion f oil, but lipoitrin (I) does not inhibit the lipæmia n the obese. This may be due to an org. lesion or to constitutional reduction (II) of the sensitivity of he "fat centre" to (I). The failure of (I) to produce epatic absorption of fat leads to excess deposition f unsplit fat in the peripheral tissues. The failure f (I) to reduce obesity in many cases may be due o (II), and perhaps to its lack of action on tissue-fat.
Nutr. Abs. (*m*)

Comparative volumetric and gravimetric eterminations of blood-fat. M. T. Schnorbusch (Z. ges. exp. Med., 1934, **94**, 63—75).—etermination of serum-fat (I) of healthy subjects y the lipocrit method (II) gives results about 12% < hose given by the gravimetric method with larger mounts of serum. In patients (III) with diabetes r psoriasis the results of (II) are 23% lower, probably n account of the nature of (I). In (III) with disturbance of lipin metabolism (hepatosplenomegaly and xanthomatosis) the results of (II) are higher by about 7·5%. The small amounts of serum (0·15 ml.) required for (II) enable the hourly changes in serum-fat after ingestion of fat to be followed; an increase is always observed after administration of 100 g. of olive oil and 5 g. of cholesterol.
Nutr. Abs. (*m*)

Calcium and phosphorus metabolism in osteomalacia. II. Response to vitamin-*D* of patients with osteomalacia. S. H. Liu, R. R. Hannon, H. I. Chu, K. C. Chen, S. K. Chou, and S. H. Wang (Chinese Med. J., 1935, **49**, 1—21).—Osteomalacia occurs in two types characterised by low serum-Ca (I) and low serum-inorg. P (II), decalcification (III) being most pronounced in the latter. Vitamin-*D* (IV) therapy is effective in both cases, improvement being most marked where (III) is extensive. Under the action of (IV), (I) returns to normal more rapidly than (II). H. G. R.

Blood-amylase in experimental pancreatitis. A. C. Glasen, P. N. Johnstone, and T. G. Orr (Surgery, Gynecol., Obstet., 1934, **59**, 756—761).—Injury to the pancreas is followed by a temporary increase in blood-amylase which ∝ the severity of the injury. Ch. Abs. (*p*)

Colloid-osmotic pressure of blood in normal and pathological conditions. X. Changes in osmotic pressure of blood and pleuritic exudates. XI. Effect of removal of fluid on protein concentration and colloid-osmotic pressure in cases of pleurisy. XII. Changes during muscular exercise. K. Nishiyama (Tohoku J. Exp. Med., 1934, **22**, 505—525, 526—540, 541—555).—X. Simultaneous variations in colloid-osmotic pressure (I) and protein concn. (II) are recorded.

XI. Removal of fluid and replacement with NaCl solution are followed in 5—7 days by return of (II) to the original val.

XII. Exercise causes parallel increases in (I) and (II), the pressure per unit of protein remaining unchanged. With heavy exercise all three factors increase. Hæmoglobin changes are relatively small.
Ch. Abs. (*p*)

State of cholesterol and the nature of the cholesterol–protein complex in pathological body-fluids. M. Bruger (J. Biol. Chem., 1935, **108**, 463—470).—Since cholesterol (I) and, to a smaller extent, (I) esters in body-fluids are selectively adsorbed by kieselguhr, the combination between (I) and protein, if such exists, must be a feeble one.
A. E. O.

Serum-cholesterol during pregnancy. G. Teilum (Hospitalstidende, 1934, **77**, 140—153).—Blood-cholesterol (I) increases during pregnancy from the 3rd or 4th month to a max. at term, when it is >50% > normal. Rapid return to normal follows delivery. In albuminuria (with and without eclampsia) the cycle of changes is as in normal pregnancy, but in spontaneous abortion (I) does not increase.
Nutr. Abs. (*m*)

Lipin composition of white blood-cells in women during pregnancy, lactation, and the puerperium. E. M. Boyd (Surgery, Gynecol., Obstet., 1934, **59**, 744—751).—Age and parity did not affect the lipin levels of leucocytes. Before parturition vals. varied widely, although cholesterol and neutral fat levels were < those in non-pregnant women. Ch. Abs. (*p*)

Creatine metabolism and ovarian function. H. Theiss (Arch. Gynäkol., 1934, **158**, 164—172).—Since ingestion of creatine (I) by healthy pubescent females leads to creatinuria during the menstrual and intermenstrual periods (I) utilisation is probably independent of ovarian function. In pregnancy utilisation of (I) is frequently reduced. NUTR. ABS. (*m*)

Glutathione and gestation. S. L. SALA (Rev. sudamer. Endocrinol., 1934, **17**, 634—650).—Glutathione (I) decreases during gestation and increases slowly at the end of the puerperium. Blood of the umbilical cord has more reduced (I) than maternal blood. Vals. are still higher in the fœtus, oxidised (I) remaining normal. CH. ABS. (*p*)

Blood-proteins in pregnancy. G. PICINELLI (Boll. Soc. ital. Biol. sperim., 1934, **9**, 1060—1062).—Blood-fibrinogen in pregnancy is increased, especially during parturition and in albuminurics. Total globulins are generally increased, but total protein is generally $<$ normal; thus the albumin–globulin ratio is decreased. Euglobulin is usually increased. R. N. C.

Calcium in pregnancy. E. A. MARSHALL and E. GOODSIT (J. Amer. Inst. Homeopath., 1934, **27**, 604—608).—The literature is reviewed. To prevent guanidine (I) poisoning in rabbits, massive doses of Ca salts must be given prior to (I). CH. ABS. (*p*)

Carbohydrate metabolism. II. Carbohydrate metabolism in various obstetrical and gynæcological conditions, including diabetes with pregnancy. E. W. WINTER (Arch. Gynäkol., 1934, **157**, 509—520).—Certain disturbances of glucose tolerance occur in carcinoma, endometritis, and pregnancy, especially during labour; deviations from normal are more striking in hyperemesis and diabetes. Normal results are obtained before, during, and after menstruation, in menstrual disorders, eclampsia, and other conditions. NUTR. ABS. (*m*)

Effects of restricting or suppressing renal function. V. SCAFFIDI. **VI. Water content of skin and blood.** P. GILIBERTI. **VII. Changes in mineral constituents of blood (sodium, potassium, chlorine, phosphorus, magnesium, calcium).** E. MORACCI. **VIII. Blood-urea and -ammonia.** P. GILIBERTI (Riv. Pathol. sperim., 1934, **13**, 109—114, 115—133, 135—139).—VI. After bilateral nephrectomy in dogs and rabbits the H_2O content of the skin and blood is unchanged. The œdema of nephritis is therefore independent of renal function, and its development is probably linked with the underlying cause of the renal lesion.

VII. There is a rise in blood-K, -P, and -Mg, a fall in Cl, and variations in either direction in -Na and -Ca. Normal [H$^\cdot$] and total ion concn. are always maintained.

VIII. The blood-urea rises, but the -NH_3 remains unchanged. NUTR. ABS. (*m*)

Significance of the phenolsulphonephthalein test of renal function. E. M. MACKAY and D. A. RYTAND (Arch. Int. Med., 1935, **55**, 131—140).—If the Addis ratio is taken as measuring the amount of functioning renal tissue, the excretion of phenolsulphonephthalein in 2 hr. is a measure of renal function. W. O. K.

Chloride and urea excretion as a measure of the functional activity of healthy and diseased kidneys. F. H. SMIRK (Clin. Sci., 1933, **1**, 131—158).—The composition of urine in cases of advanced chronic nephritis is examined. CH. ABS. (*p*)

Glycogen of the organs in Bright's disease after repeated injections of hypertonic sugar solutions. E. MARTIN and F. SCICLOUNOFF (Compt. rend. Soc. Biol., 1935, **118**, 751).—Glycogen is increased in all organs. R. N. C.

Attempts to produce uric acid calculi in albino rats. S. RANGANATHAN (Indian J. Med. Res., 1934, **22**, 71—75).—The urinary excretion (I) of uric acid (II), allantoin, and total N in young rats of both sexes is not appreciably affected by ingestion of (II) or Na_1 urate (up to 200 mg. daily) or of spleen (5—10 g. of fresh material daily). (I) is increased by parenteral administration of (II) in isotonic solution, although the increase is not $\propto$ the amount of (II) injected. Experimental production of (II) calculi in rats is not possible. NUTR. ABS. (*m*)

Acid metabolism in rheumatic children. W. W. PAYNE (Arch. Dis. Childhood, 1934, **9**, 259—266).—Urinary excretion of acid in rheumatic is $>$ in normal or asthmatic children. The excess is partly due to org. acids. The acid : base ratio is unchanged. CH. ABS. (*p*)

Blood-iodine in rickets. D. TOEPFER (Z. Kinderheilk., 1934, **56**, 405—407).—Nitschke's view that blood-I (I) is low in rickets is not confirmed. The distribution of fasting (I) vals. is normal before and after treatment. NUTR. ABS. (*m*)

Blood-iodine of rachitic infants. H. FASOLD (Z. Kinderheilk., 1934, **56**, 408—409).—Blood-I determined by Pfeiffer's method in rachitic infants, before treatment of any kind, was within the normal range. Nitschke's idea that the thyroid is involved is therefore not supported. NUTR. ABS. (*b*)

Incurable rickets. II. Rôle of the "local factor" and of viosterol in the pathogenesis of rickets due to beryllium. A. E. SOBEL, A. R. GOLDFARB, and B. KRAMER (J. Biol. Chem., 1935, **108**, 395—401).—The calcifying power of the bones of rats with Be rickets (I) is low. Administration of calciferol does not prevent (I) in rats receiving Be but there is a rise in serum-Ca × P. H. G. R.

Comparative sensitiveness of schizophrenic and normal subjects to glycerol extract of adrenal cortex. H. FREEMAN and R. G. HOSKINS (Endocrinol., 1934, **18**, 576—582).—In schizophrenics there is a marked increase in the % of pressor reactions produced by cortex extract, whilst the mean systolic and diastolic pressures show significant rises compared with those of normal subjects. R. N. C.

Biochemistry of blood in scurvy. N. C. TOLMATCHEV (Questions of Nutrition, U.S.S.R., 1934, **3**, No. 4, 74—78).—The alkali reserve of the blood in scurvy (I) is apparently undisturbed but the blood-sugar and -cholesterol (II) are reduced, depending on the degree of anæmia which accompanies (I). During recovery the (II) level increases parallel with that of the erythrocytes. NUTR. ABS. (*m*)

Biochemistry of silicosis. F. J. Nieuwen- yzen (Acta Brev. Neerl. Physiol., 1933, 3, 108—109; nem. Zentr., 1934, ii, 2566).—SiC and Fe_2O_3 do not oduce silicosis. SiO_2 is somewhat sol., and the sulting colloidal silicic acid ppts. protoplasmic otein. H. J. E.

Metabolism of blood-phosphorus during some fectious diseases of childhood (diphtheria, berculous meningitis, and measles). E. esné, P. Zizine, and S. B. Briskas (Compt. rend. oc. Biol., 1934, 116, 1309—1311).—Decreased inorg. of blood occurs during the diseases. Total and poid P vary irregularly. Ch. Abs. (*p*)

Blood-glutathione in tuberculosis. R. N. oomis and F. Bogen (Amer. Rev. Tuberc., 1934, 30, 5—509).—The increased total and reduced gluta- ione contents, and the lowered difference between ese vals., in tuberculosis indicate that the latter volves an actual condition of suboxidation. Ch. Abs. (*p*)

Vigantol in tuberculosis therapy. R. Hussa Vien. med. Woch., 1934, 84, 973; Chem. Zentr., 934, ii, 2547).—The favourable action of vigantol shown in the rapid increase in the blood-Ca and -P. A. G. P.

Iodine tolerance test for thyroid insufficiency. ..W. Elmer (Endocrinol., 1934, 18, 487—496).— he I excreted following injection of KI serves as a st of thyroid activity. Ch. Abs. (*p*)

Determination of metabolism by the inter- rometer. H. Wollschitt, W. Bothe, H. Ruska, nd E. G. Schenck (Arch. exp. Path. Pharm., 1935, 77, 635—654).—The application of the Zeiss inter- rometer to gas analysis for metabolic determin- ions is described and appropriate tables are given. F. O. H.

Chemical nature of the amphibian organiser. Use of the kephalin fraction of mammalian rain as an inducing agent. L. G. Barth (Biol. ull., 1934, 67, 244—249).—The organiser may be lentical with kephalin or an impurity in it. Ch. Abs. (*p*)

Catalase in embryonic development. I. Fer- lisation and activity of catalase in the eggs i *Salmo irideus*, *Esox lucius*, and *Barbus lebeius*. U. Sammartino (Arch. Farm. sperim., 935, 59, 49—85).—The catalase activity (I) of the nature eggs of *Salmo irideus* (II), *Esox lucius* (III), nd *Barbus plebeius* (IV) is high in the egg recently ressed from the oviduct, but is lowered by depositing he eggs in tap-H_2O, the fall being > 50% for (IV). I) of eggs thus treated falls slightly in the first 4—6 r., afterwards rising slowly. Fertilisation (V) does ot affect this behaviour, but the (I) ratio between ertilised and non-fertilised eggs varies with the pecies: in (II) it is > 100% immediately after (V), fterwards tending to fall to 100%; in (III) it is < 00% after (V), afterwards tending towards, but not eaching, 100%, whilst in (IV) it falls slowly from als. > 100% to < 100%. R. N. C.

Behaviour of peroxidases during embryonic levelopment. A. Spirito (Boll. Soc. ital. Biol. perim., 1934, 9, 901—903).—Peroxidase (I) is distributed uniformly in the eggs of cyclostomes, but is found only at the animal pole in those of fish. In the developing embryos, (I) disappears after the appearance of the circulation. Traces of (I) are found at the animal pole in amphibian eggs. In the later stages of development (I) reappears in the yolk-sacs of fish-embryos, and on the abdominal side of the amphibian. In the frog this stage occurs before the appearance of hæmoglobin, which is therefore not responsible for the (I) activity. R. N. C.

Distance action of enzymic oxidation of quinol on the development of the eggs of the sea-urchin. J. Magrou (Compt. rend. Soc. Biol., 1935, 118, 763—765).—Eggs of *Paracentrotus lividus* exposed in quartz vessels to oxidation of quinol by peroxidase show abnormal development. R. N. C.

Changes in the concentration of reducing substances during the metamorphosis of *Galleria mellonella* (Bee-moth). F. Crescitelli and I. R. Taylor (J. Biol. Chem., 1935, 108, 349—353).—The concn. of reducing substances increases during the prepupal and pupal stages. There is a decrease at the commencement of the pupal life and just prior to emergence. H. G. R.

Hibernation. I. Reduced glutathione contents of the various tissues of *Rana nigromaculata* throughout all seasons. II. Metabolism in the muscle of *R. nigromaculata*. T. Yazawa (Sei-i-Kwai Med. J., 1934, 53, 134—156).—I. Reduced glutathione (I) contents of nearly all organs were in summer > in winter. Only the ovary and skin had more (I) during hibernation (II). Organs of male frogs contained more (I) than those of females, except kidneys and skin.

II. Frog muscle had higher fat (III), acid, and glycogen (IV) contents during (II), max. vals. occurring at the beginning of (II). In the breeding season metabolism increased rapidly, and (III) and (IV) decreased. Cholesterol and undetermined unsaponifiable matter showed no seasonal variation. Creatine and creatinine increased gradually during the active season. Ch. Abs. (*p*)

Mechanism of respiration. A. Szent-Györgyi (Nature, 1935, 135, 305).—In the main process of respiration in the breast muscle of the pigeon, no substances other than succinic (I), fumaric (II), and malic acids (III), are oxidised directly by the Warburg–Keilin " Atmungsferment–Cytochrom " system. (I) and (III) are activated by the corresponding sp. dehydrogenase. (I) and (III) are reversibly oxidised to (II) and hydroxyfumaric acids, respectively. Foodstuffs are oxidised by dismutating them with oxidation products of (I), and these products become reduced again and thus act as catalytic H carriers. The oxidation system is an enzyme complex acting specifically on (I) and its oxidation products. L. S. T.

Respiration of *Ascaris suilla*. F. Kruger (Proc. K. Akad. Wetensch. Amsterdam, 1935, 38, 101—104).—The R.Q. of the parasites was measured. It fell from 4·0 gradually to 1·1—0·7. The fall is faster for small worms than for large; it is probably due to starvation. The abnormal R.Q. found is due to a balance between anaërobic processes leading to fatty acid production and ordinary oxidative processes. Hence R.Q. studies are fallacious. The end-product is probably hexoic acid, not valeric acid as previously stated. H. T.

Oxygen consumption of rabbit bone-marrow in relation to its morphology. C. O. Warren, jun. (Amer. J. Physiol., 1934, **110**, 61—73).—O_2 consumption (I) of normal marrow is variable, due to differences in histological composition. The principal variable affecting (I) is the myeloid–erythroid ratio, which increases with (I). The mature normoblast has a similar (I) to the myeloid; in the immature erythroid it is relatively high. Fat content (II) of the marrow is not an index of metabolic activity except in extreme cases where high (II) and low (I) are associated and *vice versa*. R. N. C.

Gaseous interchanges through the visceral pleura of the cat. M. Kremer, A. T. Wilson, and S. Wright (J. Physiol., 1934, **82**, 414—422).—CO_2 passes from the blood through the visceral pleura about 1500 times as slowly as into the normally ventilated alveoli; a pressure gradient of 40—50 mm. between the blood and the outside air is necessary to eliminate all the CO_2. O_2 passes inwards even more slowly, a pressure gradient of several hundred mm. only slightly influencing the % O_2 saturation of the blood. R. N. C.

Physiological basis of the sensation of cold. I. Influence of the initial skin temperature on the excitability of the cold end-organs. J. M. O'Connor. **II. Analogy between human cold sensations and shivering in the rabbit.** J. M. O'Connor, M. Moriarty, and O. Fitzgerald. **III. Influence of the body temperature on the resting oxygen consumption. A metabolic analogy to cold sensations.** J. M. O'Connor (Proc. Roy. Irish Acad., 1935, **42**, **B**, 327—344, 345—350, 351—357).—III. As temp. falls the rise at 33° in O_2 consumption of the rabbit (I) with no shivering resembles a phase of the excitability of human and (I) skin at 29°. The activity of the skin of (I) corresponds with the basal metabolism. H. G. R.

Changes in chemical composition of horse's blood after a race. S. I. Banaïtis and V. V. Oppel (J. Physiol., U.S.S.R., 1934, **17**, 112—123).—Sugar, lactic acid, and inorg. P (I) reached max. 10 min. after the race. After 90 min. (I) fell to $<$ the initial val. Ch. Abs. (*p*)

Alkalinisation of the muscle during contraction. R. Margaria and C. Pulcher (Boll. Soc. ital. Biol. sperim., 1934, **9**, 879—880).—The sartorius of a frog that has previously been injected with a vital-stain indicator, mounted in air containing sufficient CO_2 to give an acid reaction, shows colour changes towards the alkaline side when stimulated to contract. R. N. C.

Apparent change of p_H on stretching a muscle. R. Margaria (J. Physiol., 1934, **82**, 496—497).—The sartorius of a frog injected before excision with an indicator and mounted in air containing sufficient CO_2 to give an acid reaction shows on stretching a reversible colour change in the alkaline direction to about the same extent as when stimulated to contract. This may be due to an alteration in the acid or alkaline dissociation consts. of protein chains. R. N. C.

Effect of inspiration of oxygen and of air rich in carbon dioxide, or poor in oxygen, on energy exchange and intermediate carbohydrate metabolism. II. Effect of physical work on gas metabolism. III. Effect of fatigue during muscular exercise. K. Kodera (Tôhoku J. Exp. Med., 1934, **23**, 298—320, 321—335).—II. Intermittent stimulation of the ischiadic nerve of rabbits results, in normal air, in a temporary increase in blood-lactic acid (I). The O_2 consumption (II) falls abruptly on cessation, and, after a secondary rise, returns to normal. The CO_2 output (III) varies correspondingly. Inspiration of CO_2-rich air (IV) increases the respiratory vol. (V) during work (VI) and rest (VII). In periods of (VI), (II), O_2 deficit (VIII), O_2 requirement (IX) and (III) all increase. The R.Q. increases considerably even after cessation. Inspiration of O_2-poor air (X) during (VI) causes increased (I) and (II) while (VIII) and (IX) become $>$ when (IV) is inspired. (V) decreases during (VII) and is $>$ normal during (VI). The (III), initially high, increases slightly during (VI). The R.Q. declines during (VI) and in subsequent (VII) period attains subnormal vals.

III. During fatigue (XI), (I) increases. Inspiration of pure O_2 has little effect on the development of (XI). Inspiration of (IV) shortens the period (XII) over which muscles continue to contract and (I) remains practically const. Inspiration of (X) shortens (XII) and increases (I) at the height of (XI). Ch. Abs. (*p*)

Effect of breathing oxygen or carbon dioxide-rich or oxygen-poor air on energy and intermediary carbohydrate metabolism. V. Effect on lactic acid synthesis of nephrectomised animals. K. Kodera (Tôhoku J. Exp. Med., 1934, **24**, 21—36).—In nephrectomised rabbits after lactate administration under various respiratory conditions (inhalation of O_2, CO_2-rich air, or O_2-poor air), the removal of the blood-lactic acid is retarded and the return to normal of the blood-CO_2 and the O_2 consumption delayed. The kidney furthers lactic acid removal directly by excretion and indirectly by its regulatory action on the acid–base equilibrium, acidosis or alkalosis hindering lactic acid resynthesis. Nutr. Abs. (*b*)

Carbohydrate and respiratory metabolism in muscle during alkalosis due to hyperventilation. K. Kodera and H. Sugimoto (Tôhoku J. Exp. Med., 1934, **24**, 37—50).—Hyperventilation alkalosis increases the production of lactic acid from glucose in the intact dog gastrocnemius. The O_2 consumption and the CO_2 formation are increased. Thus a condition arises which tends to bring back to normal the disturbed acid–base equilibrium. Nutr. Abs. (*b*)

Carbohydrate and respiratory metabolism in muscle of animals of low glycogen content. I. Fasting animals. II. Phloridzinised fasting dogs. III. Pancreatectomised animals. H. Sugimoto (Tôhoku J. Exp. Med., 1934, **24**, 118—136, 137—148, 149—166).—I. In dogs fasted 5—14 days (H_2O-fasted) the resultant acidosis (I) causes the resting lactic acid (II) val. of the gastrocnemius muscle to be $<$ normal. After lactate administration the removal of (II), owing to liver disturbance, is considerably retarded. The sugar and O_2 consumption behave in accordance with these results.

II. In fasting phloridzinised dogs the resting (II) of the muscle is still lower, as the acidosis is greater, and the (II) resynthesis is greatly disturbed, due to the action of phloridzin (III) on the liver.

III. In pancreatectomised dogs the resting blood-(II) is abnormally high, due to insulin deprivation (IV). The resting muscle-(II) is very low, and (II) resynthesis is even more disturbed than after (III), (I) and (IV) producing a cumulative effect.

Nutr. Abs. (*m*)

Glycogen content of the heart. G. Evans (J. Physiol., 1934, **82**, 468—479).—Cardiac glycogen (I) in fed rats is $<$ in fasting rats; there is no decrease in (I) between the 24th and 48th hr. of fasting. (I) is not increased by feeding with glucose; simultaneous injection of insulin increases (I) except when hypoglycæmia occurs, when it is lowered. Adrenaline, exercise, and p_H changes in the blood of the intact fasting animal do not materially change (I). (I) falls rapidly in anoxæmia, but quickly recovers on relief.

R. N. C.

Phosphorus compounds in the perfused heart of the dog. H. Pollack, E. Flock, H. E. Essex, and J. L. Bollman (Amer. J. Physiol., 1934, **110**, 97—101).—The creatine phosphate (I) of perfused hearts remains normal even under adverse conditions when inorg. PO_4''' and P_2O_7'''' and creatine fall. (I) increases to 2—3 times the normal val. in some cases, especially if glucose is added to the perfusing liquid. Addition of insulin or PO_4''' apparently has no additional effect. Addition of glucose lowers the hexose monophosphate of the heart. R. N. C.

Changes in the phosphorus compounds in the perfused hind limb of the dog. H. Pollack, E. Flock, P. Mason, H. E. Essex, and J. L. Bollman (Amer. J. Physiol., 1934, **110**, 102—104).—Perfusion of the hind limb produces an increase in creatine phosphate (I), regardless of the glycogen content. Addition of PO_4''' does not affect the inorg. PO_4''' of the muscle. Addition of glucose or insulin does not affect (I). Cyanosis in the limb causes decreases in (I) and nucleotide pyrophosphate, and a rise in hexose monophosphate. R. N. C.

Compounds of phosphorus in the heart and striated muscles of the dog: methods of determination and normal values. H. Pollack, E. Flock, and J. L. Bollman (Amer. J. Physiol., 1934, **110**, 105—116).—$CCl_3{\cdot}CO_2H$ extracts of cardiac (I) and skeletal (II) tissue are separated by $Ba(OH)_2$ pptn. into sol. fractions containing creatine phosphate (III) and hexose phosphate, and insol. fractions containing inorg. and org. PO_4, as Ba salts. (III) in (I) is $\not> \frac{1}{3}$ of the (II) val. The org. P pptd. by $Ba(OH)_2$ is largely adenyl pyrophosphate, the remainder probably being other nucleotides. The insol. fractions in (I) and (II) both give positive reactions for uracil and cytosine. Total P is about the same in (I) and (II), but in (II) a larger proportion is acid-sol. R. N. C.

Serum-phosphate changes induced by injection of glucose into dogs under various conditions. H. Pollack, R. F. Millet, H. E. Essex, F. C. Mann, and J. L. Bollman (Amer. J. Physiol., 1934, **110**, 117—122).—Continuous injection of glucose causes a fall in serum-PO_4''', which returns to normal after a definite period in spite of the continued injection of glucose. Hepatectomy and adrenalectomy do not produce any appreciable alteration. In depancreatised dogs the fall does not occur unless insulin is also injected. In the Markowitz–Essex visceral organism there is no fall of serum-PO_4'''. Perfusion of a dog's hind limb in a heart–lung prep. results in a rapid fall of sugar and PO_4''' in the perfusing blood. The PO_4''' is presumably deposited in the muscle. R. N. C.

Metabolism of natural *l*-phosphoglyceric acid by animal tissues. H. K. Barrenscheen and H. Beneschovsky (Biochem. Z., 1935, **276**, 147—167).—The formation of $AcCO_2H$ (I) from *l*-phosphoglyceric acid (II) does not occur with intact blood but does occur with hæmolysates prepared by freezing of whole blood or red cells, the difference in behaviour being due to the non-permeability of red cells by (II). Natural (II) is converted into (I) by muscle pulp and extract more quickly than is the racemic prep. Liver pulp does but kidney pulp does not effect formation of (I). The optimum p_H for the conversion with blood or muscle is 6·68 and the amount of (I) formed usually exceeds the amount of PO_4''' liberated. Addition of (II) does not lead to the formation of lactic acid. $CH_2Br{\cdot}CO_2H$ and CN′ inhibit neither the dephosphorylation of (II) nor the formation of (I), but F′ inhibits both completely. In hæmolysates and muscle extracts inactivated by ageing, dephosphorylation does but formation of (I) does not occur. The power of these extracts to give (I) is, however, restored by addition of adenosinetriphosphoric and muscle-adenylic acids. Kidney pulp in presence of these acids can also form considerable amounts of (I). The presence of $Mg^{\cdot\cdot}$ is also necessary for the reaction. Adenosine, adrenaline, and p-$C_6H_4(NH_2)_2$ also act as activators of (I) formation. P. W. C.

Phosphorylation of various sugars by extracts of intestinal mucous membrane. L. Laszt (Biochem. Z., 1935, **276**, 44—48).—Glycerol extracts of rats' intestinal mucous membrane bring about with galactose, glucose, and fructose in PO_4''' buffer a decrease of inorg. PO_4''' which is in all cases inhibitable by 1/5000 $CH_2I{\cdot}CO_2Na$ (I). With mannose and xylose, decrease of PO_4''' does not occur. The activity of the extracts is lost after heating at 52—65°. Only those sugars which show selective absorption inhibitable by (I) show this PO_4''' decrease.

P. W. C.

Absorption of hexose di- and mono-phosphate compared with other hexoses. F. Mathieu (Biochem. Z., 735, **276**, 49—54).—Hexose di- and mono-phosphate are absorbed from the intestine of rats as quickly as fructose but less quickly than glucose at the same concn. P. W. C.

Rôle of diffusion and membrane activity in the absorption of various sugars from the intestine. F. Verzár (Biochem. Z., 1935, **276**, 17—27).—The same amounts of glucose (I) and galactose (II) are absorbed by rat's intestine in the same time at any concn., but with mannose, sorbose, and xylose the more conc. is the solution the more sugar is absorbed. Fructose occupies a mean position. Absorption of (I) and (II) is the result of an active cellular process; that of the other sugars is purely a diffusional process. P. W. C.

Absorption from the intestine of isotonic solutions of glucose and sorbose in comparison with sodium sulphate. F. Verzár and L. Laszt (Biochem. Z., 1935, **276**, 28—39).—In the living rabbit, glucose (I) is absorbed 5 times as quickly as Na_2SO_4 (II) from solutions containing (I) and (II) in amounts isotonic with blood, neither substance having any influence over the velocity of absorption of the other. After 1 hr. survival, the intestine behaves like a non-living membrane, (II) then diffusing more rapidly than (I). Absorption of (I) is, but of (II) is not, inhibited by $CH_2I{\cdot}CO_2H$ (III). Sorbose is absorbed much more slowly than (I) and the rate of absorption is not decreased by (III). The slow absorption of (II) corresponds with the rate of its physical diffusion. P. W. C.

Absorption of glucose and xylose at different p_H. L. Laszt (Biochem. Z., 1935, **276**, 40—43).—PO_4''' buffer accelerates glucose absorption only at p_H 7. Borate and acetate buffers similarly accelerate only at p_H 7. Absorption of xylose is not affected by p_H. P. W. C.

Absorption of glucose from the human gastro-intestinal tract. M. Wishnofsky (J. Lab. Clin. Med., 1934, **19**, 1286—1293).—If the blood-sugar curve (I) is an expression of the insulin (II) produced by the pancreas, and if the (II) produced by any one diabetic is const. in amount, (I) should indicate the rate (III) of glucose absorption from the gut. (III) seems to be independent of the amount present in the gut and of the concn. of the solution. In 2 hr. an adult absorbs 50—75 g. of glucose.

Nutr. Abs. (*m*)

Blood-sugar curves and the digestive canal. O. Kestner, H. E. Never, and H. Sehestedt (Pflüger's Archiv, 1934, **234**, 544—549).—Administration of glucose to dogs through a Vella or Thiry or duodenal fistula or intraperitoneally did not produce such marked hyper- or hypo-glycæmic phases as when given *per os*. Administration of meat without carbohydrate produced a definite rise in blood-sugar (I) followed by a hypoglycæmic phase. Ingestion of 300 ml. of 0·9% NaCl by 3 human subjects caused a slight rise and fall of (I). The normal (I) curve probably depends on the activity of all the digestive organs. Nutr. Abs. (*b*)

Adaptation of intestinal absorption to the composition of ingested food. H. G. K. Westenbrink (Arch. néerl. Physiol., 1934, **19**, 563—583).—The rate (I) of absorption of glucose (II) from rat's intestine is significantly increased by prior feeding for $\nless$ 5 days on a diet containing (II), fructose (III), or galactose (IV), whilst (I) of (III) or (IV) is increased only by prior feeding with (III) or (IV), respectively. Hence the data of Cori *et al.* (A., 1926, 429) are dependent on the diet used. The increased (I) is possibly due to increased elaboration of the appropriate enzymes (*e.g.*, esterases). F. O. H.

Selective absorption of sugar. S. Donhoffer (Arch. exp. Path. Pharm., 1935, **177**, 689—692).—The partial inhibition of the absorption (I) of glucose (II) in rats by phloridzin is confirmed (cf. A., 1933, 630, 1076). (I) of arabinose is $<$ that of (II) and is not inhibited by phloridzin. Similar phenomena occur with the ligatured rabbit's intestine, the inhibition of (II), however, being complete. The phloridzin-inhibited part of (I) is independent of the concn. of sugar. The data do not support the theory that the same physical process applies to the intestinal (I) of all sugars. F. O. H.

Effect of repeated ingestion of sugar and starch on blood-sugar. Muscular lactacidogen and glycogen in cases of complete and partial inanition. N. N. Jakovlev (Compt. rend. Soc. Biol., 1935, **118**, 784—786).—In both types of case there is a large increase in muscular lactacidogen and glycogen. Glycosuria is irregular. R. N. C.

Hydrolysis, oxidation, and energy exchanges in a dog. I. Formation and removal of lactic acid in the organs during starvation and during oxidation of galactose, glucose, and maltose. II. Lactic acid arising from or deposited in organs during the metabolism of fructose, in respect to control experiments with inositol, acetaldehyde, and sodium lactate. M. Wierzuchowski and F. Sekurachi (Biochem. Z., 1935, **276**, 91—111, 112—131).—I. Lactic acid (I) circulation in starvation and during oxidative metabolism of galactose, glucose, and maltose in resting dogs in amytal narcosis is investigated. Hexolysis *in vivo* is much smaller than under anaërobic conditions, is least in muscle, greater in the organs of the head, and greatest in the portal vein organs. Replacing fat with glucose leads to increased production of (I) by these organs, (I) being then absorbed by the liver. The prevailing direction of H_2O between vessels and tissues does not direct the stream of (I).

II. A second type of (I) circulation is brought about by prolonged intravenous injection of fructose, injection of other substances, *e.g.*, inositol, MeCHO, Na lactate, serving as controls. Under these conditions, the liver is the chief organ flooding the organism with (I). Neither the R.Q. nor the (I) balance in the organs is influenced by administration of inositol. The considerable elimination of (I) by muscle on administration of MeCHO only affects the blood-(I) to a moderate extent. P. W. C.

Ketosis. V. Comparative glycogenic and ketolytic action of glucose and some carbohydrate intermediates. I. Shapiro (J. Biol. Chem., 1935, **108**, 373—387).—Glycogenic substances exert a ketolytic effect. Both EtOH (I) and $(CH_2{\cdot}OH)_2$ (II) show a ketolytic action together with an increased urinary N. During metabolism (I) is probably converted into (II) rather than into MeCHO. H. G. R.

Digestion of carbohydrates in mulberry leaves by silk-worms. II. Digestion in different stages of growth. K. Kato (J. Agric. Chem. Soc. Japan, 1934, **10**, 691—695).—Max. vals. for digestibility coeff. and amounts of total carbohydrate, reducing sugar, and sucrose digested were obtained with partly mature leaves. Accumulation of fat and glycogen by the silk-worms was also more rapid.

Ch. Abs. (*p*)

Effect of fat and protein on fasting hypoglycæmia in infants. H. Schönfeld (Jahrb. Kinderheilk., 1934, **143**, 153—158).—In infants the fall of blood-sugar (I) produced in 16 hr. by hunger is almost completely prevented by ingestion of protein (II); fat has only a very slight effect. Ketonuria generally ∝ the degree of hypoglycæmia, but may be present with (II) feeding and absent with fat feeding, although (I) is lower in the latter case.

Nutr. Abs. (*m*)

Formation of carbohydrate from fat in the liver of the rat. C. L. Gemmill and E. G. Holmes (Biochem. J., 1935, **29**, 338—349).—The R.Q. of liver slices of a rat fed on a normal and on a butter diet is 0·79 and 0·58, respectively, the carbohydrate content of the slices in the latter case showing a definite increase after shaking for 3 hr. in NaHCO$_3$–Ringer medium at 37°. The glycogen content of the liver of rats fed on butter falls almost to zero on the first day of this diet and then gradually increases to a max. of 1% on the 4th—5th day. The COMe$_2$ content of the urine of these rats reaches a max. on the 3rd—4th day. Conversion of fat into carbohydrate occurs therefore in the livers of rats fed on butter. P. W. C.

Changes in the lipin content of blood passing through the lung. A. Francaviglia (Riv. Patol. sperim., 1934, **13**, 45—50).—After passage of the blood through the lung (dog) small changes, in either direction, were usually observed in the various lipin fractions, but there was no indication that the lung plays a special part in fat regulation.

Nutr. Abs. (*b*)

Rôle of the liver, spleen, and reticulo-endothelial system in fat and lipin metabolism. I. Total fatty acids and cholesterol of blood following liver injury. II. Total fatty acids and cholesterol of blood following splenectomy and blockade of the reticulo-endothelial system. Y. Shirato (Tôhoku J. Exp. Med., 1934, **23**, 578—587, 588—598).—I. The total fasting serum-fatty acid and -cholesterol of rabbits are increased on poisoning with P and phloridzin, and fat and lipins injected intravenously remain in the blood-stream longer than normally. The liver is affected since liver-fat metabolism is greatly disturbed, serum-bilirubin is increased, and the rate of excretion of Congo-red (I) is decreased.

II. Splenectomy (II) in rabbits causes an increase in the total blood-fatty acids (III) and -cholesterol (IV) and intravenously injected fat remains in circulation longer than normally whilst (I) excretion is retarded. Blockade of the reticulo-endothelial system with India ink does not change the total (III) and (IV) whilst (III) vals., increased by fat injection, return to normal in 3 hr. (as in normal rabbits) and the excretion of (I) is not affected thereby. Fat metabolism is probably therefore affected by (II) secondarily through disturbances of liver function.

Nutr. Abs. (*m*)

Cholesterol content of the adrenals of fatigued animals. S. E. de Jongh and W. Rosenthal (Acta Brev. Neerl. Physiol., 1933, **3**, 86—88; Chem. Zentr., 1934, ii, 2542).—Cholesterol in the adrenals of fatigued rats is < in normal animals. Blood-cholesterol is unchanged by fatigue. R. N. C.

Influence of phosphatide-rich rations on the animal organism. Resorption of phosphatides. A. Trautmann (Z. Tierzucht., 1934, **24**, 27—41; Bied. Zentr., 1934, **A**, **5**, 5—6).—The effect of feeding soya-bean lecithin (I) to dogs, rabbits, and pigs varied with dosage and the age of the animals. In very young animals (I) improved growth (1—2 g. daily) but heavier doses restricted live-wt. increases and hair growth. Older animals assimilated relatively large amounts (150 g. daily for pigs). Phosphatides were stored in the body only to a small extent, the major proportion being transformed into neutral fats. A. G. P.

Nutritive value of the fatty acids of lard and some of their esters. S. Lepkovsky, R. A. Ouer, and H. M. Evans (J. Biol. Chem., 1935, **108**, 431—438).—"Synthetic" lard prepared by the esterification of the fatty acids (I) of lard with glycerol is fully as satisfactory for the normal growth of rats as untreated lard, whether fed as 25 or 60% of the diet. The free (I), as sources of energy, are equal to the glyceride at 25% but inferior at the 60% level. Good growth occurs when the Me or Et esters of (I) are fed as 25% of the diet, but growth is very poor with the Me and moderately good with the Et esters at the 60% level. The esters of OH·CHMe·CH$_2$·OH are comparable with, but those of OH·[CH$_2$]$_2$·OH (toxic) and of OH·[CH$_2$]$_4$·OH are much inferior to the glycerides as growth-promoters. A. E. O.

Paradoxical hypolipæmia in the dog after ingestion of butter. C. Achard, M. Bariéty, and A. Codounis (Compt. rend. Soc. Biol., 1935, **118**, 779).—Blood-fatty acid falls below normal 6—9 hr. after ingestion, returning to normal after 25 hr. Cholesterol is unaffected. R. N. C.

Protein and the dietary production of fatty livers. H. J. Channon and H. Wilkinson (Biochem. J., 1935, **29**, 350—356).—Groups of rats were fed on complete diets containing 40% of fat with varying amounts of protein (5—50%) for 3 weeks and their livers and carcasses analysed for fat content. The diets were free from choline (I) except for the fact that each rat received 1·5 mg. of (I) per day as yeast extract. The amount of protein in the diet controls the amount of fat appearing in the liver irrespective of any effect of (I), the degree of infiltration increasing with decreasing protein content. Similarly in the "cholesterol" fatty liver, the relative amounts of glyceride and cholesteryl ester depend in the case of these (I)-free diets on the protein content of the diet. The possibility of protein controlling liver-fat by giving rise to (I), betaine, or substances of similar physiological action is discussed. No relationship exists between the amount of fat infiltration in the liver and the amount of depôt-fat. P. W. C.

Choline and liver-fat. D. L. Maclean and C. H. Best (Brit. J. Exp. Path., 1934, **15**, 193—199).—Choline prevents fat deposition in livers of diabetic dogs or of those receiving a high-fat diet. Ch. Abs. (*p*)

Inhibition by phloridzin of fat absorption. F. Verzár and L. Laszt (Biochem. Z., 1935, **276**, 1—10).—When olive oil is introduced into the stomach of a 150—200-g. rat, 1 g. is absorbed in 6 hr. and 3 g. in 24 hr., whereas when olive oil or lard is fed with the rest of the diet or when it is injected directly into the intestine, all the fat fed is absorbed in 24 hr. Urethane narcosis inhibits emptying of the stomach, but has practically no influence on absorption of fat. Phloridzin inhibits fat absorption both when the oil is given *per os* and when it is injected, the inhibition lasting 8 hr. P. W. C.

Inhibition of fat absorption after extirpation of the adrenals. F. Verzár and L. Laszt (Biochem. Z., 1935, **276**, 11—16).—Fat absorption in rats, the adrenals of which have been removed 3 days previously, is very greatly retarded, olive oil not being absorbed at all in 6—10 hr. and the animals dying in 12—24 hr. Inhibition is also seen when the oil is injected directly into the intestine. The toxicity of olive oil with adrenalectomised animals is due to the great sensitivity of these animals to org. acids. Thus citric, formic, and ascorbic acids are all much more toxic to these animals. P. W. C.

Influence of protein intake on the urea clearance in normal man. W. Goldring, L. Razinsky, M. Greenblatt, and S. Cohen (J. Clin. Invest., 1934, **13**, 743—748).—On a diet containing only 9 g. of protein the urea clearance of normal subjects was significantly $<$ when the diet contained 100 g. An increase of protein to 280 g. had little or no effect. Nutr. Abs. (*b*)

Allantoin during high-purine diet in man. V. Gaudio (Riv. Patol. sperim., 1934, **12**, 465—474).—As there is only a slight rise in allantoin in the urine, but a marked rise in uric acid, after a high-purine diet, the existence of an emergency uricolytic function is unlikely. There is also a rise in urea and usually a fall in the Cl' val. Nutr. Abs. (*b*)

Nuclein metabolism. IV. Oxidative deamination of nucleic acid with organic catalysts. K. Makino (Z. physiol. Chem., 1935, **231**, 149—152).—NH_3 is eliminated from nucleic acid by oxidative deamination in presence of various catalysts, *e.g.*, benzoquinone, C and methylene-blue, and hydroxybenzenes (adrenaline, pyrogallol, etc.). J. H. B.

Relation between acidosis and intermediary metabolism. I. Y. Kin (J. Chosen Med. Assoc., 1934, **24**, 945—956).—Artificial lowering of the alkali reserve is accompanied by an increase in non-protein-N (I) and sugar (II) and a decrease in Cl' in blood. In starvation acidosis (I) and Cl' increase and (II) decreases. Acidosis of rabbits having renal blood supplies cut off can be remedied by $NaHCO_3$ (III) or NaCl, but not by glucose (IV). (III) causes an increase in (II) and Cl', but not in (I). Injection of (IV) causes a decrease in (I) and Cl'. The survival period of such an animal can be prolonged by (III) only. Ch. Abs. (*p*)

Effect of sodium chloride on acid–base equilibrium. P. Nuzzi and M. Napoli (Boll. Soc. ital. Biol. sperim., 1934, **9**, 987—990).—Variation of the NaCl in the food of the dog does not affect the alkaline reserve of the blood, or the NH_3 and p_H of the urine. R. N. C.

Acid–base equilibrium in the blood following administration of sodium chloride. H. Glatzel and F. Schmitt (Z. ges. exp. Med., 1934, **94**, 370—377).—Changes in blood composition were determined following ingestion of NaCl and H_2O when the previous diet had been (1) NaCl-rich and H_2O-poor, (2) NaCl-poor and H_2O-rich, (3) acid (NH_4Cl), or (4) alkaline ($NaHCO_3$). The fasting val. of the blood-CO_2 was lower on diet (2) than on (1). After the ingestion of aq. NaCl the fall in blood-CO_2 was greater when the previous diet was NaCl-rich [diet (1)] than when NaCl-poor [diet (2)] : the fall was even more marked with diets (3) and (4). The effect of NaCl on acid-base equilibrium depends on the relative amounts of NaCl and H_2O ingested, on the nature of the previous diet, and probably also on the temp. of the aq. NaCl, if given intravenously, and on some unknown factors. Nutr. Abs. (*b*)

[Total circulating] calcium and the moulting of brachyural Crustaceæ. A. Drilhon (Compt. rend., 1935, **200**, 858—859).—The total Ca (I) of the circulating fluid (II) in *Maia squinado* is determined at various stages of development. (I) and (II) remain const., but during moulting both increase, (I) about threefold. (I) gradually returns to normal as calcification of the shell proceeds. J. L. D.

Calcium absorption in white mice. A. R. Bliss and D. B. Morrison (J. Tenn. Acad. Sci., 1934, **9**, 233—242).—The efficiency of absorption of Ca salts was in the decreasing order, lactophosphogluconate, lactate, gluconate, chloride, inositolgluconate, diphosphate, glycerophosphate. Ch. Abs. (*p*)

Liberation of calcium by stimulation of heart nerves. A. Lánczos (Arch. exp. Path. Pharm., 1935, **177**, 752—754).—Stimulation of the vagosympathetic nerve in perfused (0·6% aq. NaCl) frog's heart preps. liberates Ca which, on re-perfusion, enhances the heart-beat during the post-stimulatory period (cf. A., 1907, ii, 110). F. O. H.

Influence of the mineral composition of the ration on the calcium, phosphorus, and total carbon dioxide contents of the blood-serum. J. Marek, O. Wellmann, and L. Urbanek (Z. Zucht., 1933, **27**, B, 267—286; Bied. Zentr., 1934, A, **5**, 5).—Data are given for pigs and horses. A. G. P.

Potassium changes during incubation of the hen's egg. A. Leulier and F. Paulant (Compt. rend. Soc. Biol., 1935, **118**, 254—256).—The mean K content of the embryo increases steadily with wt. up to hatching. R. N. C.

Ratio of phosphorus to nitrogen in bone during the growth of the rat. A. Roche and I. Garcia (Compt. rend. Soc. Biol., 1934, **116**, 1029—1932).—Curves correlating the P and N contents of dried bones with body-wt. (I) indicate that ossification takes place in two stages. Development of the org. matrix predominates in the period from birth until (I) is about 110 g., and deposition of mineral salts in the period of (I) from 110 to 150 g. The P : N ratio, as a function of (I), first falls and then rises slowly in the first period; it rises rapidly in the second and is const. in adult rats. Nutr. Abs. (*m*)

Nitrate content of animal tissues and the fate of ingested nitrate. M. Whelan (Biochem. J., 1935, **29**, 782—787).—When NO_3' is administered to dogs, only 50% of the NO_3'-N is recovered in the urine. The NO_3'-N content of the tissues increases by 6—10 times, but the abs. amount accounted for in this way is small. It is suggested that the NO_3' disappearing is destroyed in the tissues. P. W. C.

Water exchange. VI. Water and ash in the bodies of animals subjected to diets poor and rich in water. M. Saviano (Boll. Soc. ital. Biol. sperim., 1934, **9**, 990—993).—The H_2O and ash of the bodies of rats is raised by limiting the H_2O supply (I), and reduced by increasing it, whilst the H_2O/ash ratio increases inversely with (I), as do also the dry residue and ash of the urine. R. N. C.

Effect of homotypic conditioning of water on the growth of fishes: chemical factors involved. W. C. Allee, E. S. Bowen, J. C. Welty, and R. Oesting (J. Exp. Zool., 1934, **68**, 183—213).—Fish grew more rapidly in H_2O after homotypic conditioning (presence of same species for 22 hr. previously). In this period the electrolyte content of well- or artificial pond-H_2O was unchanged, but was increased in lake- or distilled H_2O. Biological conditioning (by fish or mussels) results in the accumulation of NH_3, NO_2', NO_3', org. N, and other compounds. Death of fish in distilled H_2O is due to loss of electrolytes. The growth-promoting substance in conditioned H_2O survives 121° for 15 min. and may be conc. and rediluted without loss of efficiency. It is org. in nature. Ch. Abs. (*p*)

Relationship between Widmark's "β" and "r" factors in rabbits and the action of alcohol on body oxidations and a comparison of the blood-alcohol and -sugar curves. H. H. Meyer (Biochem. Z., 1935, **276**, 174—182).—The "β" vals. (the decrease of concn. of EtOH in the blood in the post-absorptive state) are not const. for the same type of animal (rabbit) but vary with usage, body-wt., external temp., and vary inversely with the "*r*" val. (ratio of mean concn. of EtOH in the body to that in the blood). The "*r*" val. is usually >1 in rabbits. Comparison of the blood-EtOH and -sugar curves shows that small amounts of EtOH lead to increased oxidation and to inhibition of the utilisation of sugar. P. W. C.

Dependence of narcotic action in muscle on the concentration of calcium and the significance of calcium for the irritability of motor nerve-endings. H. Schein and O. Riesser (Arch. exp. Path. Pharm., 1935, **177**, 463—474).—The fatigue (I) of the nerve supply to stimulated muscle (frog's sartorius) is of quicker onset the lower is the $[Ca^{\cdot\cdot}]$ of the medium. (I) in presence of low $[Ca^{\cdot\cdot}]$ ($<0.030\%$) is removed by increasing $[Ca^{\cdot\cdot}]$. The same phenomenon occurs with narcosis by EtOH, urethane, chloral hydrate, or novocaine, the max. $[Ca^{\cdot\cdot}]$ being also 0·030%. Increase of $[K^{\cdot}]$ has the same effect as the equiv. decrease in $[Ca^{\cdot\cdot}]$ and *vice versa*; Ca cannot be replaced, however, by Sr. The rôle of Ca in the irritability of motor nerve-endings is discussed. F. O. H.

Effects of some narcotics on the sedimentation of red blood-cells. M. Hino (Tôhoku J. Exp. Med., 1934, **22**, 556—558).—Anæsthesia for 60 min. with Et_2O, solæsthin, $CHCl_3$ (I), avertin (II), N_2O, or EtCl causes delayed sedimentation (III) followed by a period of accelerated (III), reaching a max. in 3 hr. except in the case of (I) and (II) in which max. was attained in 9 hr. Ch. Abs. (*p*)

Methyl chloride poisoning. C. A. Birch (Lancet, 1935, **228**, 259—260). L. S. T.

Comparison of *cyclo*propane and ethylene with reference to body saturation and desaturation. M. H. Seevers, S. F. de Fazio, and S. M. Evans (J. Pharm. Exp. Ther., 1935, **53**, 90—104).—The gas depôt method is used to determine the comparative rates of absorption and elimination of *cyclo*propane (I) and C_2H_4 (II) from the splanchnic (III) and skin (IV) regions of the rabbit and the dog. (III) reaches saturation twice as rapidly as (IV), and both saturate and desaturate with (I) in half the time required by (II). Rabbit tissues reach saturation with gases about 50% more rapidly than those of the dog. The CO_2 tension in tissues during (I) is higher than that during (II) anæsthesia. A. L.

Distribution of barbiturates in the brain. E. Keeser and I. Keeser (J. Pharm. Exp. Ther., 1935, **53**, 136).—A reply to Koppanyi (this vol., 118). After small doses of barbital there is a difference in the distribution in various portions of the brain. A. L.

Relationship between pharmacological action and chemical structure of barbituric acid derivatives. E. E. Swanson (Proc. Soc. Exp. Biol. Med., 1934, **31**, 961—963).—Among a no. of 5 : 5-substituted barbituric acids, an increase in the no. of C atoms in the alkyl group (I) (*n* or *sec.*) is associated with a decrease in min. anæsthetic and min. lethal doses, until (I) has >5 C, when the vals. again increase. The duration of action decreased as the (I) lengthened. Ch. Abs. (*p*)

Action of some derivatives of aminomethylbenzdioxan and aminomethylcoumaran on the nictating membrane of the cat. Z. M. Bacq and D. Bovet (Compt. rend. Soc. Biol., 1935, **118**, 359—361).—The compounds tested fall into five definite types as regards their action on sympathetic excitation and adrenaline secretion. R. N. C.

[Pharmacological] action of tetrazoles. B. von Issekutz, M. Leinzinger, and E. Novák (Arch. exp. Path. Pharm., 1935, **177**, 398—414).—"Cardiazol" (I) and 9 other tetrazole derivatives were investigated. The action of (I) on the central nervous system is increased 10- to 20- and 2- to 3-fold by insertion of *o*- and *p*-Me, respectively, into the $(CH_2)_5$ ring. The effect of decrease in size of the $(CH_2)_n$ ring is offset by alkylation. F. O. H.

Action of cardiac stimulants on the chloroform-impaired circulation. B. VON ISSEKUTZ (Arch. exp. Path. Pharm., 1935, **177**, 415—434).—The impaired cardiac function due to $CHCl_3$ narcosis in cats is improved by administration of tri- and tetra-methylenetetrazole, strophanthin, adrenaline, or "sympatol," to a smaller extent by that of theophylline or ephedrine, and not at all by that of "cardiazol," coramine, hexetone, or caffeine. F. O. H.

Tetramethylammonium camphorsulphonate.—See this vol., 496.

Surface activity and spasmolytic action. W. BIEHLER (Arch. exp. Path. Pharm., 1935, **178**, 101—103).—"Octin" ($NHMe\cdot CHMe\cdot[CH_2]_2\cdot CH{:}CMe_2$) is equal or even superior to "perparin" (an *iso*quinoline derivative) in its inhibition of peristalsis and tonus of normal and spastically contracting guinea-pig's intestine (cf. A., 1934, 1030). F. O. H.

Comparison of toxicity and general effects of natural and synthetic camphor on guinea-pigs. R. HAZARD and R. LARDÉ (J. Pharm. Chim., 1935, [viii], **21**, 97—101).—The min. lethal dose of *r*-camphor (I) is much < that of natural (I). In addition to greater toxicity, synthetic (I) produces more violent and convulsive physiological effects on guinea-pigs. H. T.

Pharmacodynamic properties of β-aminoethylapiole.—See this vol., 485.

Nitrogen metabolism. III. Toxic action of salicylic acid, benzonaphthol, and phenol, and protective action of base-forming substances. P. SPOTO and G. SARZANA (Arch. internat. Physiol., 1934, **39**, 24—33).—Na citrate prevents the loss of wt. and negative N balance following administration of NH_4 salicylate (I), benzonaphthol (II), or PhOH. The protective action is less marked with PhOH than with (I) or (II). NUTR. ABS. (*m*)

α-Dinitrophenol and its influence on metabolism. W. E. ROBERTSON (J. Lab. Clin. Med., 1934, **19**, 1280—1285).—Administration of 2 : 4-dinitrophenol in cases of obesity causes a rapid increase in the rate and degree of oxidation whether given during fasting or with a glucose meal. Oxidation occurs at the expense of fats. CH. ABS. (*p*)

Mechanism of the stimulant action of dinitro-derivatives on cellular respiration. H. HANDOVSKY and C. SCHEPENS (Compt. rend. Soc. Biol., 1935, **118**, 369—371).—Respiration of muscle activated by muscle-extract (I) from the same species is further stimulated by dinitrophenols (II), which also activate respiration in presence of a non-sp. (I). Action of (II) is destroyed by cooling (I) to —180°, but not by heating to 100°, and is hence due to one or more thermostable constituents of (I), which, although unimportant in normal respiration, require for their action more sp. conditions than the normal respiratory enzymes and co-enzymes. R. N. C.

Metabolic activity of compounds related to dinitrophenol. M. L. TAINTER, F. W. BERGSTROM, and W. C. CUTTING (J. Pharm. Exp. Ther., 1935, **53**, 58—66).—Using body-temp. as an index, the effect of fifty compounds related to 2 : 4-dinitrophenol (I) on the metabolism of rats, pigeons, and dogs is studied. When either other groups are substituted for the OH or NO_2 in (I), or the position of these is changed, the effect is greatly reduced. In some cases only, active compounds are obtained by adding extra groups to the (I) mol. or by introducing NO_2 in other cyclic compounds. Picramic acid, dinitrohydroxydiphenyl, and 2 : 6-dinitrophenol were slightly active, whereas 2 : 4-dinitro-α-naphthol was inactive in rats, but 25% more toxic in pigeons than (I) for the same activity. Dinitro-*o*-cresol was active in rats and pigeons but more toxic, and 2 : 4-dinitro-*o*-*cyclo*hexylphenol and the similar *cyclo*pentyl compound were not more active in pigeons but slightly less toxic than (I). A. L.

Impairment of the heart by dinitro-compounds. H. STAUB and K. MEZEY (Arch. exp. Path. Pharm., 1935, **178**, 52—56).—2 : 4-Dinitro-*o*-cresol and, to a smaller extent, 2 : 4-dinitrophenol in concns. of 1 : 10^5—10^6 markedly decrease the contraction of isolated frog's heart or heart-muscle and diminish the output of heart–lung preps. (cat). The data confirm the danger of their application in man. F. O. H.

Influence of ovariotomy and bile acid on alimentary glycosuria. H. YUUKI (Arb. Med. Fak. Okayama, 1934, **4**, 211—218).—Ovariotomy causes increased glycosuria (I) after intravenous injection of glucose. Subcutaneous injection of cholic acid decreases (I) in normal and ovariotomised rabbits. CH. ABS. (*p*).

Relation of sex to susceptibility to toxicity of bile salts. S. HONGO (Sei-i-Kwai Med. J., 1934, **53**, 50—54).—The higher susceptibility of male frog muscle is not related to its phospholipin content. CH. ABS. (*p*)

Spectrographic changes in the blood of hens after injection of a lecithin–perhydrite complex. D. ABRAGAM, J. MAGAT, and M. MAGAT (Compt. rend. Soc. Biol., 1934, **116**, 1326—1329).—Lecithin and "perhydrite" (urea–H_2O_2) form a stable complex which when injected intravenously does not liberate O_2 but causes a reversible transformation of blood-pigment into a dark substance. Absorption curves for darkened and normal bloods are given. CH. ABS. (*p*)

Correlation of the spermicidal efficiencies of aromatic aldehydes with their chemical reactivities, and electrometric alkaline titrations of gelatin in presence of aromatic aldehydes. J. M. GULLAND and T. H. MEAD (Biochem. J., 1935, **29**, 397—406; cf. A., 1932, 648).—A series of mono- and di-methoxybenzaldehydes arranged in order of spermicidal efficiencies closely resembles the series of the same aldehydes arranged in order of their capacities for condensation with the gelatin anion, as measured by the deflexion of the titration curve towards a more acid reaction at p_H 8—10. A similar deflexion also occurs between the isoelectric point and p_H 6—7. A. E. O.

Toxicological detection of ergot. H. Kluge (Z. Unters. Lebensm., 1934, 68, 645—650).—After ingestion or injection of extract of ergot (I), or addition of the extract to minced organs, (I) can be identified in the organs by isolation of scleroerythrin, (I) alkaloids, and the red pigment which is not pptd. by $Pb(OAc)_2$, but not by the cock's comb reaction.

E. C. S.

Chemistry and toxicity of mussel poison. H. Müller (J. Pharm. Exp. Ther., 1935, 53, 67—89).—The concn. of mussel-poison (I) preps. is described, $1{\cdot}7 \times 10^{-6}$ g. of the most active prep. containing 35% of ash being toxic for mice on intraperitoneal injection. (I) is basic, but gives no colour reactions for alkaloids, and is not pptd. by the usual reagents. A. L.

Action of lupanine and of infusion of *Lupinus albus* seeds on blood-sugar, and on diabetic glycosuria and hyperglycæmia. A. Clementi and D. Torrisi (Boll. Soc. ital. Biol. sperim., 1934, 9, 1004—1008).—Subcutaneous injection in sublethal doses of lupanine (I) in the rabbit produces a hypoglycæmia lasting 3—5 hr. Oral administration of extract or infusion of *Lupinus* seeds (II) has no effect on rabbits, but produces a heavy fall of blood-sugar in the fowl. Both (I) and (II) in sublethal doses reduce slightly glycosuria and hyperglycæmia in diabetics. R. N. C.

Croton resin. I. Toxicity studies using goldfish. II. Toxic and vesicant action of certain of its derivatives. J. R. Spies. **III. Combined acids.** N. L. Drake and J. R. Spies (J. Amer. Chem. Soc., 1935, 57, 180—182, 182—184, 184—187).—I. When a MeOH extract of unshelled croton beans (seeds of *C. tiglium*) is fractionally extracted with ligroin (b.p. 55—70°), the active material is preferentially removed; successive fractions give darker and harder resins. The product (I) is more toxic to goldfish than is rotenone.

II. Hydrogenation (Pd or Ni) of (I) reduces the I val. from 53 to 38, but does not affect the toxic or vesicant action. The latter is connected with free OH, since acetylation (which indicates 3·4% OH) partly and methylation by Ag_2O–MeI [11·7% OMe; 1·2% in (I)] completely removes it. (I) forms no H_2O-sol. salt with dil. KOH and gives no colour with $FeCl_3$–EtOH; however, it probably contains phenolic OH, as indicated by the large decrease in sap. val. caused by methylation.

III. Hydrolysis of (I) gives about 32% of ligroin-sol. acids, including tiglic, heptoic, octoic, lauric, myristic, palmitic, oleic, and linoleic acids, but no stearic or higher saturated acids, and no acids with 3 or more ethylenic linkings. R. S. C.

Assay of *Strophanthus*. Mortality curve for *Xenopus lævis*. J. W. C. Gunn and N. Sapeika (Quart. J. Pharm., 1934, 7, 656—660).—A mortality curve for *X. lævis* to strophanthin is described. The average fatal dose for frogs which have recovered from the first injection returns to the normal val. in 3 weeks.

A. E. O.

Potency of digitoxin. J. C. Gage (Quart. J. Pharm., 1934, 7, 654—655).—Biological assays using frogs or guinea-pigs give similar results. A. E. O.

Influence of digitoxin and strophanthin on oxidation processes of *in-vitro* systems and of surviving heart-muscle. K. Salomon and O. Riesser (Arch. exp. Path. Pharm., 1935, 177, 450—462).—Digitoxin (I) has not a characteristic m.p. (I), m.p. 262° (corr.), $[\alpha]_D^{21}$ +17·7° in $CHCl_3$, does not influence the oxidation of systems containing linseed oil or hæmin. Neither (I) nor strophanthin (II) influences the action of purified catalase preps. or the respiration of nucleated or non-nucleated erythrocytes, isolated frog's heart, or heart-muscle pulp (frog, mouse, rabbit). Hence the action of (I) and (II) is not related to cell-oxidation. F. O. H.

Combination of *Digitalis* glucosides with blood-proteins. L. Lendle and F. Pusch (Arch. exp. Path. Pharm., 1935, 177, 550—563).—Ultrafiltration experiments indicate that ovalbumin (I) (2%) does not combine with 0·002% aq. digitoxin (II) whilst, following addition of 25% of serum, only 25% of (II) occurs in the ultrafiltrate from 0·004% (II). No such combination occurs with strophanthin (III). Purified (II) and (III) show no cataphoretic migration either alone or in presence of (I). Hence the combination of (II) and (III) in the organism is not explained by characteristic surface potentials. F. O. H.

Adsorption of *Digitalis* glucosides and strophanthin on various substances in presence and absence of proteins. F. Pusch (Arch. exp. Path. Pharm., 1935, 177, 564—573).—Strophanthin (I) (in 0·9% aq. NaCl), but not digitoxin (II) or digitoxigenin (III) (in 2—4% aq. EtOH), is adsorbed by $Al(OH)_3$. (II) and (III), but not (I), are adsorbed by $Fe(OH)_3$ and kaolin. A relation between concn. and adsorption of (II) or (III) is not apparent. With $Al(OH)_3$, but not $Fe(OH)_3$ or kaolin, addition of serum influences the adsorption, that of (II) being increased and that of (I) diminished. Comparison is made with adsorption of dyes (methylene-blue, eosin, and Congo-red). The data obtained afford no explanation for the action of (I), (II), and (III) in the organism.

F. O. H.

Baljet's colour reaction for *Digitalis* substances. L. Lendle and W. Schmelzer (Arch. exp. Path. Pharm., 1935, 177, 622—627).—The alkaline picric acid reaction (I) (A., 1919, ii, 438; 1922, ii, 882) is given both by aglucones of the glucosides (II) and the sugar components (B., 1926, 339). Scillaren *A* (A., 1933, 811) does not give (I), indicating that the unsaturated lactone group of (II) is responsible; this is confirmed by the negative (I) of hydrolysed strophanthidin. The scope of application of (I), which is also given by 0·1% aq. glucose, is indicated. F. O. H.

Physico-chemical properties of *Digitalis* glucosides. Capillary activity and influence on the permeability of Traube's membrane. W. Schmelzer (Arch. exp. Path. Pharm., 1935, 177, 614—621).—The capillary activity (measured by diminution of σ) of digitoxin (I), digitoxigenin, strophanthin (II), and allied substances is slight. With $Cu_2Fe(CN)_6$ membranes, the permeability to H_2O is decreased by relatively high concns. [0·005% of (I) and 0·033% of (II)] and increased by lower concns.,

(I) being somewhat more effective than (II). No correlation between these properties and the action of the glucosides in the organism appears to exist.
F. O. H.

Elimination of uric acid from rat's liver by the action of phenylcinchoninic acid (cinchophen) and ethyl *p*-tolylcinchoninate (tolysin). O. Fürth and E. Edel (J. Pharm. Exp. Ther., 1935, **53**, 105—112).—The normal uric acid content of the liver of albino rats fed on bacon and bread is 6·5±1 mg. per 100 g. and whilst this is diminished by phenylcinchoninic drugs, the elimination is never complete. Cinchophen (I) and tolysin (II) both exert their max. effect in doses of 0·01 g. per kg. daily, but whereas 0·2 g. of (I) per kg. daily causes in 8 days 18—22% loss in body-wt., the same effect is obtained only after administration of 0·6 g. of (II).
A. L.

Action of curare and of tetanus toxin on the muscle-potassium of the guinea-pig. A. Leulier and G. Vanhems (Compt. rend. Soc. Biol., 1935, **118**, 256—257).—Curare causes reduction of K to variable extents in muscles, the greatest loss occurring in the striated fibres of the myocardia. Tetanus toxin produces similar results, but the max. fall is in striated voluntary muscles, whilst the cardiac region of the stomach shows an increase.
R. N. C.

Sensitising action of cocaine to adrenaline in relation to the different constitutional elements of its formula. E. Philippot (Compt. rend. Soc. Biol., 1935, **118**, 802—805).—The sensitising action of cocaine is associated with its *l*-rotation, N^{III} atom, and the esterification of the CO_2H and OH groups of ecgonine by alkyl and an aromatic acyl, respectively.
R. N. C.

Curariform activities of strychnine methosalts and curarine chloride. S. L. Cowan and H. R. Ing (J. Physiol., 1934, **82**, 432—437).—Strychnine methiodide (I) is slightly more active as a curarising agent on the isolated sartorius prep. than curarine chloride (II). In the decerebrate frog (I) is less active than (II) as a paralyser, as it is excreted more rapidly in the urine. In a frog paralysed with strychnine methochloride (III) to prevent urine secretion, (III) accumulates in the liver, and to a smaller extent in the kidneys.
R. N. C.

Effect of some papaverine derivatives on the excised intestine. S. Sakuraba (Tôhoku J. Exp. Med., 1934, **22**, 556—558).—Derivatives containing NMe increased, and those having no NMe decreased, the tonus of isolated rabbit intestine.
Ch. Abs. (*p*)

Mechanism of morphine hyperglycæmia. I. Influence of opium alkaloids on respiratory movements in rabbits. H. Gyoku (Folia Pharmacol. Japon., 1934, **18**, 224—246).—Opium alkaloids having a phenanthrene nucleus depress respiratory movement and produce a greater hyperglycæmia in rabbits than those having an *iso*quinoline nucleus.
Ch. Abs. (*p*)

Respiratory effects of morphine, codeine, and related substances. III. Effect of morphine, dihydromorphine, dihydromorphinone (dilaudid), and dihydrocodeinone (dicodid) on the respiratory activity of the rabbit. C. I. Wright and F. A. Barbour (J. Pharm. Exp. Ther., 1935, **53**, 34—45).—The min. doses of morphine, dihydromorphine, dilaudid, and dicodid required to reduce respiratory activity in the rabbit are 0·32, 0·22—0·27, 0·027—0·035, and 0·21—0·30 mg. per kg., respectively. The effects on the rectal temp., heart rate, and sensitivity to CO_2 stimulation of the above are also described.
A. L.

Effect of morphine on the oxygen consumption of brain-tissue in the rat. E. G. Gross and I. H. Pierce (J. Pharm. Exp. Ther., 1935, **53**, 156—168).—Brain (I) from non-tolerant animals (III) killed after subcutaneous injection of morphine (II), in contrast to (I) from tolerant (III) and to normal (I), shows an increased O_2 consumption due to added glucose. Subcutaneous injection of (II) into non-tolerant (III) produces no change in the metabolic rate of kidney and testes.
H. G. R.

Comparison of the actions of morphine and dihydromorphinone (dilaudid) hydrochloride on the intact small intestine of the dog. C. M. Gruber and J. T. Brundage (J. Pharm. Exp. Ther., 1935, **53**, 120—136).—The min. effective intravenous dose of dilaudid hydrochloride (I) on the jejunal Thiry–Vella loop of the dog is about 2×10^{-4}, that of morphine sulphate (II) 2×10^{-3} mg. per kg. For the ileum 3×10^{-4} of (I) and 3×10^{-3} mg. per kg. of (II) are required. Both drugs decrease the amplitude of the rythmic contractions (III) during the period of increased tonus, and increase the height of (III) during the return of the gut to normal tonus.
A. L.

Action of morphine on the permeability of the nervous tissue in theophyllinised animals to sodium ferrocyanide. G. B. Giordano (Boll. Soc. ital. Biol. sperim., 1934, **9**, 932—934).—The passage of $Na_4Fe(CN)_6$ into the brain of theophyllinised guinea-pigs is accelerated temporarily by morphine.
R. N. C.

Effect of caffeine on basal metabolism. N. A. Womack and W. H. Cole (Proc. Soc. Exp. Biol. Med., 1934, **31**, 1248—1250).—Daily feeding of 70 mg. of caffeine citrate progressively increased the rate of O_2 consumption. Lugol's solution or thyroidectomy tended to inhibit this effect.
Ch. Abs. (*p*)

Pharmacological studies of aromatic guanidine derivatives. I. General action and influence on blood-coagulation. A. Kuroda (Folia Pharmacol. Japon., 1934, **18**, 106—120).—Effects are recorded of 3 : 4-dihydroxybenzyl-, phenoxyethyl-, *p*-hydroxyphenyl-, *p*-methoxybenzyl-, and α-phenylethyl-guanidine.
Ch. Abs. (*p*)

Pharmacological action of the active principles of extracts of the crystalline lens. G. Bietti (Boll. Soc. ital. Biol. sperim., 1934, **9**, 980—983).—Aq., 1% aq. AcOH, and EtOH extracts of the cryst. lens contain a depressor, which has also oxytocic action and inhibits intestinal movement, and hence is not histamine, choline, or acetylcholine.
R. N. C.

Histamine-like substance liberated by antidromic excitation of sensitive nerves. G. Ungar,

M. R. Zerling, and A. Pocoulé (Compt. rend. Soc. Biol., 1935, **118**, 778—779).—The action of the substance liberated is not inhibited by atropine, and hence it is not acetylcholine. Total acidity of the gastric juice produced by stimulation of the peripheral end of the crural nerve is similar to that of juice produced by histamine. R. N. C.

Nicotine-like action of choline, acetylcholine, and "cholazyl" on sympathetic ganglia. F. T. Brücke (Arch. exp. Path. Pharm., 1935, **177**, 532—542).—Choline, acetylcholine (I), and "cholazyl" (a chloroacetylcholine chloride–urea prep.) stimulate the superior cervical ganglion (II) in cats. (I) shows nicotine-like properties, the first phase of stimulation being followed by a second phase of paralysis. The chemical transference of stimuli at (II) is discussed. F. O. H.

Fatigue of isolated muscle in relation to the possible effect of acetylcholine liberated during excitation of the nerve. V. Kruta (Compt. rend. Soc. Biol., 1935, **118**, 757—760).—Muscles treated with eserine contract to a smaller degree than untreated muscles, which does not suggest that acetylcholine is liberated during nerve excitation. R. N. C.

Chemistry and pharmacology of fermented foodstuffs. W. Keil and B. Kritter (Biochem. Z., 1935, **276**, 61—65).—Fermentation of cucumber (I) follows the same stages as that of cabbage (II), lactic acid bacteria being the active agents and acetylcholine (III) being formed. (III) is also formed using extract of (I) with a culture of these bacteria. During fermentation of (I), loss of protein does not occur. The deproteinised extract of (II) does, but that of (I) does not, contain arginine and choline. (III), histamine, and putrescine present in the fermented (I) and (II) arise during fermentation. P. W. C.

Physiological action of substances used in treatment of flour. J. von Darányi and S. von Vitéz (Z. Unters. Lebensm., 1934, **68**, 597—612).—Of the substances used in the treatment of flour it is the oxidising agents which affect the health and development of rats, mice, and dogs. Of these, $NaBO_3$ and Bz_2O_2 are most harmful; $(NH_4)_2S_2O_8$ is less so. E. C. S.

Chemotherapy of dyes. Reticulo-endothelial system. A. Risi (Arch. exp. Path. Pharm., 1935, **178**, 36—51).—Small doses of acidic dyes (trypan-red and -blue), in association with various substances [CH_2Ph cinnamate, $Mn(OH)_2$, allyl sulphite, HCO_2Na, HCO_2Et, $CHPh_3$] or as an electro-negative complex with phenol-red, have a stimulating action (indicated histologically) on the reticulo-endothelial system. The application of these complexes to the treatment of tuberculosis in guinea-pigs (resulting in no noteworthy improvement) is described. F. O. H.

Chemotherapy of helminthics. M. Oesterlin and H. Krainick (Zentr. Bakt. Par., 1934, I, **132**, 222—228).—*Fasicola hepatica* was particularly sensitive to the phenoxazine dye cresyl-blue 2RN *in vitro*, but not *in vivo*. *Strongyloides stercoralis* and *Microfilaria diurna* were similarly sensitive to acridine dyes (I) (flavizide, rheonin), *Opistorchis felineus* to phenols (hexylresorcinol), *Schistosoma nansoni* to (I), but very resistant *in vivo*. A. G. P.

Anthelmintic studies of alkylhydroxybenzenes. I. Alkylpolyhydroxybenzenes. P. D. Lamson, H. W. Brown, and C. B. Ward. **II. *o*- and *p*-*n*-Alkylphenols.** P. D. Lamson, H. W. Brown, R. W. Stoughton, P. D. Harwood, R. Baltzly, and A. D. Bass. **III. 6-*n*-Alkyl-*m*-cresols.** P. D. Lamson and H. W. Brown. **IV. Isomerism in polyalkylphenols. V. Phenols with other than *n*-alkyl side-chains.** P. D. Lamson, H. W. Brown, R. W. Stoughton, P. D. Harwood, R. Baltzly, and A. D. Bass (J. Pharm. Exp. Ther., 1935, **53**, 198—217, 218—226, 227—233, 234—238, 239—249).—I. Hexylresorcinol (I) is the most active anthelmintic of the 4-*n*-alkylresorcinols (II) and is non-toxic. It is more effective for *Ascaris* than for hookworm. It causes slight local irritation but this is not parallel with the anthelmintic activity (III). (III) of (II) is exhibited between amyl- and dodecyl-resorcinol. The m.p. of active substances is generally $< 80°$ and the solubility range between 1 : 1000 and 1 : 35,000.

II. (III) of *o*- and *p*-*n*-alkylphenols increases to *n*-amylphenol and then falls, the activity of the *p*- being slightly > that of the *o*-isomeride. The toxicity (IV) and irritant action (V) decrease with the length of the side-chain. *o*-*n*-Heptylphenol has about 50% of the activity of (I) and has no effect on the mucous membrane of the mouth.

III. (III) of 6-*n*-alkyl-*m*-cresols increases to butyl-*m*-cresol and then falls, (IV) and (V) decreasing with the length of the chain. 6-*n*-Hexyl-*m*-cresol, given in large doses, has no effect on the tissues and has lower (III) than (I).

IV. Substitution in the Ph nucleus of several alkyl radicals of the same total no. of C atoms as a single *n*-chain does not increase (III).

V. None of the synthetic alkylphenols other than those having *n*-alkyl side-chains shows any decided (III). H. G. R.

Behaviour of carbohydrate reserve at high altitudes. E. Sapegno (Boll. Soc. ital. Biol. sperim., 1934, **9**, 886—888).—Liver- and muscle-glycogen (I) in mice kept at 2910 m. above sea-level fall during the first few days, afterwards rising steadily. If the animals are then brought back to low levels (I) returns to normal after a short lag. R. N. C.

Blood-sugar, reducing power, and glutathione content at high altitudes. A. Rossi and E. Sapegno (Boll. Soc. ital. Biol. sperim., 1934, **9**, 888—890).—The blood-sugar of normal human subjects is increased at 2910 m. above sea-level, and other reducing substances are also increased to variable extents. The increases in total and reduced glutathione are not uniform. R. N. C.

Effect of the piqûre diabétique on the blood-sugar and the mean blood-pressure of dogs with the adrenal glands or medullæ removed. T. Kaiwa and M. Wada (Tôhoku J. Exp. Med., 1934, **23**, 536—555).—Puncturing the fourth ventricle of the dog in the region of the *alæ cinereæ* (without injury to the cerebellum) caused hyperglycæmia (I) with varying changes in the blood-pressure (II). When the adrenal glands, or their medullæ, were previously removed the piqûre (I) was reduced whilst the (II) changes were unaffected. Previous section of the vagi did not affect the (I). The adrenalectomised dogs received a diet rich in carbohydrate. NUTR. ABS. (*b*)

Intrinsic regulation of the circulation in the hypothalamus of the cat. C. F. SCHMIDT (Amer. J. Physiol., 1934, **110**, 137—152).—The circulation is regulated by a humoral rather than a nervous mechanism. Hypothalamic vessels are dilated by excess CO_2 and lack of O_2, and constricted by increased ventilation. Changes of p_H produced by fixed acid or alkali have no direct effect. Adrenaline causes weak but prolonged constriction, and histamine and choline derivatives are dilators, whilst pituitrin and Ca have no direct action. R. N. C.

Phenomena following iodoacetic acid poisoning. III. Oxygen consumption and respiratory quotient in pigeons poisoned by iodoacetic acid after injection of dinitrophenol. U. LOMBROSO and G. SARZANA (Boll. Soc. ital. Biol. sperim., 1934, 9, 803—804).—O_2 consumption is raised by $C_6H_3(NO_2)_2\cdot OH$, whilst the R.Q. is raised if glucose is administered, but the increase is < that of normal pigeons injected with the same amount of glucose. R. N. C.

Effect of injection of iodoacetic acid and sodium cyanide on the mammalian heart. L. H. NAHUM and H. E. HOFF (Amer. J. Physiol., 1934, **110**, 56—60). R. N. C.

Chronic carbon monoxide poisoning. K. SÜFFLE (Deut. med. Woch., 1934, **60**, 1263—1267; Chem. Zentr., 1934, ii, 2551).—In dogs breathing air containing small quantities of CO daily for some hr., considerable alterations and compensating effects are produced ∝ the CO content, which are considered to be the result of partial O_2 deprivation. The nature of acute CO poisoning depends on O_2 withdrawal. In the animal's body repeated separation of part of the hæmoglobin (I) occurs, followed by formation of CO-(I), and is compensated by increased (I) and erythrocyte production. The animal is sensitive to prolonged exposure to 0·02% CO; concns. of 0·01% or less have no harmful effect. R. N. C.

Methylene-blue in illuminating-gas poisoning L. MACK and E. A. SMITH (Proc. Soc. Exp. Biol. Med., 1934, **31**, 1031—1032).—The lethal interval in rats exposed to an atm. containing 1·89% of illuminating gas was not increased by injection of methylene-blue, but was much decreased by administration of desiccated thyroid gland or 2 : 4-dinitrophenol. CH. ABS. (*p*)

Remedies for cyanide poisoning in sheep and cattle. A. B. CLAWSON, H. BUNYEA, and F. J. COUCH (J. Washington Acad. Sci., 1934, **24**, 369—385).—Intravenous injection of methylene-blue, $Na_2S_2O_3$ (I), $NaNO_2$ (II), or a mixture of (I) and (II) afforded protection. A. G. P.

Effect of excito-metabolic substances on the alkaline reserve and p_H of the blood. C. ZUMMO and G. SCOZZARI (Boll. Soc. ital. Biol. sperim., 1934, 9, 808—809).—NaOAc and Na citrate administered orally to dogs produce an increase in the alkaline reserve (I) of the blood, and p_H is raised 0·03—0·05. The increase of (I) is less with NH_4OAc and NH_4 citrate, whilst p_H is affected very slightly in most cases. R. N. C.

Mechanism of the action of hypertonic solutions of sodium chloride. C. COLOMBI (Boll. Soc. ital. Biol. sperim., 1934, 9, 976—978).—The spleen is relaxed by 5% NaCl but contracted by 20% and more conc. solutions. NaCl has a double action in inhibiting sympathetic response and directly exciting plain muscle. R. N. C.

Action of different salts introduced intravenously on intestinal peristalsis. A. COSTANTINI and G. BALLARIN (Boll. Soc. ital. Biol. sperim., 1934, 9, 1029—1032).—Peristalsis is generally stimulated by $Na^{\cdot}$ and glucose at high concns., and by dil. $K^{\cdot}$ and $Mg^{\cdot\cdot}$, but is arrested by conc. $K^{\cdot}$ and $Mg^{\cdot\cdot}$ solutions. R. N. C.

Ciliary motion in relation to electrolytic equilibrium. M. BENAZZI (Boll. Soc. ital. Biol. sperim., 1934, 9, 880—881).—In the ionic equilibrium controlling the ciliary motion of *Mytilus*, K may be replaced by Rb, Cs, or NH_4, Na by Li, and Ca by Sr or Ba. R. N. C.

Stimulation of peripheral nerve-elements subserving pain-sensibility by intra-arterial injections of neutral solutions. R. M. MOORE (Amer. J. Physiol., 1934, **110**, 191—197).—The nerve-elements are stimulated by $Li^{\cdot}$, $Na^{\cdot}$, $Cs^{\cdot}$, $Mg^{\cdot\cdot}$, $Ca^{\cdot\cdot}$, and $Sr^{\cdot\cdot}$ in hypertonic solution, and by hypotonic solutions and isotonic $K^{\cdot}$, $Rb^{\cdot}$, and $Ba^{\cdot\cdot}$ solutions in the absence of $Mg^{\cdot\cdot}$, $Ca^{\cdot\cdot}$, and $Sr^{\cdot\cdot}$, suggesting that stimulation is associated with the permeability of the nerve-membrane to the different ions. R. N. C.

Permeability of capillaries in man, studied by the concentration curve of glucose injected into the humoral artery and recovered from the vena mediana. G. C. DOGLIOTTI and V. TAGLIONI (Boll. Soc. ital. Biol. sperim., 1934, 9, 859—861).—The curve rises almost immediately to a sharp. max. and then falls again in normal subjects, but in certain pathological conditions it remains high for some time owing to the decreased capillary permeability. R. N. C.

Effect of p_H on the lumen of the capillaries. F. SCHUPFER (Boll. Soc. ital. Biol. sperim., 1934, 9, 861—864).—Fall of p_H in the capillaries produces vaso-dilatation, and conversely, rise of p_H produces vaso-constriction, these changes probably leading to the vaso-motor reactions of the peripheral ring observed on change of p_H. R. N. C.

Effect of calcium and potassium ions on the variations of the lumen of the capillaries. F. SCHUPFER (Boll. Soc. ital. Biol. sperim., 1934, 9, 864—866).—Introduction of KCl into the circulation causes a vaso-dilatation of the capillaries, whilst $CaCl_2$ produces a vaso-constriction. $K^{\cdot}$ and $Ca^{\cdot\cdot}$ are antagonistic in their effects on tissue-p_H and the sensitivity of the capillaries to p_H changes. R. N. C.

Action of heavy water on reviving animals. L. Plantefol and G. Champetier (Compt. rend., 1935, **200**, 587—589).—Movement of *Macrobistus macronyx*, Duj., after imbibition of 18 and 57% H_2^2O occurred as early as after imbibition of H_2O. Movement was delayed when 98% H_2^2O was used. The survival period in drop cultures was curtailed by 57 and 98% H_2^2O. Revival of desiccated *Rotifer vulgaris*, Schr., was slightly retarded in some cases by H_2^2O. A. G. P.

Action of sulphur on gaseous metabolism in man. D. Campanacci (Boll. Soc. ital. Biol. sperim., 1934, 9, 1064—1066).—O_2 consumption is lowered by administration of small quantities of S, the effect being similar to that of insulin. R. N. C.

Effect of fluorine on blood and respiration. D. A. Greenwood, E. A. Hewitt, and V. E. Nelson (Proc. Soc. Exp. Biol. Med., 1934, 31, 1037—1040).—Puppies receiving orally 0 to 4·52 mg. of F as NaF per kg. of body-wt. showed slight increases in hæmoglobin and coagulation time, no change in plasma-Ca, and a slight fall, increasing with the dosage, in the acid-sol. inorg. P of the plasma. Nutr. Abs. (*b*)

Action of sodium fluoride on serum-calcium and -inorganic phosphorus in rabbits. S. B. Bogdanović (Arch. exp. Path. Pharm., 1935, **178**, 104—108).—Intravenous injection for 3 weeks of small amounts of NaF generally increases the serum-Ca and -inorg. P, probably due to the action on the liver and parathyroid gland. F. O. H.

Behaviour of digestive enzymes in experimental intoxication by sodium fluoride. A. Costantini (Boll. Soc. ital. Biol. sperim., 1934, 9, 916—918).—Intragastric injection of NaF in guinea-pigs causes a decrease in the activity of pancreatic invertase (I), amylase (II) and lipase (III), whilst intraperitoneal injection increases (I), decreases (II), and does not affect (III). R. N. C.

Mottled enamel of deciduous teeth. M. C. Smith and H. V. Smith (Science, 1935, **81**, 77).—The use of H_2O containing high concns. of F (12—16 p.p.m.) during the period of formation of temporary teeth in human beings appears to produce mottled enamel of a severe type. L. S. T.

Micro-determination of lead in biological materials. Titrimetric–extraction method. E. S. Wilkins, jun., C. E. Willoughby, E. O. Kraemer, and F. L. Smith (Ind. Eng. Chem. [Anal.], 1935, 7, 33—36).—Pb is separated from other metals by extraction with diphenylthiocarbazone (I) dissolved in $CHCl_3$, and subsequently determined by titration with (I). The method is sensitive to 0·001 mg. Pb. E. S. H.

Dependence of urinary porphyrin excretion in lead-poisoned rabbits on the acid–base economy. H. T. Schreus and H. Poullain (Arch. exp. Path. Pharm., 1935, **177**, 543—549).—Rabbit's urine contains coproporphyrin (I), the content with a diet of oats (II) being > that with one of green vegetables (III). Oral administration of $PbCO_3$ increases the excretion of (I) with a diet of (II) but not (III). The fæces contain proto-, smaller amounts of deutero- (IV), and, in traces, copro-porphyrin. Administration of Pb increases only (IV). F. O. H.

Reversibility of acidosis in acute uranium nitrate nephritis. L. Brull (Compt. rend. Soc. Biol., 1935, **118**, 811—812).—The alkaline reserve of the blood in acute $UO_2(NO_3)_2$ nephritis in dogs is not raised by anastomosis of normal liver, muscle, or kidneys with the circulation. R. N. C.

Poisoning by uranium nitrate. I. Modifications of the liver. S. Marras (Boll. Soc. ital. Biol. sperim., 1934, 9, 820—823). R. N. C.

Localisation of polonium in the organism as a function of the nature of the injected solution. A. Lacassagne and M. Servigne (J. Pharm. Chim., 1935, [viii], 21, 145—151).—A known quantity of Po was injected into rabbits in aq. solution (I) and in neutral olive oil (II). Like Bi and Ra-*E*, more Po is retained in the lungs with (I) and the animals show a greater resistance when (II) is injected. The Po excreted in the urine reaches a max. for (I) and then falls, whilst excretion is uniform in the case of (II). The localisation of the Po does not seem to depend on the form in which it is combined when injected but on the nature of the solvent used. H. T.

Relation between chemical structure and biological activity of diphenylmethylarsine dihydroxide and its derivatives. V. M. Karasik and M. M. Lichatschev (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 314—316).—Diphenylmethylarsine dihydroxide, diphenyldimethylarsine hydroxide (I) and the nitrate of (I) are less toxic when injected subcutaneously than the corresponding compounds containing one Ph group less. F. N. W.

Passage of arsenic through the human placenta following arsphenamine therapy. N. J. Eastman and A. L. Dippel (Bull. Johns Hopkins Hosp., 1933, 53, 288—296).—As occurs in the meconium of newborn infants after maternal treatment with arsphenamine. Simple diffusion cannot explain transmission of As. Ch. Abs. (*p*)

Arsenoxide in relation to the toxicity and therapeutic activity of arsphenamine and neoarsphenamine. J. F. Schamberg, J. A. Kolmer, and H. Brown (Amer. J. Syphilis, 1934, 18, 37—55).—The naphthaquinone test for arsenoxide (I) gives positive results with arsphenamine (II) and neoarsphenamine (III) after exposure to air but not in freshly prepared solutions. The test is less delicate for (I) in tissues after administration of (II). The toxicity of alkaline solutions of (II) is approx. doubled when 34% has been oxidised to (I). Other factors than (I) are concerned in the toxicity of (III). Ch. Abs. (*p*)

Influence of drugs used in antisyphilitic therapy on the reticulo-endothelial system. K. B. Muir and S. W. Becker (Arch. Path., 1934, 18, 370—377).—Comparison is made of the effects of neoarsphenamine, thioarsene, colloidal Bi, mercurosal, tryparsamide, Na Au thiosulphate, sulpharsphenamine, Bi arsphenaminesulphonate, K Bi tartrate, $HgCl_2$, and Na cacodylate. The reticulo-endothelial system participates in disposing of drugs injected intravenously, but the proportion of thiol compounds present is insufficient to explain its rôle in oxidation–reduction processes. CH. ABS. (*p*)

Toxicity of arseno-protein compounds. P. MASCHERPA (Boll. Soc. ital. Biol. sperim., 1934, **9**, 919—922).—The toxicity of As–ovalbumin complexes is > that of an equiv. amount of Na_2HAsO_4. R. N. C.

Fixation of elementary arsenic by ovalbumin in presence of radium emanation. P. MASCHERPA (Boll. Soc. ital. Biol. sperim., 1934, 9, 922—925).—The amount of As fixed by ovalbumin in H_2O saturated with Rn is $\not>$ the amount fixed in pure H_2O. The amount of Co fixed is increased by Rn. R. N. C.

Influence of therapeutic radium and *X*-ray treatment on blood-cholesterol and liver. K. FUGE (Strahlenther., 1934, **50**, 157—166; Chem. Zentr., 1934, ii, 2242).—The level of cholesterol (I) in blood, and the proportion between total (I) and (I) esters, was unaffected by irradiation. A. G. P.

Nature of enzymes. J. ALEXANDER (Science, 1935, **81**, 44—45).—A reply to criticism (cf. this vol., 121). L. S. T.

Inactivation of catalases from certain marine plants by oxygen. G. W. MARKS (Biochem. J., 1935, **29**, 509—512).—Phosphate buffer extracts of marine plant catalases (I) are inactivated by mol. O_2 as the pseudo-unimol. rate of inactivation is greater when (I) is kept under air than under N_2. The inactivation occurs over the p_H range 4·5—10·0. The rate of inactivation increases with rise in temp. in accordance with the Arrhenius equation. E. A. H. R.

Peroxidase in algæ. H. TAMIYA (Planta, 1934, **23**, 284—288).—Distribution of peroxidase (I) in various species of algæ is recorded. (I) extracted from *Plocamium coccineum* has an active p_H range 1·2—5·8 with optimum at 3·0—4·0, is heat-resistant, and, unlike other peroxidases, does not react with guaiacol or pyrogallol but has a positive action on benzidine and *o*-tolidine. There is no reaction with p-$C_6H_4(NH_2)_2$ α-$C_{10}H_7\cdot OH$, quinol, or *p*-cresol. The activity of the enzyme is not inhibited by Et urethane but is weakened by KCN, Na_2S, and NH_2OH (0·02*M*). A. G. P.

Influence of adenylic acid on certain enzymic, especially oxidative, processes in muscle extract. C. G. HOLMBERG (Skand. Arch. Physiol., 1934, **68**, 1—88; Chem. Zentr., 1934, ii, 2549).—In the presence of cozymase (I) the system muscle–hexose diphosphate decolorises methylene-blue. (I) acts as co-enzyme for all forms of carbohydrate fission involving 3-C chains. A. G. P.

Dehydrogenases and hydrogen donators in the brains of narcotised and hypnotised animals. Animal immobilisation. H. WAELSCH (Klin. Woch., 1934, **13**, 1177—1180; Chem. Zentr., 1934, ii, 2551).—Brain-pulp of narcotised animals decolorises methylene-blue more rapidly than that of normal animals. Previous poisoning of the animal with $CH_2I\cdot CO_2H$ does not delay the decolorisation, so that increased lactic acid production is not responsible for the acceleration. A similar acceleration occurs in the brains of animals immobilised by hypnosis. R. N. C.

Mechanism of oxidative processes. XLI. Dehydrogenation of alcohol by yeast. H. WIELAND and F. WILLE (Annalen, 1935, **515**, 260—272; cf. A., 1933, 865).—The impoverishment of yeast by agitating its suspension in H_2O with O_2 proceeds rapidly initially and declines to a const. rate. The main process appears to consist in the oxidative removal of simple and readily hydrolysed carbohydrates (I) followed by an action controlled by the slow saccharification of glycogen. The content of (I) decreases by about 50% whereas that of lipins (II) increases about 100%. Non-hydrolysable compounds decrease about 8%. Increase due to (II) is about 10% of the decrease due to loss of (I). Of 14 mols. of EtOH 11 are completely oxidised, 2 transformed into fat, and 1 into carbohydrate; re-synthesis in the sense of Meyerhof (A., 1925, i, 993) therefore does not take place. Yeast can form much less cell material from AcOH than from EtOH; lactic acid is an unfruitful material. Since the oxidation of EtOH proceeds through AcOH it is remarkable that about twice as much $(\cdot CH_2\cdot CO_2H)_2$ is produced from the former as from the latter whereas citric acid is not formed. Fumaric acid is intermediately produced. The decolorisation of methylene-blue (III) in presence of EtOH is accompanied by production of the corresponding amount of AcOH: $EtOH + 2(III) \longrightarrow AcOH + 2$ leuco-(III). H. W.

Tyrosinase of tea-leaves, and its probable rôle in tea manufacture. A. I. POTAPOV (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 323—325).—Tyrosinase has been found in green tea-leaves, and is connected with their change of colour during drying. Tyrosine was found in finished tea. F. N. W.

Effect of added fat and protein on the hydrolysis of rice starch. M. M. KIBE (Poona Agric. Coll. Mag. 1934, **26**, 55—61).—Hydrolysis of pure rice starch (I) by diastase, pancreatin, and conc. HCl was adversely affected by the addition of 1—5% of rice fat (II) (from polish by Et_2O). Rice containing no (II) but only (I) and protein was hydrolysed more rapidly than the pure (I). CH. ABS. (*p*)

Characterisation of different amylases. K. V. GIRI (J. Indian Inst. Sci., 1934, **17**, **A**, 127—129).—A method of characterising α- (I) and β-amylase (II) depends on the extent to which starch is hydrolysed by (I) and (II). Agar impregnated with starch gives a violet diffusion zone with (II) and a colourless one with (I) on addition of 0·005*N*-I. A mixture of amylases gives two diffusion zones, a central colourless one and a violet one surrounding it. E. A. H. R.

Banana amylase. B. N. SASTRI and G. R. ROW (Proc. Indian Acad. Sci., 1934, **1**, **B**, 318—323).—Extracts (prep. described) of banana skin (I) have a definite saccharifying action on solutions of starch, whereas the pulp (II) has nearly none. Extracts of whole banana are more active than those of (I), due probably to activators in (II). Amylolytic activity is inhibited by tannin [present in unripe (II)], which explains the failure of previous investigators to get results (cf. B., 1928, 796). J. L. D.

Hydrolysis of glycogen by glycerol extract of muscle. A. Carruthers and W. Y. Lee (J. Biol. Chem., 1935, **108**, 525—533).—A glycerol extract of rabbit muscle (A., 1930, 249) was dialysed and incubated with glycogen (I) at 37°. Protein and unchanged (I) were removed, and fractions were separated by pptn. with EtOH (*A*) and EtOH–Et_2O (*B*), and the residue was conc. (*C*). The $[\alpha]_D$ and reducing power before and after hydrolysis, and the mol. wt. of the Ac products of the fractions were determined. *A* and *B* were predominantly disaccharide whilst *C* contained more monosaccharide. H. D.

Hydrolysis of glycogen by muscle and liver extracts. A. Carruthers (J. Biol. Chem., 1935, **108**, 535—545).—Oyster and rabbit-liver glycogen (I) are hydrolysed by dialysed (II) and undialysed glycerol extracts (III) of rabbit muscle at 37° and the course of hydrolysis is followed by (I) and sugar determinations. The hydrolysis products (IV) with (II) have reducing powers > those with (III). (II) hydrolyses maltose, the reaction being inhibited by glycerol. The (IV) of (I), maltose, and glucose all inhibit the amylase activity of (II). Complete conversion of (I) into glucose is possible only when small amounts of (I) are present in the reaction mixture. H. D.

Amylosynthease. XXI—XXIII. T. Minagawa (J. Agric. Chem. Soc. Japan, 1934, **10**, 379—381, 382—387, 388—392).—XXI. After pptn. of yeast extract by $FeSO_4$, $Fe_2(SO_4)_3$, and $Al_2(SO_4)_3$, amylosynthease (I) was reactivated by $(NH_4)_2SO_4$ from the $FeSO_4$ filtrate and the $Al_2(SO_4)_3$ ppt. (I) was damaged by addition of Cr alum. K alum and Fe alum ppt. (I) incompletely. The ppts. have the action of (I). The enzyme action could not be reactivated by $(NH_4)_2SO_4$. On dissolving pancreatin in H_2O, pptg. with $(NH_4)_2SO_4$, and repptg. with EtOH, the ppt. lost its amylase action but retained its accelerating effect on barley amylase.

XXII. The nature and concn. of substrate (glucose polyanhydrides), p_H, and temp. affect the reaction velocity of (I).

XXIII. The ppt. obtained from yeast extract with 70% EtOH has an accelerating action on (I); that obtained with 95% EtOH has only the action of a complement of amylase. Although glutathione and cysteine accelerate amylase action they retard the action of (I). H_2S is toxic; a very small quantity of H_2O_2 is favourable, but > 0·03% retards the action. (I) treated with conc. H_2O_2 is easily reactivated by dilution. Ch. Abs.

Water relations of enzymes. I. Influence of viscosity on invertase action. Z. I. Kertesz (J. Amer. Chem. Soc., 1935, **57**, 345—347).—The rate (r) of hydrolysis of sucrose by invertase is unaffected by high η caused by addition of citrus pectin, contrary to the theory of Colin *et al.* (A., 1929, 722), whose data are open to objection. The effect of temp. on r is not correlated with η. R. S. C.

Cholesterol and cholic acid in lung autolysis. G. Borgatti (Boll. Soc. ital. Biol. sperim., 1934, **9**, 940—942).—Cholesterol (I) shows an initial rise, and afterwards oscillates over a range of vals. > normal. Cholic acid shows an initial fall, and generally behaves inversely to (I). R. N. C.

Autolysis of algæ. B. Aleev (Biochem. Z., 1935, **276**, 55—56).—Pure cultures of *Pediastrum boryanum* (I) and *Kirchneriella lunaris* (II) are allowed to autolyse at 37° in physiological saline under PhMe, and the increase of residual and NH_2-N is determined. Proteinase activity is greater with (II) and the optimum p_H for proteinase of (I) is 6. P. W. C.

Dilatometric determination of the relative digestibility of proteins. H. B. Sreerangachar and M. Sreenivasaya (Biochem. J., 1935, **29**, 291—294).—The course of the digestion by trypsin of the globulins of *Phaseolus mungo* and *Dolichos lablab* are followed by the dilatometric (I) and the Van Slyke methods. In both cases the (I) depression ∝ the increase in NH_2-N. A. L.

Protein structure and synthetic substrates for proteases. K. Shibata (Acta Phytochim. Japan, 1934, **8**, 173—178).—Neutral diketopiperazines (I) are not attacked by trypsin (II) or pepsin (III), but those having a $\cdot CO_2H$ are hydrolysed by (II), and those with free $\cdot NH_2$ by (III). Glycyldiamino- and diamino-propionic anhydrides were hydrolysed by (III). The existence of (I) groups in the protein mol. is indicated. Ch. Abs. (*p*)

Application of quantum mechanics to certain cases of homogeneous catalysis. II. Enzyme action. A. E. Stearn (J. Gen. Physiol., 1935, **18**, 301—306).—From a consideration of the effect of foreign rigid dipoles (cf. this vol., 43) on the energy of an activated configuration (I) of the atoms involved in the reaction $:C\cdot N:+H_2O=:C\cdot OH+:NH$ (*e.g.*, hydrolysis of a peptide linking), the dipole effects and lowering of activation energy are obtained for acidic and alkaline reactions, a dipole distance of 0·3 mμ being assumed. Under such arbitrary conditions, the lowering of the potential energy of (I) would result in an increased reaction velocity of 6- to 4700-fold at room temp. The data indicate that groups found in ordinary proteins may be capable of active catalysis if suitably placed with respect to the reacting substrate. F. O. H.

Reabsorption of pancreatic enzymes after ligature of the ducts. E. Milla (Boll. Soc. ital. Biol. sperim., 1934, **9**, 835—847).—Serum- and urinary amylase rise to a max. 24—36 hr. after ligature, returning steadily to normal after 10—15 days. Injection of secretin produces a similar rise. Serum-maltase and insulin secretion are unaffected. The increase is the result of the reabsorption of the pancreatic juice and its passage into the serum. R. N. C.

Digestive enzymes in cattle. M. Salvietti (Riv. Biol., 1932, **14**, 64—77; Bied. Zentr., 1934, **A**, 5, 3).—Pepsin and chymase occur only in the abomasum (I), the former decreasing in concn. from the entrance of the omasum (II) toward the pylorus. Lipases occur in all stomach divisions in amounts which decrease from (II) towards (I), proportions in the rumen (III) and reticulum (IV) being small. The amylase concn. is highest in (II), declining in the order, (III), (I), and (IV) (nil). Invertase is similarly distributed. A. G. P.

Purification, specificity, and inhibition of liver-esterase. Z. Baker and C. G. King (J. Amer. Chem. Soc., 1935, **57**, 358—361).—A simple method of concentrating this enzyme is described. The product has the properties of an albumin; the Et butyrase is distinct from other esterases. Inhibition by a no. of substances changes from a competitive to a non-competitive type with increasing concn. R. S. C.

Factors influencing the activity of fungus-lipase. D. Kirsh (J. Biol. Chem., 1935, **108**, 421—430).—The H_2O-sol. lipase of *Penicillium oxalicum* (I) and of *Aspergillus flavus* is most active at p_H 5·0, but is very unstable in aq. solution at this p_H. (I)-lipase is highly non-sp., is activated by $CaCl_2$ (but inhibited by chicken- and ox-bile), and does not follow the Schutz law. A. E. O.

Mammalian lipins. IX. Enzymic fission of liver-polydiaminophosphatide. A. Rossi (Z. physiol. Chem., 1935, **231**, 115—124).—The rates of hydrolysis of polydiaminophosphatide by various phosphatase preps. differ widely from the rates shown on glycerophosphate or lecithin substrates. The best prep. was a NaCl extract of dried powdered spleen. The activity was doubled in presence of 0·026 mol. of Mg salts (I) per litre. Bile acid salts (II) also increase the activity, which is further enhanced by the combination of (I) and (II). PO_4''' or AsO_4''' inhibit completely. J. H. B.

Phosphatase of pig's kidney. H. Köster and T. Bersin (Z. physiol. Chem., 1935, **231**, 153—156).—Glutathione has no effect on the phosphatase; thiolactic and dithiodilactic acids inhibit only slightly. Various oxidising agents are almost without action. J. H. B.

Phosphatase in blood and urine. E. Waldschmidt-Leitz and W. Nonnenbruch (Naturwiss., 1935, **23**, 164).—In urine only the acid phosphatase (I) (p_H optimum 5—6) is found. (I) also predominates in blood. (I) is associated with the red corpuscles as only slight phosphatase activity is found in serum. The (I) found in organs may be due to the erythrocytes present; the alkali phosphatase would then be the one peculiar to the organ. (I) in the urine is probably derived by dissolution of the erythrocytes. E. A. H. R.

Phosphatases. Influence of some electrolytes on the phosphatases of animal tissue. Phosphatases of the liver, kidney, serum, and bones of the rabbit. S. Belfanti, A. Contardi, and A. Ercoli (Biochem. J., 1935, **29**, 517—527).—p_H-activity curves of rabbit-liver and -kidney phosphatase indicate the existence of an "acid" phosphatase (I) (max. activity at p_H 4·5) and an "alkaline" phosphatase (II) (max. activity at p_H 9·5). NaF (III) and $Na_2C_2O_4$ (IV) inactivate (I) but not (II). In bone and serum extracts the activity due to (I) is very small and (II) is partly inhibited by (IV) but not by (III). E. A. H. R.

Phosphatese. H. von Euler (Svensk Kem. Tidskr., 1935, **47**, 16—25).—A review. E. A. H. R.

Unicellular chemistry. Part played by external influences in determining chemical character and biological behaviour of unicellular organisms. J. V. Eyre (J.C.S., 1935, 201—207).—A lecture. F. O. H.

Velocity of alcoholic fermentation. L. S. Ornstein and J. W. Meyer (Proc. K. Akad. Wetensch. Amsterdam, 1935, **38**, 12—24).—The kinetics of the alcoholic fermentation process are discussed with the help of data for the rate of evolution of CO_2. Four characteristic consts. are involved. The same principles can be applied to all cases where an organism forms a substance which limits its activity. M. S. B.

Enzymic decomposition of sugar to carbon dioxide, alcohol, and lactic acid, with intermediate formation of triose (or triosephosphoric acid). A. N. Lebedev (Bull. Acad. Sci. U.R.S.S., 1934, 1291—1297).—Earlier work is summarised. New work on the fermentation of sucrose by distillery yeast shows the formation of triose, $AcCO_2H$, CO_2, glycerol, EtOH, and MeCHO. T. H. P.

Influence of alkali cations on the fermentation capacity of yeast. A. Lasnitzki and E. Szörényi (Biochem. J., 1935, **29**, 580—587).—The rate of anaërobic fermentation of glucose by living yeast (measured by CO_2 production) is markedly increased by RbCl or KCl (0·01*M*), less markedly by NaCl or CsCl, whilst the effect of LiCl is slight. These effects, especially with CsCl, are quantitatively somewhat variable. $MgSO_4$ or $MgCl_2$ (0·02*M*) exerted no significant effect. W. O. K.

Combined action of monochromatic light and photodynamic substances on the fermenting power of *Saccharomyces cerevisiæ*. G. Guerrini (Boll. Soc. ital. Biol. sperim., 1934, **8**, 816—820).—The stimulant and inhibitory actions of photosensitive dyes (I) on the fermenting power of *S. cerevisiæ* are augmented by monochromatic light, the augmentation increasing with λ. The actions of (I) are independent of the positions of their absorption bands. R. N. C.

Irradiation of *Saccharomyces* with monochromatic ultra-violet light. IV. Relation of energy to observed inhibitory effects. R. H. Oster and W. A. Arnold (J. Gen. Physiol., 1935, **18**, 351—355; cf. A., 1934, 1262).—Variations in the inhibition (I) of cell division of yeast irradiated with monochromatic ultra-violet light indicate, when analysed by Curie's method (A., 1929, 357), that the degree of (I) or killing is related to the no. of "quantum hits." F. O. H.

Detection of volutin in living yeast cells by neutral-red. R. Heucke and W. Henneberg (Zentr. Bakt. Par., 1934, II, **90**, 425—427).—A staining technique is described. A. G. P.

(A) Growth factor from wheat germ: extraction by lead acetate: action on a fungus. (B) Crystallised vitamin-*B* as a growth hormone for micro-organisms (*Phycomyces*). W. H. Schopfer (Arch. Mikrobiol., 1934, **5**, 502—510, 511—549).—(A) A growth-promoting substance stimulating the development of *Phycomyces* (I) is isolated from wheat germ and from rice polishings.

(B) Normal development of (I) is impossible in purely synthetic media. Addition of vitamin-B_1 induces rapid growth, which increases with the supply of N. The action of -B_1 is optimum at p_H 7·0—7·2, is unaffected by heating at 135°, but is much reduced by autoclaving with alkali. Neither -B_1 nor -B_2 affects alcoholic fermentation by *Saccharomyces cerevisiæ*. A. G. P.

Metabolism of *Fusarium lycopersici* and *F. lini*. G. Luz (Phytopath. Z., 1934, 7, 585—638).—In culture media with NH_4NO_3 as N source, growth of the organisms is marked by four phases of reaction change, viz., an initial change of p_H 3·9—3·5 characterised by the production of org. acids, followed by a phase of increasing alkalinity (to p_H 7·5) coinciding with preferential intake of NO_3-N, a third phase of slight acidification (p_H 7·5—7·2) in which intake of NH_4-N predominates, and a final stage in which, with exhaustion of sugars, the org. acids are slowly utilised and p_H rises to 8·5. The growth curve shows a point of inflexion corresponding with a decrease in ash contents of the mycelium and the completion of sugar utilisation. Subsequently EtOH is the principal source of C. The change of C source corresponds with the change of N source. Metabolic products of the organisms include volatile and non-volatile org. acids, EtOH as an intermediate product from sugars, but no aldehyde. These changes are discussed in relation to wilt disease of flax (see this vol., 554). A. G. P.

Culture methods for fungi. J. L. Harley (New Phytol., 1934, 33, 372—385).—The absorption and release of substances by fungi may involve very considerable changes in the composition of the medium. A p_H gradient is set up from the centre of the culture extending outwards. Increased alkalinity due to absorption of NO_3' from media results in pptn. of K, Mg, and PO_4''' and formation of additional HCO_3'. Intake of sugar by *Neocosmospora* is inhibited by high acidity developing in NH_4 salt media. The influence of these changes on results of biochemical and physiological investigations of fungi is considered. A. G. P.

Influence of calcium on the growth of micro-organisms. U. Stoess (Diss., Göttingen, 1932; Bied. Zentr., 1934, A, 5, 136).—An abs. need of Ca by some micro-organisms cannot always be demonstrated. Fungi which react favourably to Ca are those which are sensitive to injury by small dosages of Mg. The corrective action of Ca on Mg injury is explained by colloidal phenomena. Sr can, at least partly, replace Ca in this respect. A. G. P.

Metallic mixtures as co-catalysts of growth [of moulds]. N. Nielsen and V. Hartelius (Biochem. Z., 1935, 276, 183—185).—A mixture of the chlorides of Ba, Be, Hg, Cr, Ca, Zn, Cd, Cu, Mn, Co, and Li is a more powerful co-catalyst of growth action on *A. niger* than an HCl extract of filter-paper ash (cf. A., 1932, 661; 1933, 189, 638, 1205). The ash contains most of these metals. The metals are for the most part individually inactive. P. W. C.

Physiological action of elements on the growth of *Aspergillus niger*. (Stimulation and toxicity.) K. Pirschle (Planta, 1934, 23, 177—224).—The effects of $Li^{\cdot}$, $Na^{\cdot}$, $K^{\cdot}$, $Rb^{\cdot}$, $Cs^{\cdot}$, $NH_4^{\cdot}$, $Ba^{\cdot\cdot}$, $Sr^{\cdot\cdot}$, $Ca^{\cdot\cdot}$, $Be^{\cdot\cdot}$, $Mg^{\cdot\cdot}$, $Cu^{\cdot\cdot}$, $Cd^{\cdot\cdot}$, $Hg^{\cdot\cdot}$, $Ag^{\cdot}$, $Au^{\cdot\cdot\cdot}$, Cl', Br', I', F', ClO_3', BrO_3', IO_3', and IO_4' in various concns. on the growth and spore production of the organism are determined. A. G. P.

Importance of potassium in the metabolism of *Aspergillus niger*. A. Rippel (Arch. Mikrobiol., 1934, 5, 561—577).—In K-deficient media, *A. niger* stores NH_3 in the mycelium, produces $H_2C_2O_4$ (I) in the substrate, and exhibits a lowered sugar economy coeff. The influence of K on carbohydrate metabolism is discussed. Cultures of strains freely producing (I) contain > those producing small amounts of (I). A. G. P.

Chemistry of mould tissue. VII. Lipins of *Penicillium aurantiobrunneum*. E. H. Kroeker, F. M. Strong, and W. H. Peterson (J. Amer. Chem. Soc., 1935, 57, 354—356; cf. this vol., 255).—The mould contains ergosterol and lipins, from which by hydrolysis are obtained palmitic, stearic, oleic, and linolenic acids. R. S. C.

Production of fat by *Penicillium javanicum*, var. *Beijma*. L. B. Lockwood, G. E. Ward, O. E. May, H. T. Herrick, and H. T. O'Neill (Zentr. Bakt. Par., 1934, II, 90, 411—425).—In cultures of *P. javanicum*, the wt. of mycelium increased steadily for 60 days, but max. yields of fat (I) and max. titratable acidity in the media occurred at approx. 20 days. The optimum sugar concn. for mycelial growth was 20%, but highest (I) yields were obtained with 30% sugars. The effects of various nutrient materials and of toxic ions on the organism are recorded. Fermentative actions on a no. of sugars, org. acids, and alcohols are examined. A. G. P.

Metabolism of protozoa. I. Nitrogenous metabolism and respiration of *Bodo caudatus*. N. R. Lawrie (Biochem. J., 1935, 29, 588—598).—In cultures of *B. caudatus* (I) feeding at 25° on living resting bacteria, the rate of NH_3 formation during the first 8 hr. approx. ∝ the no. of (I) present. From about the 8th to the 26th hr. the NH_3 formation increases less rapidly or even becomes approx. const., although the nos. continue to increase rapidly. Up to the 16th—18th hr. the O_2 uptake increases ∝ the no. of (I) in the culture but it then begins to fall although the no. continues to increase. W. O. K.

Chemotherapy of protozoa. E. Fourneau (Chem. Weekblad, 1935, 32, 90—100).—A lecture. F. O. H.

Numerical distribution of micro-organisms in the atmosphere. A. S. Horne (Proc. Roy. Soc., 1935, B, 117, 154—174).—Results obtained by the plate method (chiefly in orchards) treated by Fisher's statistical procedure indicate that bacteria and fungi are distributed at random in the atm. W. McC.

Photometric studies on the multiplication of bacteria. M. Faguet (Compt. rend., 1935, 200, 498—500; cf. A., 1932, 545, 779).—The proportion

of the incident light passing through a simple optical system which is scattered by cultures of bacteria is measured by means of a photo-electric cell and gives a measure of the ρ of the bacterial population. Each strain has a different rate of multiplication, which is not significantly affected by the intensity of the light.
J. L. D.

Growth of bacteria in organic acid media. W. F. Bruce (J. Amer. Chem. Soc., 1935, **57**, 382).—Certain bacteria can use as sole source of C the Na salts of AcOH, $Pr^{\alpha}CO_2H$, $Pr^{\beta}CO_2H$, lactic, glyceric, and α-hydroxyacrylic acid, alanine, and, very feebly, glyceric, glycollic, and β-hydroxy-*n*-butyric acids, but not HCO_2H, $CH⋮C{\cdot}CO_2H$, $EtCO_2H$, α-hydroxy*iso*butyric or α-amino-*n*-butyric acid. Regularities concerning chain-length are pointed out. R. S. C.

Methionine as an impurity in natural leucine preparations. J. H. Mueller (Science, 1935, **81**, 50—51).—S determinations indicate the presence of considerable amounts of methionine in commercial leucine preps. This affects the data obtained on the growth of diphtheria bacilli. L. S. T.

Toxæmia and carbohydrate metabolism. A. B. Corkill and S. Ochoa (J. Physiol., 1934, **82**, 399—406).—Injection of young rabbits with diphtheria toxin does not appear to affect the normal breakdown of muscle-glycogen to lactic acid, but the liver is unable to resynthesise glycogen from lactate.
R. N. C.

Diphtheritic pseudoglobulin and toxin–antitoxin flocculate. L. Velluz (Compt. rend. Soc. Biol., 1935, **118**, 745—747).—The flocculate is chemically similar to pseudoglobulin. R. N. C.

Recovery of diphtheria antitoxin coagulated by the toxin by means of the sodium salts of aminonaphthalenetrisulphonic acid. H. Goldie (Compt. rend. Soc. Biol., 1935, **118**, 220—223).—Addition of $NH_2{\cdot}C_{10}H_4(SO_3Na)_3$ and citric acid to bring the p_H to 4—5, or of $NH_2{\cdot}C_{10}H_4(SO_3H)(SO_3Na)_2$, alone, to dil. antidiphtheria serum ppts. the globulins (I) together with the antitoxin (II), without destroying its neutralising power. The same salts, added to the toxin–(II) coagulate, ppt. (I) and (II), leaving the toxin in solution more or less changed, together with the albumins, part of (I), sol. N compounds and their salts. Similar results are obtained with the "anatoxin"–(II) coagulate. (II) thus recovered retains most of its activity, but its stability and its avidity for the antigen are decreased. The toxin when separated from the complex is extremely labile.
R. N. C.

Staphylococcus toxoid. D. S. Murray (Lancet, 1935, **228**, 303—306).—The amount of circulating staphylococcal antitoxin in normal cases is not greatly different from that in cases where chronic superficial lesions occur. It can readily be increased by the injection of staphylococcus toxoid. L. S. T.

***Coccidioides immitis*, Stiles. IV, V. Cultural, biochemical, pathogenic, and micromorphological characteristics *in vivo* and *in vitro* of typical and degraded strains.** R. Ciferri and P. Redaelli (Boll. Soc. ital. Biol. sperim., 1934, **9**, 961—962, 963—964). R. N. C.

Behaviour towards acids of coliform bacteria occurring on green plants. G. Ruschmann and W. Meyer (Arch. Mikrobiol., 1934, **5**, 477—501).—The effects of changes of p_H on the activity of these organisms (I) are examined with special reference to their survival during the ensilage of green fodder. In general mineral acids are less inhibitory than org. acids [except lactic acid (II)], HCl and H_3PO_4 are tolerated to p_H 4·5—5·0, HNO_3, H_2SO_4, (II), and tartaric acid to 5·0—5·5, $H_2C_2O_4$, HCO_2H, and AcOH to 5·5—6·5, and $PrCO_2H$ to 6·0—6·5. The limit of viability of (I) in (II) or AcOH is higher if the acids are of microbiological origin, *e.g.*, by fermentation of sugar or EtOH. A. G. P.

Oxidation–reduction potentials and ferricyanide-reducing activities. (A) In peptone cultures and suspensions of *Escherichia coli*. C. E. Clifton, J. P. Cleary, and P. J. Beard. **(B) In glucose–peptone cultures and suspensions of *E. coli*.** C. E. Clifton and J. P. Cleary (J. Bact., 1934, **28**, 541—560, 561—569).—(A) The oxidation–reduction potential (I) in peptone (II) cultures of *E. coli* declines during the period of rapid growth and a max. reduction potential occurs in or near the max. stationary growth period. (I) is probably the resultant of the metabolic activities of the cells.

(B) The initial fall in (I) is more marked in glucose (III)–(II) cultures. Maltose, (III), and lactose are readily oxidised by $K_3Fe(CN)_6$ in suspensions of resting *E. coli*. The ability of the organisms to use these sugars decreases with the E_h of the oxidant.
A. G. P.

Nodule bacteria of *Astragulus sinicus*, Genge. III. Fermentation of carbohydrates with special reference to the carbon and nitrogen source. A. Itano and A. Matsuura (Ber. Ōhara Inst. landw. Forsch., 1934, **6**, 341—369).—The ability of the organisms to ferment carbohydrates varied in the order, arabinose (I), xylose (II), glucose (III), galactose (IV), mannose (V) > fructose (VI), sucrose, mannitol > lactose, maltose > raffinose and dextrin. The suitability of these C sources for growth, however, was in the order, (III), (V), (VII), (II), (VI) > (I), (IV), the remainder producing no satisfactory growth. A N source is not necessary for growth but is required for fermentation, $NH_4^{\cdot}$, NO_3', and peptone being effective in this respect. A. G. P.

Cholesterol and reduced glutathione contents in the blood of rabbits immunised with typhoid bacilli. F. Murata (Sei-i-Kwai Med. J., 1933, **52**, 46—57).—Data for normal, splenectomised, and immunised rabbits are given. Ch. Abs. (*p*)

Fission by bacteria of inorganic complex salts and the use of these salts in differential media. F. Sander (Zentr. Bakt. Par., 1934, I, **132**, 465—470).—Decomposition of various complex ferrocyanides in the presence of carbohydrates is followed by colour changes in the media and serves to characterise various strains of typhoid bacteria.
A. G. P.

Sodium nitroprusside as a means of differentiating the paratyphoid group of organisms. R. Höffling (Zentr. Bakt. Par., 1934, I, **133**, 113—121).—Addition of nitroprusside to carbohydrate media permits differentiation between the principal types of the paratyphoid group in fermentation reactions. A. G. P.

Metabolism of the strict anaërobes. II. Reduction of proline by *Cl. sporogenes*. L. H. Stickland (Biochem. J., 1935, 29, 288—290).—Washed suspensions of *Cl. sporogenes* reduce *l*-proline at the expense of the oxidation of alanine to δ-amino-*n*-valeric acid. A. L.

Anaërobic decomposition of plant materials. I. Rice straw (*Oryza sativa*). C. N. Acharya (Biochem. J., 1935, 29, 528—541).—The anaërobic fermentation of rice straw yields AcOH (I), butyric acid (II), CH_4, and CO_2. The ratio CO_2/CH_4 is approx. 1, indicating that these gases are formed by the decomp. of (I) and (II), and that CH_4 is not formed by the reduction of CO_2 with H. E. A. H. R.

Products of bacterial oxidation of thiosulphate in inorganic media. R. L. Starkey (J. Gen. Physiol., 1935, 18, 325—349).—Bacteria oxidising S_2O_3'', grown in media containing inorg. salts (I) and $Na_2S_2O_3$ at p_H 7·8, yield primarily $Na_2S_4O_6$ and NaOH (increasing the p_H); secondary reactions give S_3O_6'', S_5O_6'', SO_4'', and S (decreasing the p_H of the medium). *Thiobacillus novellus* oxidises $Na_2S_2O_3$ to Na_2SO_4 and H_2SO_4, the p_H diminishing steadily with growth and oxidation; the ratio SO_4-S : assimilated C=56 : 1. With *Th. thioparus*, S is also formed (SO_4 : S=3 : 2), whilst S_2O_3-S oxidised : C assimilated=125 : 1; org. compounds are synthesised from (I). F. O. H.

Dissociation of *Mycobacterium tuberculosis*. II. K. E. Birkhaug (Ann. Inst. Pasteur, 1935, 54, 195—244).—Varieties of avian, bovine, and human tubercle bacilli differ in their assimilation of carbohydrates, resistance to the bacteriostatic action of dyes and disinfectants, cataphoretic migration, p_H of agglutination, acid-resistance, and virulence. F. O. H.

Differences between mammalian tubercle bacilli, paratubercle bacilli, and *Streptothrix*, revealed by the comparative toxicities of sulphuric and acetic acids. A. Saenz, M. Sadettin, and L. Costil (Compt. rend. Soc. Biol., 1935, 118, 215—217).—Human tubercle bacilli are destroyed by 5% AcOH, but not by 20% H_2SO_4. Paratubercle bacilli are destroyed by 10% H_2SO_4 or AcOH, whilst 5% AcOH permits very slight growth. *Streptothrix* and *Nocardia epingeri* are destroyed by 5% AcOH or H_2SO_4. R. N. C.

Microbial agglutination and lysin of bacteriophage. V. Sertic (Compt. rend. Soc. Biol., 1935, 118, 780—781).—Agglutination occurs only with the lysin-secreting bacteriophages. R. N. C.

Chemotherapy. XI. Trypanocidal titre of rabbit serum after intravenous injection of various compounds of arsenic. F. Murgatroyd, H. Russell, and W. Yorke (Ann. Trop. Med., 1934, 28, 227—242).—Arsenobenzene (I) and As^{III} compounds (II) confer an immediate and very high trypanocidal titre which ∝ the dosage. The subsequent decline is much more rapid for (II) than for (I). As^{V} compounds produce a small action, increasing steadily, but final vals. are much < those for (I) and (II). A. G. P.

Relative efficiencies of germicidal [dental] cements. T. J. Hill (J. Amer. Dental Assoc., 1934, 21, 1565—1571). Ch. Abs. (*p*)

Influence of certain quinoline derivatives on growth [of bacteria]. Fron and Monchot (Compt. rend., 1935, 200, 485—487).—8-Hydroxyquinoline (I) in concns. < 0·0005*N* (optimum concn. is 0·00005*N*) in soil causes *Azotobacter* colonies to proliferate. Concns. > 0·0005*N* retard development. Concns. of (I) which benefit the bacterial colonies do not increase the fertility of the soil because (I) is toxic. J. L. D.

Sterilising power of neutral 8-hydroxyquinoline sulphate (sunoxol) on cultures of pathogenic bacteria. A. Morel, A. Rochaix, F. Denard, L. Perrot, and C. Dessaignes (Compt. rend. Soc. Biol. 1935, 118, 257—260).—The min. toxic concns. are given for a no. of bacilli. R. N. C.

Long wave-length limit of photolethal action in the ultra-violet. A. C. Giese and P. A. Leighton (Science, 1935, 81, 53—54).—*Paramecium multimicronucleata* are vesiculated by a dosage of 33,000 ergs per mm.^{2} at 3025 Å. A dosage of 16,500 ergs per mm.^{2} kills the *Paramecia* 24 hr. after irradiation. At 3130 Å., however, no injury results from irradiation with dosages much > those which are fatal at 3025 Å. L. S. T.

Influence of ultra-violet rays on the physiological activities of *Azotobacter*. I. Lethal action on *A. chroococcum*. A. Itano and A. Matsuura (Ber. Ōhara Inst. landw. Forsch., 1934, 6, 383—392).—Exposure of the bacteria to radiation from a Hg lamp, in vessels of varying transmission rates, was injurious except in the case of brief exposures in quartz and hard glass flasks. A stimulative effect resulted in these instances. A. G. P.

Action of soft *X*-rays on bacteria. B. S. Levin and I. Lominski (Compt. rend., 1935, 200, 863—865).—Exposure of many strains of bacteria, previously cultured for 18 hr.—8 days, to soft *X*-rays during 1 sec. to 10 min. prevents their further development. Acid-resisting and sporulating bacilli are least affected, whereas Gram-negative bacilli are very sensitive. A lethal or sub-lethal dose causes morphological and cytological variations; the latter are followed by a latent period (up to 5 days) during which no development occurs. J. L. D.

Action of liver extract on blood-calcium and -phosphorus. J. A. Collazo and A. S. Ruiz (Anal. Fis. Quím., 1934, 32, 173—185).—Intramuscular injection of liver extract (I) has a "tetanogenic" effect on the serum (II) of dogs, lowering the total Ca by 3·17 mg. per 100 c.c. (normal 10·6 mg.), lowering the $Ca^{\cdot\cdot}$ by 0·039 mg. per 100 c.c. (normal 2·156 mg.), raising the P by 0·45 mg. per 100 c.c. (normal 3·07 mg.) of (II), and raising the total CO_2 by 14 vols. per 100 c.c. (normal 58 vols.) of plasma. The blood-p_H is lowered from 7·42 to 7·34. Intravenous injection of (I) has a similar effect on rabbits. F. R. G.

Detoxicating hormone of the liver (yakriton). XLIX. Effect of yakriton on a negative Arakawa reaction. L. Effect in counteracting cardiac dilation. LI. Effect on the chloride content of blood. A. Takamatsu (Tôhoku J. Exp. Med., 1934, **23**, 372—380).—XLIX. Milk from a woman inadequately supplied with vitamin-*B* gave a negative Arakawa reaction and contained a toxic substance resembling AcCHO. The latter disappeared after injection of yakriton (I) alone or supplemented with dietary vitamin-*B*.

LI. Injection of (I) maintained blood-Cl const. in rabbits despite intraperitoneal injection of 10% aq. NaCl. Ch. Abs. (*p*)

Function of nephrohormone in regulating blood- and urinary chloride. K. Ishida (J. Chosen Med. Assoc., 1934, **24**, 525—548).—Renal venous blood contains a substance (I) capable of lowering the blood-Cl in rabbits and accelerating urinary excretion of Cl. The (I) does not occur if tubules are damaged by ligation or by injection of $K_2Cr_2O_7$, but is present if only glomeruli are damaged by cantharidin. Ch. Abs. (*p*)

Relation of nephrohormone to blood-calcium. H. Miyazaki and Y. Sato (J. Chosen Med. Assoc., 1934, **24**, 1015—1026).—The renal nephrohormone decreases serum-Ca in normal and increases that of hypocalcæmic animals. Ch. Abs. (*p*)

Response of the canine and human pancreas to secretin. W. L. Voegtlin, H. Greengard, and A. C. Ivy (Amer. J. Physiol., 1934, **110**, 198—224).—Secretin is extracted from pigs' duodena with 0·4% HCl, pptd. with NaCl, extracted with EtOH, freed from proteins by isoelectric pptn. at p_H 5·4, and pptd. with $CCl_3{\cdot}CO_2H$. The dry ppt. is dissolved in HCl and impurities are pptd. with $COMe_2$ and NH_2Ph, which are then removed by evaporation and the secretin is extracted with MeOH and pptd. with Et_2O. The product contains C, H, N, and Cl (ionisable), but no S. Intravenous injection in the dog and in man produces no consistent increase in the concn. of the enzymes of the pancreatic juice, but the enzyme production per min. is almost always increased during the first 15 min. following injection. The *d* of the juice generally shows a slight increase. In man, repetition of the test on the same individual does not produce strictly const. results. R. N. C.

Glucose content of blood from the femoral artery and vein during hypoglycæmia provoked either by secretin or by incretin. J. la Barre and J. Ledrut (Compt. rend. Soc. Biol., 1935, **118**, 797—799).—In dogs injected with secretin or incretin arterial blood-sugar (I) is $>$ venous (I) throughout the hypoglycæmia; both have the same val. in controls. R. N. C.

Effect of callicrein on diuretin hyperglycæmia. H. Herling (Z. ges. exp. Med., 1934, **94**, 99—100; Chem. Zentr., 1934, ii, 2409).—Callicrein does not necessarily lower the hyperglycæmia produced by diuretin, but it checks the increase of blood-sugar under certain conditions. R. N. C.

Effect of insulin on blood-lactic acid. I. Friesz and E. Mohos (Orvosi Hetilap, 1934, **78**, 907—908).—Injection of 20 units of insulin into non-diabetic subjects was followed by a rise in blood-lactic acid, the average vals. being 8·2 mg. per 100 ml. before and 13·3 mg. 2 hr. after the injection. Nutr. Abs. (*b*)

Effect of insulin on the immediate deposition of absorbed carbohydrate and fat in the organism. H. Schur, A. Löw, and A. Krčma (Wien. Arch. inn. Med., 1934, **25**, 203—210).—Insulin favours the deposition of fat from fat or sugar, hinders the deposition of carbohydrate (I) from (I), accelerates the lowering of (I) in the liver following fat ingestion, and favours the deposition of (I) following fat in the omentum. Nutr. Abs. (*m*)

Effect of insulin on the excretion of allantoin by the normal dog. P. S. Larson and I. L. Chaikoff (J. Biol. Chem., 1935, **108**, 457—462).—Excretion of allantoin is greatly increased without alteration of urine vol. A. E. O.

Blood-sugar in "heat-stroke" under the influence of insulin. D. di Macco (Boll. Soc. ital. Biol. sperim., 1934, **9**, 1009—1010).—The hypoglycæmia produced by insulin in guinea-pigs with hyperthermia is $>$ that of control animals without insulin. R. N. C.

Muscle chemistry and insulin. S. Grzycki (Klin. Woch., 1934, **13**, 1089—1090; Chem. Zentr., 1934, ii, 2409).—Occasional muscular weakness with hæmoglobinuria in horses after prolonged exertion is improved by injection of insulin. During the attacks blood-lactic acid, sugar, and particularly creatine and PO_4''' are increased. R. N. C.

Action of insulin and adrenaline in young adrenalectomised rabbits. O. Cope and A. B. Corkill (J. Physiol., 1934, **82**, 407—413).—Young adrenalectomised rabbits injected with insulin (I) fail to show any deposition of liver-glycogen as compared with normal animals. This effect is the result of hypoglycæmic convulsions rather than of (I). Glycogen deposition occurs when adrenaline (II) and (I) are administered together, or (II) alone, in absence of cortical deficiency. R. N. C.

Destructive action of erythrocytes on insulin. F. Rosenthal, I. Friedheim, and R. Nagel (Klin. Woch., 1934, **13**, 1121—1124).—Insulin is inactivated by hæmolysed erythrocytes (I) but not by plasma or stroma. (I) lose this power on heating for 1 hr. at 70°. Nutr. Abs. (*m*)

Biological standardisation of adrenal cortex hormone. C. Bomskov and K. Bahnsen (Arch. exp. Path. Pharm., 1935, **178**, 1—14).—Adrenal cortex preps. are standardised by their action on the survival period of young adrenalectomised mice (7—11 g. in wt.), a "corticodynamic mouse-unit" being defined as the min. dose necessary to maintain the survival of 80% of such mice for 8 days after 7 daily injections. The average error is ±25, 20, and 15% when 5, 10, and 35 mice, respectively, are used. Fresh ox adrenal glands (1 kg.) yield 40·5 mg. of a prep. (method of Swingle and Pfiffner; B., 1933, 205) which on purification by repeated extraction from aq.

solution by Et_2O and *vice versa* at various [H˙] affords a prep. of which 2×10^{-5} g. is a mouse-unit.
F. O. H.

Standardisation of extracts of the adrenal cortex. R. Mendez (Quart. J. Pharm., 1934, **7**, 641—644).—The mortality in adrenalectomised rats varies so largely that it is impossible to use the survival period after injecting cortical extract (I) as a basis for standardisation. Injection of an active (I) maintains the life of orchidectomised and adrenalectomised rats, the mortality among which is normally 100%. A. E. O.

Relation of the adrenal cortical hormone to vitamin-B_1, -C, and -B_2. W. M. Firor and A. Grollman (Amer. J. Physiol., 1934, **109**, 35).—Removal of the ascorbic acid (I) present in adrenal cortical preps. did not influence their life-prolonging effects on adrenalectomised animals, and such effects were not produced by (I) alone. The adrenal cortical hormone had no activity in experimental avitaminosis-B_1 or -B_2 of rats. Nutr. Abs. (*b*)

Adrenal cortex hormone (cortin) and sex apparatus. J. Freud and F. Oestreicher (Acta Brev. Neerl. Physiol., 1933, **3**, 82—83; Chem. Zentr., 1934, ii, 2407).—Injection of cortin (I) together with the anterior pituitary sex hormone (II) produces a more marked growth of the preputial glands (III) than (II) alone. The (III) : seminal-vesicle wt. ratio is altered in favour of (III) by (I) or (II), and to a higher degree by the two combined. R. N. C.

Behaviour of adrenalectomised rats with and without cortin in a running-wheel. R. Kooy (Acta Brev. Neerl. Physiol., 1933, **3**, 114—115; Chem. Zentr., 1934, ii, 2408).—The performance of adrenalectomised rats in the running-wheel is increased considerably within 24 hr. by injection of cortex extract; the increase ∝ the amount injected.
R. N. C.

Adrenalinuria (Viale reaction) in physiological conditions. F. Domenici (Boll. Soc. ital. Biol. sperim., 1934, **9**, 908—910).—In normal subjects adrenaline is present in fresh urine in small concns., but disappears on keeping 72 hr. R. N. C.

Comparative action of adrenaline and *p*-*l*-sympatol. B. Behrens and H. Taeger (Arch. exp. Path. Pharm., 1935, **178**, 64—85).—An investigation of the pharmacology of adrenaline and "sympatol" (β-hydroxy-β-*p*-hydroxyphenylethylmethylamine) indicates that the dissimilarity is not so marked as claimed by Kuschinsky (A., 1931, 120), the difference being qual. and not quant. F. O. H.

Action of adrenaline on serum-potassium. J. L. d'Silva (J. Physiol., 1934, **82**, 393—398).—Injection of adrenaline in cats causes a rapid increase in serum-K (I) followed by a more prolonged fall to a val. < normal. The effect is unaltered by anæsthetisation or decerebration. Posterior pituitary extract, $BaCl_2$, and hæmorrhage produce similar effects. The effect of adrenaline is abolished by ergotoxine, but not by atropine. Sympathetic stimulation raises (I) if the adrenals are not already exhausted. Ephedrine produces a marked but delayed increase, and acute asphyxia and Et_2O are also effective. Intravenous injection of KCl or K gluconate increases (I), which, however, rapidly returns to normal. The fall of (I) below normal is nearly abolished after pancreatectomy. R. N. C.

Action of adrenaline on serum-potassium. H. Schwarz (Arch. exp. Path. Pharm., 1935, **177**, 628—634).—Injection of adrenaline (0·09—0·24 mg. per kg. of body-wt.) into rabbits increases the serum-K, the effect being inhibited by curare or ergotamine.
F. O. H.

Significance of the augmented adrenaline liberation by piqûre for the fluctuation of blood-sugar and of mean blood-pressure, simultaneously occurring. M. Wada and T. Kaiwa (Tôhoku J. Exp. Med., 1934, **23**, 556—577).—Piqûre hyperglycæmia is attributed to a combination of two processes, (*a*) an output of adrenaline (I) from the adrenals, and (*b*) a sugar output, independent of (I), caused by nerve impulses travelling in the splanchnics, probably to the liver. Nutr. Abs. (*m*)

Assay of parathyroid hormone by magnesium sulphate. A. Simon (Arch. exp. Path. Pharm., 1935, **178**, 57—63).—A method based on the diminution of toxicity of subcutaneously injected $MgSO_4$ in mice following administration of parathyroid hormone is described (cf. A., 1927, 380). F. O. H.

Effect of parathormone on basal metabolism of normal dogs. I. E. Steck, D. S. Miller, and C. I. Reed (Amer. J. Physiol., 1934, **110**, 1—3).—The metabolic rate is not increased by large doses of parathormone as it is by viosterol. R. N. C.

Effects of hypercalcæmia produced by parathyroid hormone and irradiated ergosterol on the activity of the cerebral cortex by means of conditioned reflexes. L. Andreyev and L. A. Pugsley (Quart. J. Exp. Physiol., 1934, **24**, 189—206).—The hypercalcæmia caused exaggeration of the inhibitory process. The effect is dispelled by caffeine.
Ch. Abs. (*p*)

Effect of irradiated ergosterol and parathormone on blood-phosphorus. J. F. Sykes, N. B. Taylor, and C. B. Weld (Amer. J. Physiol., 1934, **109**, 104—105).—The rise in the total and inorg. P in the blood and serum of dogs is greater after administration of irradiated ergosterol than after dosage with parathormone (I). In the former case it accompanies, and in the latter follows, the rise in serum-Ca. The primary effect of (I) is not on P metabolism.
Nutr. Abs. (*m*)

Thyro-parathyroidectomy and diffusible calcium of serum. C. Roersch (Compt. rend. Soc. Biol., 1935, **118**, 809—811).—Thyro-parathyroidectomy in dogs produces a lowering of total and ultrafilterable blood-Ca, but the diffusible : colloidal Ca ratio is increased. R. N. C.

Action of thyroid extract on the respiration of tissues of invertebrates. R. Ashbel (Nature, 1935, **135**, 343).—Thyroid extract largely increases the O_2 consumption (I) of organs of various invertebrate animals. Comparative figures are given for the eggs of *Bombyx mori*, Crustaceæ, Mollusca, and the ovaries of Echinoderma and Tunicata. Synthetic thyroxine has no effect on (I). L. S. T.

Efficacy of various thyroid preparations. I. I. Abelin (Arch. exp. Path. Pharm., 1935, 177, 359—366).—Administration to rats of various thyroid preps. (dried gland, iodothyroglobulin and its fractions, etc.) containing the same amount of thyroxine (I) produces metabolic disturbances differing in type and degree. The variation is probably due to non-(I) substances containing I which, although themselves inactive, influence the action of (I). F. O. H.

Action of thyroid activation on the iodine economy of thyroid tissue. H. Paal (Arch. exp. Path. Pharm., 1935, 177, 367—378).—Activation of rabbit's thyroid tissue *in vitro* (A., 1934, 222) by anterior pituitary prep. (I) increases the EtOH-sol. (II) at the expense of the EtOH-insol. fraction (III). With repeated subcutaneous injection of (I), the I content of the thyroid gland (IV) decreases, whilst (II) increases until it approximates to (III). Freezing of active (IV) diminishes the ability to liberate inorg. I, whilst frozen resting (IV) is no longer activated by (I). Thyroxine also induces *in-vitro* liberation of inorg. I from resting (IV) and from (IV) activated *in vivo* by (I). The correlation between liberation of inorg. I and activation of (IV) is discussed. F. O. H.

Action of thyroxine on the metabolism of cold-blooded vertebrates. E. Drexler and B. von Issekutz, jun. (Arch. exp. Path. Pharm., 1935, 177, 435—441).—The production of sugar by the liver of frogs before and after adrenaline administration is not influenced by treatment with thyroxine (I). Neither (I) nor thyrotropic hormone increases the metabolic rate of frogs, turtles, or fish. F. O. H.

Site of thyroxine action. B. von Issekutz and B. von Issekutz, jun. (Arch. exp. Path. Pharm., 1935, 177, 442—449).—With narcotised [urethane or luminal (I)] cats, administration of thyroxine (II) increases the respiration, temp., and basal metabolism within a few hr. With deep (I) narcosis, decapitation, or cervical section of the spinal cord, (II) is without action, whilst section at the first or second dorsal vertebra does not produce inhibition. Hence the site of (II) action is the temp.-regulating centre in the mid-brain. F. O. H.

Effect of thyroxine on the tissue metabolism of excised frog heart. J. E. Davis, E. da Costa, and A. B. Hastings (Amer. J. Physiol., 1934, 110, 187—190).—Perfusion of the intact heart for prolonged periods with citrated Ringer's solution containing thyroxine (I) causes a rise in metabolism, whereas without (I) it falls. The effect is not shown by sliced heart. R. N. C.

Action of thyroxine on pancreatic amylase, lipase, and trypsin. G. Scoz (Boll. Soc. ital. Biol. sperim., 1934, 9, 971—973).—Amylase is reduced by 80%, lipase by 40—50%, and tryptic activity approx. 30% by thyroxine. There is apparently no relation between variations of enzyme activity and of wt. R. N. C.

Action of thyroxine on the dog's plasma-phosphatase power. G. Scoz and P. L. Marangoni (Boll. Soc. ital. Biol. sperim., 1934, 9, 973—976).—Plasma-phosphatase is raised to 2—3 times the normal val. by injection of thyroxine. It returns to normal in approx. 8 days. R. N. C.

Action of thyroxine on the rat's bone-phosphatase. G. Scoz and P. L. Marangoni (Boll. Soc. ital. Biol. sperim., 1934, 9, 969—971).—The phosphatase is increased approx. 33% in rats treated with thyroxine, the increase being of the same order in presence or absence of Mg. R. N. C.

Action of thyroxine on the weight of the internal organs in the rat. G. Scoz (Boll. Soc. ital. Biol. sperim., 1934, 9, 837—839).—The wet and dry wts. of the organs are increased by thyroxine. H_2O is increased in the spleen and muscles, but diminished in the liver and kidneys. R. N. C.

Percentage of nitrogen in tissues in the rat treated with thyroxine. P. L. Micheli (Boll. Soc. ital. Biol. sperim., 1934, 9, 978—980).—The % of N in the liver, kidney, spleen, and muscles is generally increased by thyroxine. R. N. C.

Effect of hormones on reduced glutathione in tissues and blood. J. Vilar, A. Munilla, and J. Silveira (Compt. rend. Soc. Biol., 1934, 116, 1206—1208).—Injection of thyroxine in rabbits raised the reduced glutathione (I) content of the myocardium (II), thyroid (III), and blood (IV), and lowered that of the lung (V) tissue. Parathormone increased the (I) in all tissues. Adrenaline caused increases in (II), voluntary muscles, and (IV). Insulin increased (I) in muscles and slightly lowered the amounts in (III), (V), kidneys, and (IV). Ch. Abs. (*p*)

Influence of various hormones on intestinal absorption. I. Sodium chloride solution. II. Glucose solution. S. Isawa (J. Chosen Med. Assoc., 1934, 24, 603—618, 1037—1047).—I. Absorption of 0·9% NaCl solution is temporarily reduced by injection of thyroxine (I), accelerated and subsequently much retarded by insulin (II), accelerated by adrenaline (III), and unaffected by pituglandol (IV). The blood-Cl level and rate of absorption of Cl are unrelated.

II. Absorption of 5% glucose solution is accelerated by (I), temporarily retarded by (IV), and by (II) (which accelerates in cases of hypoglycæmia) and (III). Ch. Abs. (*p*)

Effects of various endocrine products and vegetative nerve poisons on the liver function. H. Kurokawa (Sei-i-Kwai Med. J., 1934, 53, 1—45).—Liver function in rabbits, as determined by the urinary urobilinogen and urobilin and the serum-bilirubin, was affected most by insulin, followed, in order, by adrenaline, pituitrin, thyroxine, pilocarpine, eserine, hypophorin, ergotoxine, and atropine. Ch. Abs. (*p*)

Changes in the chlorine ions of blood-serum under the influence of the thyroid and pituitary. V. Bergauer, J. Boucek, and V. Podrousek (Compt. rend. Soc. Biol., 1935, 118, 281—284).—Addition of aq. thyroid extract (I) to fresh serum diluted with 0·9% NaCl in a HgCl electrode produces a fall of potential that increases with the amount of (I) added, indicating a desorption of NaCl from the protein micelles into the solution. When (I) concn. reaches 1—2%, desorption ceases through establishment of equilibrium. Pituitary extract produces an analogous rise of potential through adsorption, whilst prolan gives variable results.

R. N. C.

Thyrotropic hormone and basal metabolism. F. Zajic (Compt. rend. Soc. Biol., 1935, **118**, 273—276).—Injection of normal dogs, and dogs the basal metabolism (I) of which had been previously increased by feeding with thyroid (II), with thyrotropic hormone (III) produces a considerable rise in (I), which falls below normal after cessation of the injections. Resumption of injections in the dogs with artificially raised (I) accelerates the fall. Injection of thyroidectomised dogs with (III) does not affect (I), even when (I) has been kept normal by (II) feeding. Hence the effect of (III) on (I) is indirect through (II). R. N. C.

Effect of thyrotropic hormone on serum-cholesterol. L. I. Pugsley (Biochem. J., 1935, **29**, 513—516).—Injection of thyrotropic hormone extract (I) into rats and dogs leads to a decrease in the serum-cholesterol (II) level followed by a subsequent recovery. The curve obtained has a reciprocal relationship to the basal metabolic rate curve of rats receiving injections of (I). A thyroparathyroidectomised–hypophysectomised dog showed no significant decrease in (II) after injection of (I).

E. A. H. R.

Effect of the ovary on the secretion of the thyrotropic hormone. A. Loeser (Klin. Woch., 1934, **13**, 766—767; Chem. Zentr., 1934, ii, 2240).—Ovariectomy in young guinea-pigs raises the thyrotropic hormone content of the pituitary. The thyroid undergoes histological alteration. R. N. C.

Origin of the hypoglycæmia provoked by the thyrotropic hormone of the anterior pituitary. E. Zunz and J. la Barre (Compt. rend. Soc. Biol., 1935, **118**, 794—797).—The thyrotropic hormone (I) does not produce hypoglycæmia in thyroidectomised dogs. The increased insulin secretion (II) produced by (I) in normal dogs is not inhibited by vagotomy. Hence (I) stimulates (II) through the thyroid.

R. N. C.

Inhibition of thyroid action by the metabolic hormone of anterior pituitary gland. I. Liver-glycogen. H. Magistris (Arch. exp. Path. Pharm., 1935, **178**, 15—26).—Anterior pituitary preps. ("orophysin") contain a H_2O-sol. anti-thyroid principle (I) which produces a return to normal of the diminished liver-glycogen due to thyroid administration (cf. A., 1933, 1086). (I) occurs in the blood, being liberated by the action of thyroid preps. or thyroxine. The nature and relation to other hormones of (I) are discussed. F. O. H.

Effect of the anterior pituitary growth hormone on protein metabolism. N. K. Schaffer and M. Lee (J. Biol. Chem., 1935, **108**, 355—371).—During the treatment of rats with anterior pituitary growth hormone, free NH_2-acids (I), peptide (I), urea (II), and non-protein-N decreased in the whole carcase (III), liver (IV), and muscle: the amounts were > could be accounted for by retention of H_2O. In hypophysectomised rats, there was a decrease in body-protein ∝ the time after hypophysectomy; in (III), free (I) and (II) plus NH_3 increased, and in (IV), free (I) decreased, and (II) plus NH_3 increased.

H. G. R.

[Fat] metabolism hormone of the pituitary. M. Orrù (Boll. Soc. ital. Biol. sperim., 1934, 9, 1055—1057).—Rabbits injected with dried pituitary show an intense hyperketonæmia (I); the increase with prolan is much smaller. The increase on injection of pregnancy urine is variable. Rats show (I) when injected with pregnancy serum, or repeatedly with pregnancy blood. R. N. C.

Action of pituitary extracts on the ketone content of blood. G. Leiner (Z. ges. exp. Med., 1934, 94, 84—93; Chem. Zentr., 1934, ii, 2406).—The hypolipæmic "lipoitrin" (I) lowers blood-ketones (II) in the dog. The hyperketonæmic "orophysin" (III) does not affect blood-fat (IV) or (II) in the dog. (III) sometimes increases (II) in rabbits, but does not affect (IV). (I) and (II) are thus two non-identical active substances the hormonal character of which has not been established. R. N. C.

Repair of the reproductive system of hypophysectomised female rats by combinations of a pituitary extract (synergist) with pregnancy-prolan. H. M. Evans, R. I. Pencharz, and M. E. Simpson (Endocrinol., 1934, **18**, 601—606).—The effect of prolan and the pituitary synergist on the ovaries of hypophysectomised female rats is as great as on normal rats. R. N. C.

Maintenance and repair of the reproductive system of hypophysectomised male rats by pituitary synergist, pregnancy-prolan, and combinations thereof. H. M. Evans, R. I. Pencharz, and M. E. Simpson (Endocrinol., 1934, **18**, 607—618).—The testes of male hypophysectomised rats injected with prolan (I), pituitary synergist (II), or the two combined (III) for 10—20 days after operation continue to grow, those of animals receiving (III) or (II) reaching the normal wt. range. Injections 40 days after hypophysectomy produce a repair of the seminiferous tubules, though (II) does not affect the interstitial tissues or the seminal vesicles; (I) produces a repair of these and an increase in Leydig tissue.

R. N. C.

Action of pituitary extracts in castrates. (Difference between gonadotropic urine extracts.) J. Freud (Acta Brev. Neerl. Physiol., 1933, 3, 84—86; Chem. Zentr., 1934, ii, 2541).—Injection of anterior pituitary extract simultaneously with male or female hormone in young and growing castrated human subjects essentially strengthens the effect of the male hormone on the preputial glands and of menformone on the seminal vesicles.

R. N. C.

Difference between the effects of gonadotropic (early pregnancy) urine and anterior pituitary extracts. J. Freud (Acta Brev. Neerl. Physiol., 1933, 3, 101—102; Chem. Zentr., 1934, ii, 2542).

R. N. C.

Œstrogenic gonadotropic substance of the anterior pituitary of the guinea-pig. A. Lipschütz and E. Vinals (Compt. rend. Soc. Biol., 1935,

118, 229—230).—The anterior pituitary of the guinea-pig has no œstrogenic action on young ovariectomised female rats. The œstrogenic action on normal rats is not diminished by preliminary extraction with Et_2O, and is hence due to an Et_2O-insol. gonadotropic hormone similar to the follicular and luteinising hormones. R. N. C.

Pituitary changes in severe atrophy and fibrosis of the testicles. W. Berblinger (Endokrinol., 1934, **14**, 73—85; Chem. Zentr., 1934, ii, 2541).—The anterior pituitary, in primary atrophy of the testicles, shows the same changes as in castration. Since the interstitial cells of the atrophied testicles increase in no., they cannot be the chief source of the male hormone. R. N. C.

Nature of the gonadotropic hormone found in the urine of a case of teratoma testis. R. J. Main and S. L. Leonard (Endocrinol., 1934, **18**, 629—632).—The urine contains folliculin, but no luteinising hormone. It resembles pregnancy urine in not producing indefinite enlargement of the ovaries. R. N. C.

Fate of prolan injected into the rabbit. A. Lipschütz, A. Fuente-Alba, and T. Vivaldi (Compt. rend. Soc. Biol., 1935, **118**, 226—229).—The curve of disappearance of prolan from the blood is logarithmic. R. N. C.

Prolan and yeast metabolism. M. Reiss, L. Schwarz and M. Gothe (Endokrinol., 1934, **14**, 257—260; Chem. Zentr., 1934, ii, 2542).—Highly purified prolan preps. increase respiration and fermentation of yeast. The effect is probably due to a metabolically active substance (Euler's "*Z* factor") associated with prolan. R. N. C.

Sex hormone and mucosa separation in the genital apparatus. S. E. de Jongh (Acta Brev. Neerl. Physiol., 1933, **3**, 112—113; Chem. Zentr., 1934, ii, 2404).—Menformone (I) produces considerable alterations in the epithelium of the seminal vesicles of young castrated male mice, which become thickened, the extra layers separating after cessation of the action of (I). R. N. C.

Does follicle-juice contain, besides menformone, a substance influencing metabolism? E. Dingemanse and S. E. de Jongh (Acta Brev. Neerl. Physiol., 1933, **3**, 79—81; Chem. Zentr., 1934, ii, 2405).—The effect of menformone-free follicle-juice extract on the development and growth of tadpoles is not different from that of serum. R. N. C.

Lactation inhibition. S. E. de Jongh (Acta Brev. Neerl. Physiol., 1933, **3**, 88—90; Chem. Zentr., 1934, ii, 2405).—Menformone (I), injected into suckling rats, inhibits lactation. Injection of gonadotropic extract (II) produces the same effect, even if the mother has been castrated after littering. Hence the action of (II) is not due to stimulation of (I) secretion. R. N. C.

Site of the action of menformone on the lacteal gland. S. E. de Jongh (Acta Brev. Neerl. Physiol., 1933, **3**, 99—100; Chem. Zentr., 1934, ii, 2405).—Menformone in a lacteal transplant produces variable outgrowth of the ducts, and formation of a secretion is always observed. R. N. C.

Protein nature of prolactin and follicle-stimulating hormones. R. W. Bates, O. Riddle, and E. L. Lahr (Proc. Soc. Exp. Biol. Med., 1934, **31**, 1223—1224).—Both substances are destroyed by trypsin at 37° and p_H 8·0. Ch. Abs. (*p*)

Effect of injections of pregnancy urine on the magnesium, calcium, and phosphorus of the blood. F. Guercio (Boll. Soc. ital. Biol. sperim., 1934, **9**, 1057—1060).—Blood-Mg is increased 50% of the initial val. in 10—12 days. The effect is not altered by preliminary administration of Mg, which is excreted in the urine. Ca is unaffected, whilst P shows a small increase, due possibly to P in the pregnancy urine, and to its acidity, which disturbs PO_4''' equilibrium. R. N. C.

Hormones in the urine following oophorectomy during pregnancy. H. Allan and E. C. Dodds (Biochem. J., 1935, **29**, 285—287).—No change in the anterior-pituitary hormone content of the urine is caused by bilateral oophorectomy. The œstrone content of the urine is decreased. A. L.

Experimental uterus growth by ovarian hormone. M. Borst (Endokrinol., 1934, **14**, 85—87; Chem. Zentr., 1934, ii, 2541).—Castrated rabbits repeatedly injected with ovarian hormone show a conspicuous uterine growth. R. N. C.

Effect of the corpus luteum on basal exchange. O. Riml and E. Engelhart (Klin. Woch., 1934, **13**, 735—736; Chem. Zentr., 1934, ii, 2240).—The O_2 consumption of adult female rabbits, served with a sterile buck to produce apparent pregnancy, falls to a min. (24% of the normal val.) in 9—12 days, and rises again to normal in 15—22 days. This effect is due to association of the corpus luteum and the thyroid, and the resultant effect on the carbohydrate metabolism of the liver. R. N. C.

Biological properties of equilin. K. David and S. E. de Jongh (Biochem. J., 1935, **29**, 371—377).—Equilin (A., 1932, 433) is fully as active as œstrone, and is not an undesirable contaminant when present in commercial œstrogenic preps. A. E. O.

Isolation of androstanone from the neutral products of the oxidation of cholestane. E. Fernholz and P. N. Chakravorty (Ber., 1935, **68**, [*B*], 353—354).—The neutral products of the oxidation of cholestane (I) are treated with $COMe_2$ to remove unchanged (I). The residue after treatment with $NH_2\cdot CO\cdot NH\cdot NH_2$ affords androstanone, m.p. 121° [semicarbazone, m.p. 275 (decomp.)], which is physiologically active. H. W.

Function of the pineal body. W. Saphir (Endocrinol., 1934, **18**, 625—628).—Implantation of human pineal gland into white mice does not inhibit the sex cycle, nor show gonadotropic effect in infantile mice. It does, however, produce œstrus in castrated female mice, each pineal gland containing 2—3 mouse-units of œstrogenic hormone. R. N. C.

Oxytocic hormone of the posterior lobe of the pituitary gland. V. Recognition as an oxidation–reduction system. VI. Action of oxidising and reducing agents. J. M. Gulland and S. S. Randall (Biochem. J., 1935, **29**, 378—390, 391—396).—The oxytocic activity of the hormone (I) (see A., 1932, 655) falls to ½ the normal val. when (I) is reduced by H_2S, and also [but this time with partial destruction or adsorption of (I)] when reduced by H_2, catalytically or electrolytically. (I) reduced by H_2S is completely reactivated by oxidised methylene-blue, and partly and temporarily reactivated by air, or by removal of H_2S anaërobically. (I) contains a redox system having E_0' +0·025 volt at p_H 6, the activity being 100% when this is oxidised and 50% when reduced. At potentials between −0·1 and −0·25 volt, in presence of suitable indicators, the activity again increases from 50 to 100%, possibly due to the presence of a second reducible group.

VI. Na_2SO_3, NaCN, and Cl_2 inactivated (I) completely and irreversibly. Aq. I also inactivates, but SO_2, HCN, and H_2O_2 all bring about a temporary decrease in activity (II), followed by reactivation and finally by a second decrease in (II).
A. E. O.

Effect of oxytocin and vasopressin on the action of insulin. M. R. GURD (Quart. J. Pharm., 1934, 7, 661—671).—The anti-insulin effect of vasopressin (I) is approx. twice that of oxytocin (II). The effect of (I) in diminishing the hyperglycæmic action of adrenaline is also > that of (II).
A. E. O.

Effect of posterior pituitary extract and thyroxine on the water, sodium, and chlorine contents of the tissues. F. G. DIETEL and H. DITSCH (Klin. Woch., 1934, 13, 1174—1177; Chem. Zentr., 1934, ii, 2407).—Guinea-pigs injected daily for 10 days with 6 Voegtlin units of pituitrin show a storage of NaCl in the muscles and liver, but not in the skin; Na storage is not always accompanied by H_2O storage. Simultaneous administration of thyroxine wholly or partly inhibits this separation.
R. N. C.

Metabolism apparatus (pituitrin, histamine). I. E. UYLDERT (Acta Brev. Neerl. Physiol., 1933, 3, 103—104; Chem. Zentr., 1934, ii, 2415).—CO_2 production in rats was decreased by injection of pituitrin (I) (0·5—3·0 units), pitressin, pitocin (2—2·5 units), or histamine (II). Simultaneous injection of (I) and (II) effects no change. A. G. P.

Relation between pituitary and products of internal secretions as reflected in reduced glutathione contents of blood. H. KAWAI (Sei-i-Kwai Med. J., 1934, 53, 104—133).—Hypophysectomised dogs (I) had lowered reduced glutathione (II) contents in blood. Subcutaneous injection of pituitrin or oöphormin into normal or (I) increased (II), especially in (I). Insulin produced the opposite effect. Antuitrin, pituglandol, and thyroxine decreased (II) in normal and increased this in (I). Effects of adrenaline are less accentuated.
CH. ABS. (*p*)

Hormones of the pituitary of the infantile rat. O. SWEZY (Endocrinol., 1934, 18, 619—624).—Implants into adult hypophysectomised male rats of pituitaries from male rats 1—13 days old have no effect on the testes, but those from day-old rats implanted into normal rats 21 days old produce effects equal to those from adult pituitaries. Hence the pituitary of the infantile rat contains no maturity hormone, but a factor that can stimulate the adult pituitary to increased hormone production.
R. N. C.

Effect of intensive *X*-ray irradiation of the pituitary on blood-magnesium and magnesium exchange. L. CANNAVÒ and R. BENINATO (Boll. Soc. ital. Biol. sperim., 1934, 9, 804—808).—Destruction of the rabbit's pituitary by *X*-rays produces a fall of blood-Mg, which remains low until death. Blood-PO_4''' is also decreased, but Ca is unaffected. Mg excretion in urine and fæces is also considerably reduced, PO_4''' less so, whilst Ca excretion scarcely varies. R. N. C.

Vitamin synthesis. O. BAUER (Pharm. Zentr., 1935, 76, 129—136).—A review.

Vitamin-*A* content of carrot varieties. N. N. IVANOV and M. A. SMIRNOVA (Bull. Appl. Bot. Leningrad, 1934, Suppl. 67, 53—64).—Red carrots were richest as a source of vitamin-*A*, yellow were less rich, and white almost valueless.
NUTR. ABS. (*b*)

New crystalline derivatives of vitamin-*A*. K. KAWAKAMI (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1935, 26, 77—81).—The Ac derivative of the biosterol (I) from the liver oil of *Theragra chalcogramma* with maleic anhydride in C_6H_6 at 80° (CO_2 atm.) affords *acetylsukesoic acid anhydride*, $C_{30}H_{36}O_8$, m.p. 261—262°, and that from *Stereolepis ishinagi* gives the isomeric *acetylishingiic acid anhydride*, m.p. 221—222°. The Bz derivative of (I) (from cod-liver oil) gives *benzoylsukesoic acid anhydride*, m.p. 263—264°, and fractional distillation of the hydrogenation product of (I) affords *hydrovitamin*-A, $C_{20}H_{38}O$, b.p. 190—192°/7 mm. (isolated as its H phthalate).
J. W. B.

Crystalline derivative of vitamin-*A*. S. HAMANO (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 26, 87—90).—The liver oil of *Stereolepis ishinagi* with maleic anhydride (I) in C_6H_6 at 90—100° (CO_2 atm.) affords *palmitylvitamin*-A *dimaleic anhydride adduct* (II), $C_{44}H_{64}O_8$, m.p. 220°, hydrolysed by dil. alkali to palmitic acid and the lactone acid, $C_{28}H_{36}O_8$, also obtained by hydrolysis of the similar adduct, m.p. 262° (cf. preceding abstract), of acetylvitamin-*A*, prepared from the active prep. of (III) previously obtained (this vol., 260). (II) is synthesised by addition of (I) to the palmitate of vitamin-*A* (III) [prepared from (III) and palmityl chloride in C_6H_6–C_6H_5N]. (III) is therefore present as its palmitate in ishinagi-liver oil. J. W. B.

Influence of administration of yeast on hypervitaminosis-*A* in young rats. A. KANTER (Klin. Woch., 1934, 13, 1157; Chem. Zentr., 1934, ii, 2544).—Pressed yeast contains a heat-resistant factor which inhibits the decline in wt., but has no effect on other symptoms, of hypervitaminotic rats.
A. G. P.

Vitamin-*A* deficiency in turkeys. W. R. HINSHAW and W. E. LLOYD (Hilgardia, 1934, 8, No. 9, 281—304).—General effects of vitamin-*A*-deficient diets on young turkeys and chicks are compared. The -*A* requirement of the former is approx. double that of the latter. A. G. P.

(A) Extraction of vitamin-*B*. (B) Simplified method for preparing lactoflavin and its growth effect. (C) Possible rôle of thiol group in vitamin-B_2 deficiency. S. ITTER, E. R. ORENT, and E. V. McCOLLUM (J. Biol. Chem., 1935, 108, 571—577, 579—583, 585—594).—(A) Vitamin-*B* (I), extracted from yeast with 4*N*-HCl in MeOH, was just as active as yeast in its growth response (II) in (I)-deficient rats. The residue from the extraction was inactive. The extract contained a high % of total solids, but only traces of Na, Ca, and Mg. The solubility of (I) in the MeOH–HCl was not due to the presence of H_2O, nor was a saturated solution of MeCl in MeOH able to extract (I) from yeast.

(B) Lactoflavin (III) was prepared by extraction of dry whey powder with boiling EtOH; lactose was removed by chilling and vitamin-B_2 (IV) adsorbed with fuller's earth (V). After elution with C_5H_5N–MeOH–H_2O colloidal (V) was pptd. with MeOH and other impurities with $COMe_2$. (III) was pptd. from the conc. residue by EtOH. Picric acid did not produce a ppt. on addition to a solution of (III) prepared in this way. A daily dose of 0·1 mg. of (III) produced a (II) in (IV)-deficient rats.

(C) The ·SH content of blood and liver of (IV)-deficient rats was < that of controls; addition of autoclaved yeast, cystine (VI), and glutathione (VII) to the diet restored only the liver vals. to normal; adrenalectomy was without influence on the blood-(VII) of dogs and anterior pituitary extract failed to increase the liver-(VII) of rats. (IV)-deficient rats showed a (II) with doses of (VI), (VII), and (III), whilst their alopecia was cured only by (VI) and (VII). H. D.

Effect of deficiency of vitamin-*B* complex on the oxido-reduction system in the eye-lens. S. N. RAY, P. GYÖRGY, and L. J. HARRIS (Biochem. J., 1935, 29, 735—740).—The indophenol-reducing capacity (I) of a single rat lens is determined by a back titration method described (error ±10%). In rats kept on diets deficient in various constituents of the vitamin-*B* complex (I) is greatly diminished: in extreme cases (I) disappears and ascorbic acid is oxidised by extract of the lens. The diminished (I) appears to be due to a factor (II) not identical with vitamin-B_1, -B_2, -*A*, or -"*H*." (II) occurs in large amount in raw egg-white, which has marked prophylactic and curative properties. W. McC.

Vitamin-*B*-sparing action of fat. H. G. K. WESTENBRINK (Acta Brev. Neerl. Physiol., 1933, 3, 95; Chem. Zentr., 1934, ii, 2411).—Symptoms of polyneuritis appeared later in pigeons receiving a high-fat diet than in those with a fat-free ration. A. G. P.

Sparing action of fat on vitamin-*B*. VIII. Loss of vitamin-*B* from the rat's tissues. H. M. EVANS and S. LEPKOVSKY (J. Biol. Chem., 1935, 108, 439—455).—In growing rats, fat appears to exert a measurable sparing action on the vitamin-*B* (I) content of the tissues [especially on the (I) content of the muscles of rats reared without (I)] by decreasing the amount of (I) dissipated in metabolism. The greatest initial withdrawal of (I) takes place in the liver. (I) avitaminosis has no great effect on total blood-fat, or on the fat in the heart, but a correlation exists between heart- and blood-fat contents. With a (I)-free diet poor in fat, the I val. of the heart-fat and the total sterol of the blood-fat are both high. A. E. O.

Relationship between the *B*-vitamins and the protein, fat, and carbohydrate content of the diet. P. VOGT-MØLLER (Diss., Levin & Munksgaard, Copenhagen, 1934, 165 pp.).—In mice receiving standard diet [modified to yield food rich in carbohydrate (I), protein (II), or fat], dried yeast as a source of the vitamin-*B* complex, and a modified tikitiki extract, freed from -B_2, as a source of -B_1 and -B_4, -B_1+-B_4 bears a quant. relation to the (I) content of the diet, and -B_2 bears a similar relationship to the fat content and probably also to (II). With a high fat diet relatively less -B_1 is required than when mice are fed on a balanced ration or on a high-(I) diet. Blood-sugar vals. show no significant change in avitaminosis-*B*. Feeding of thyroid gland (III) to mice on vitamin-B_1-deficient diets shortens the time of survival. The effect ∝ the amount of (III) given. NUTR. ABS. (*m*)

Crystalline vitamin-B_1. H. W. KINNERSLEY, J. R. O'BRIEN, and R. A. PETERS (Biochem. J., 1935, 29, 701—715).—The identity of hydrochlorides (possibly $C_{12}H_{16}ON_4S,2HCl$) of the vitamin from different sources has been demonstrated. Biological activity (average 437 international units per g.) is best measured by the catatorulin test on avitaminous brain and is not destroyed by CH_2O. The *nitrate*, decomp. 164—165°, and *sulphates* $2X(SO_4)_3$ (X = base), m.p. 203° (corr.), prepared at p_H 3, and $2X(SO_4)_4$, m.p. 276—278° (corr.) prepared at p_H 1 are described. W. McC.

Improved yields of vitamin-B_1. H. W. KINNERSLEY, J. R. O'BRIEN, and R. A. PETERS (Biochem. J., 1935, 29, 716—717; cf. A., 1933, 541).—By means of improvements [use of special yeast (I), adsorption on charcoal at p_H 6·5, clarification of filtrate from initial boiling of (I) with double quantity of $Pb(OAc)_2$ after centrifuging, addition of light petroleum to hot alcoholic mother-liquors after concentrating, rapid pptn. of Au compound which is kept cool] in methods of isolation increased yields [up to 73·2 mg. per kg. of (I)] of the cryst. hydrochloride of the vitamin are obtained. W. McC.

Ultra-violet absorption of crystalline vitamin-B_1. E. R. HOLIDAY (Biochem. J., 1935, 29, 718—721; cf. A., 1933, 645).—Purest cryst. vitamin-B_1 (samples from Kinnersley *et al.*, Windaus, Van Veen) in 75% EtOH+0·005*N*-HCl exhibits selective absorption (I) with max. at 245—247 mμ. Kind of solvent and [H˙] greatly affect (I). W. McC.

Test for vitamin-B_1. W. H. SCHOPFER (Z. Vitaminforsch., 1935, 4, 67—75).—*Phycomyces blakesleeanus* does not grow on artificial media but addition of $0·00005 \times 10^{-6}$ g. of vitamin-B_1 per c.c. permits its development. P. W. C.

Water-soluble *B*-vitamins. IV. Components of vitamin-B_2. H. CHICK, A. M. COPPING, and C. E. EDGAR (Biochem. J., 1935, 29, 722—734).—Vitamin-B_2 (I), the heat-stable constituent of the vitamin-B complex which must be added to diets containing all other dietary essentials [including -B_1 (II)] in order to maintain growth and health in the rat and to prevent dermatitis, is an association of a flavin with a supplementary substance (III) (factor Y or vitamin-B_6). (III) occurs in yeast extract, liver, and egg-yolk (but to a small extent only in egg-white), is stable to heat and alkali, dialyses through Cellophane, is not adsorbed by fuller's earth at p_H 1·0 or pptd. by $Pb(OAc)_2$ at p_H 8·0 or 4·0, and is present in small amount in (II) prepared by Peters' method. Pure hepato- (IV) or lacto-flavin (V) added to a basal diet containing adequate (II) but free from (I) restores growth in rats to a small extent, but in order to attain normal growth (III) must also be given. (IV) or (V) has no curative effect (sometimes a stimulating effect) on the florid dermatitis of rats deprived of (I) and only occasionally cures the more general type of skin disease. (III) alone neither restores growth nor appreciably affects the disease (VI) but (IV) or (V) accompanied by (III) cures (VI) and restores normal growth. (IV) and (V), but probably not (III), are destroyed by exposure to visible light. W. McC.

Vitamin-B_2 complex. I. Differentiation of lactoflavin and the "rat antipellagra" factor. II. Distribution of lactoflavin and of the "pellagra-preventing factor" (vitamin-B_6) in natural products of animal origin. III. Inactivation of lactoflavin and vitamin-B_6 by visible light. P. György (Biochem. J., 1935, **29**, 741—759, 760—766, 767—775).—I. "Rat pellagra" (I) is produced on a vitamin-B-free basal diet with added purified -B_1 (II) and this result is not affected by addition also of lactoflavin (III). For prevention of (I) a "supplementary substance" or -B_6 (IV) is necessary. A suitable source of (IV) free from (III) is obtained in Peters' "charcoal eluate" from yeast. The combined administration of (III), (IV), and (II) leads to marked increase of growth in rats. The term vitamin-B_2 is retained for the (III)+(IV) complex.

II. Determination of the (IV) and (III) activities of various foodstuffs show wide abs. and relative variations. Muscle of herring, salmon, and haddock is a rich source of (IV), but is almost devoid of (III), whilst egg-white has a high (III) content but no antipellagra activity. The (III) and (IV) contents of striated muscle of ox, calf, and chicken, of ox-heart muscle, of chicken gizzard, liver, and milk are also given.

III. Both (III) and (IV) are destroyed by visible light, the inactivation of (IV) occurring in solutions free from (III). The possibility is discussed that (IV) like (III) may be a natural dyestuff. P. W. C.

State of vitamin-B_2 in cow's milk. R. Kuhn and H. Kaltschmitt (Ber., 1935, **68**, [*B*], 386—387).—In an electric field, the milky suspension of freshly-skimmed cow's milk wanders towards the anode whereas the pigment remains stationary; after dialysis at 0° and concn. of the dialysate in vac., wandering of the pigment is not observed. The pigment of milk is therefore not identical with the active group of the yellow enzyme and lactoflavin in milk is present in the non-esterified form. H. W.

Synthetic vitamin-B_2-phosphoric acid. R. Kuhn and H. Rudy (Ber., 1935, **68**, [*B*], 383—386).—Lactoflavin (I) is transformed by $POCl_3$ in C_5H_5N into *lactoflavin H_2 phosphate*, isolated as the Na salt (II). (I) and (II) are identical in colour as solids and in colour and fluorescence in solution. Contrary to (I) but similarly to the active group of the yellow enzyme (III), (II) passes rapidly to the anode in an electric field.

[With T. Wagner-Jauregg and E. F. Möller.] Under given conditions and in contrast with (I), (II) shortens the time required for decolorisation of methylene-blue but the effect is slight in comparison with that of (III). H. W.

Identity of vitamin-B_2 and flavin and the nomenclature of vitamins. B. C. P. Jansen (Nature, 1935, **135**, 267; cf. this vol., 262).—The view that lactoflavin and vitamin-B_2 are identical is supported. L. S. T.

Renoflavin and vitamin-B_2. B. C. Guha and H. G. Biswas (Current Sci., 1935, **3**, 300).—Purified renoflavin is normally deficient in vitamin-B_2 activity, but the latter is enhanced by supplements of the filtrates from adsorption of the flavin on fuller's earth, which were devoid of vitamin-B_1 and -B_4 and had been previously heated for 1 hr. at p_H 9 under pressure. P. G. M.

Nomenclature of vitamin-B_2. B. C. Guha (Nature, 1935, **135**, 395—396).—In "vitamin-B_2" four factors, the flavin, the heat-stable, the anti-dermatitis, and the anti-cataract factor, appear to be involved. The term "vitamin-B_2" should provisionally be reserved for the entire complex, which supplements the usual vitamin-B_2-deficient diet for the promotion of good growth in rats. The other factors should be indicated by their special characteristics. L. S. T.

Flavin and the pellagra-preventing factor as separate constituents of a complex vitamin-B_2. L. J. Harris (Biochem. J., 1935, **29**, 776—781).—Flavin (I) (lactoflavin of Kuhn) has no antipellagra action. For adequate growth (*i.e.*, for wt.-promoting action and cure and prevention of symptoms approx. equal to that of the total complex in the form of marmite) vitamin-B_1 (II) must be supplemented with both (I) and the "antipellagra substances" (III) of Peters' eluate. Administration only of (II)+(III) led to subnormal body-wts. and of (II)+(I) to the development of severe pellagra which was prevented or cured by addition also of (III). The International standard of (II) appears to be contaminated with (III). P. W. C.

Egg-white as sole source of protein and vitamin-B_2 for young rats. F. J. Gorter (Biochem. J., 1935, **29**, 322—329).—Dermatitis in young rats, brought about by feeding egg-white (I) as the sole source of protein and vitamin-B_2, can be prevented by replacement of part of (I) by purified caseinogen. The curative factor is insol. in dil. or conc. acid, EtOH, or Et_2O and is also present in liver, yeast, and egg-yolk. It differs in solubilities from the B-vitamins. P. W. C.

Ascorbic acid content of the crystalline lens of guinea-pigs on a scorbutigenic diet. G. Bietti and A. Cartenì (Boll. Soc. ital. Biol. sperim., 1934, 9, 983—985).—The ascorbic acid of the cryst. lens falls to a mere trace after 30 days of a scorbutigenic diet, that of the adrenals being slightly larger. R. N. C.

Variations of ascorbic acid in the aqueous humour following administration of vitamin-*C*. G. Bietti and A. Cartenì (Boll. Soc. ital. Biol. sperim., 1934, 9, 1066—1070).—Rabbits given orange-juice orally, or ascorbic acid (I) intravenously, show an increase of (I) in the aq. humour similar to that in serum (II). In the dog no increase is shown except a slight transitory increase in (II) immediately after injection, and (I) is eliminated rapidly in the urine; hence the animal has no storage capacity for (I). R. N. C.

Vitamin-*C* in the skin. A. Giroud, C. P. Leblond, and R. Ratsimamanga (Compt. rend. Soc. Biol., 1935, 118, 321—322).—The mucosa of the skin contains an appreciable quantity of ascorbic acid, the content of other parts being negligible. R. N. C.

Vitamin-*C* content of human milk. W. Neuweiler (Z. Vitaminforsch., 1935, 4, 39—54).—Breast milk contains 4—7 mg. of ascorbic acid (I) per 100 c.c. Colostrum contains the same amount as early or late milk. The amount is determined by the food supply. In cows the (I) content of the milk is decreased during pregnancy. The dichlorophenol-indophenol titration method gave results in good agreement with the biological assay. P. W. C.

Vitamin-*C* in dried fruit, berries, and vegetables. A. N. Shivrina and N. P. Onokhova (Bull. Appl. Bot. Leningrad, 1934, Suppl. 67, 89—102).—The vitamin survives drying in black currants, dog-rose fruits, and apples, but in potatoes only 10—16% is preserved. Nutr. Abs. (*m*)

Vitamin-*C* preparation from fruits of the dog-rose. N. N. Ivanov, V. I. Marga, and N. P. Onokhova (Bull. Appl. Bot. Leningrad, 1934, Suppl. 67, 155—160).—From 48 kg. of dog-rose fruits, 42 g. of concentrate was obtained, which cured guinea-pigs of scurvy in a dose of 0·004 g. and retained its activity on storage. Nutr. Abs. (*b*)

Mexican tomatoes as an antiscorbutic remedy. E. N. Zorin (Questions of Nutrition, U.S.S.R., 1934, 3, No. 3, 125—129).—The tomatoes contain < 100 antiscorbutic "guinea-pig" units per kg. Nutr. Abs. (*m*)

Needles of forest trees as a source of the antiscorbutic vitamin. P. A. Yakimov, T. N. Kuznezova-Zarudnaya, and A. A. Ryabinin (Bull. Appl. Bot. Leningrad, 1934, Suppl. 67, 143—153).—The min. daily prophylactic dose for guinea-pigs of fresh spruce or pine needles is 1·0 g. Nutr. Abs. (*m*)

Antiscorbutic action of juice of raw sorrel and of rhubarb. T. L. Izumrudova (Questions of Nutrition, U.S.S.R., 1934, 3, No. 4, 91—94, 94—98).—Fresh sorrel and rhubarb juice proved a fairly good source of vitamin-*C* as tested by prophylactic experiments on guinea-pigs, the antiscorbutic activity being about 140 "units" per kg. Nutr. Abs. (*b*)

Vitamin-*C* consumption and storage in the animal. H. von Euler and M. Malmberg (Svensk Kem. Tidskr., 1935, 47, 25—29).—An increase in the daily dose of ascorbic acid (I) leads to an increase in the amount of (I) in the urine of the rat and (much smaller) the guinea-pig (II). The (I) content of the adrenal gland (III) of the hypervitaminised (II) is approx. 1·6 mg. per g. of organ as against the normal val. of 0·8 mg. The amount of (I) stored in the (III) of the rat does not appear to be affected by increasing the quantity of (I) administered. Hypervitaminosis of the (II) does not affect the (I) content of the lens of the eye. E. A. H. R.

Urinary excretion of vitamin-*C*. P. Rohmer, N. Bezssonoff, R. Sacrez, and E. Stoerr (Compt. rend. Soc. Biol., 1934, 116, 1414—1416).—Infants of 3—8 months excrete the vitamin (I) in their urine whether it is present in the diet or not. Possibly synthesis occurs. In children over 11 months, adults, and guinea-pigs, in contrast with rats and birds, (I) is only excreted in the urine if present in the diet. Nutr. Abs. (*m*)

Influence of animal tissues on the oxidation of ascorbic acid. C. A. Mawson (Biochem. J., 1935, 29, 569—579).—The aërobic oxidation of aq. solutions of ascorbic acid (I) in presence of phosphate buffer at p_H 7·4 is inhibited by the presence of small quantities of animal tissues or tissue extracts. Similar inhibition is produced by glutathione (II), cysteine (III), cystine (IV), or H_2S. The inhibiting mechanism present in the tissues becomes less effective in presence of Cu or Fe, whilst a somewhat similar but less marked effect is produced on the (II) inhibition by Cu. Dialysed tissue extracts retain their anti-oxidative properties in full, whilst after pptn. with $Hg(OAc)_2$ or $CCl_3{\cdot}CO_2H$ their activity is only partly lost. The (II), (III), and (IV) contents of the tissues probably account for only part of their activity. (I) is relatively stable in glass-distilled H_2O, but Cu and to a smaller extent Fe and especially mixtures of the two catalyse aërobic oxidation of (I). The known concns. of Fe and Cu in tissues and blood-serum would, in the absence of an anti-oxidant, effect rapid oxidation of (I). Lemon juice contains no anti-oxidant, the stability of (I) being entirely due to the low p_H. W. O. K.

Influence of vitamins on the catalase content of blood. II. H. J. Jusatz (Klin. Woch., 1934, 13, 727—728; Chem. Zentr., 1934, ii, 2544, cf. A., 1933, 645).—Administration of ascorbic acid to rabbits increases the catalase activity of the blood. Carotene and vitamin-*A* have no effect. A. G. P.

Ascorbic acid and blood-catalase. G. Török and L. Neufeld (Klin. Woch., 1934, 13, 1205—1207).—In premature, wasted, or healthy infants, administration of daily doses of 10—30 mg. of the acid (I) for 2 weeks has no effect on the blood-catalase (II). Dogs and guinea-pigs on a diet devoid of vitamins show, usually between the 7th and 10th day, a definite fall in (II) level and a marked rise after daily doses of 10 mg. of (I); intravenous in-

jection of 50 mg. causes an immediate rise. (I) has a direct effect on the (II)-producing mechanism.
NUTR ABS. (*m*)

Experimental scurvy in connexion with the character of the chief diet. M. F. GLASUNOV and K. L. POVOLOTZKAYA (Bull. Appl. Bot. Leningrad, 1934, Suppl. 67, 217—224).—Addition of autoclaved hay to Bezssonoff's diet rendered it much more satisfactory for use in prophylactic tests with guinea-pigs. NUTR. ABS. (*b*)

Vitamin-*C* and chemically related compounds: configuration and antiscorbutic action. O. DALMER (Deut. med. Woch., 1934, 60, 1200—1202; Chem. Zentr., 1934, ii, 2546).—Only a part of the titrimetrically-determined vitamin-*C* in some samples of orange juice is biologically active. Ascorbic acid (I), solid or in suitable solution, retains its activity in the absence of air. Only $COMe_2$-(I) is fully active.
A. G. P.

Chemical method of determining vitamin-*C*. B. AHMAD (Biochem. J., 1935, 29, 275—281).—For the determination of ascorbic acid (I) in solutions and in natural material by titration with 2 : 6-dichlorophenol-indophenol, the (I) concn. should be $\ngtr$ 2 mg. per 100 ml., the $CCl_3{\cdot}CO_2H$ (II) concn. $\ngtr$ 5%, and the solution titrated against the indicator with a time limit of 1—2 min. (I) in fruits and vegetables should be extracted with 20—25% aq. (II). A. L.

Determination of ascorbic acid. J. P. SPRUYT and W. F. DONATH (Meded. Volksgezond. Ned.-Ind., 1934, 23, 117—128).—Ascorbic acid (I) oxidises very quickly in aq. solution to dehydroascorbic acid (II). The rate of oxidation is greatly restricted by 0·25% $CCl_3{\cdot}CO_2H$, but to a much smaller extent by higher concns. up to 20%. Reduction of (II) by H_2S is quant. in all concns. of $CCl_3{\cdot}CO_2H$ up to 20%. Aq. (I) can be stored without oxidation, apparently indefinitely, under H_2S. Titration of (I) with 2 : 6-dichlorophenol-indophenol is, within wide limits, independent of p_H (up to 7·4) and of concn. The (I) content of oranges, determined by this method, is 0·56—0·71 mg. per ml. of juice. NUTR. ABS. (*m*)

Determination of ascorbic acid. Vitamin-*C* content of various plant and animal tissues. H. TAUBER and I. S. KLEINER (J. Biol. Chem., 1935, 108, 563—570).—Vitamin-*C* (I) is determined in tissue extracts, prepared by the method of Emmerie *et al.* (A., 1934, 1043), by addition of $K_3Fe(CN)_6$ and heating at 40° for 3 min. On cooling, ferric gum ghatti (Folin, A., 1929, 1096) is added and the colour compared with that produced in a standard solution of (I). (I) added to urine is not destroyed by pptn. with $Hg(OAc)_2$. The (I) contents of a variety of plant and animal tissues are determined. H. D.

Determination of vitamin-*C* in blood. M. VAN EEKELEN, A. EMMERIE, and L. K. WOLFF (Acta Brev. Neerl. Physiol., 1933, 3, 104—105; Chem. Zentr., 1934, ii, 2415).—Fresh blood (20 c.c.) is mixed with 10 c.c. of 20% $CCl_3{\cdot}CO_2H$ (I) and centrifuged, and a portion of the centrifugate is titrated with 2 : 6-dichlorophenol-indophenol. To another portion KOH is added until the mixture contains 0·25% of (I). The liquid is saturated with H_2S for 6 hr., freed from the gas by a current of N_2, and titrated. The ascorbic acid content of blood so determined is 0·5 mg. per 100 c.c. before and 2·05 mg. after reduction.
A. G. P.

Determination of vitamin-*C* in blood-serum. E. GABBE (Klin. Woch., 1934, 13, 1389—1392).—The vitamin-*C* (I) in serum determined by dichlorophenol-indophenol in patients with various diseases was 0·14—1·21 mg. per 100 c.c. The lowest vals. occurred in the most serious cases, whilst the highest vals. were found in the lighter and convalescent cases. There was no evidence that lack of (I) promoted the onset of infection, for cases of acute infection (appendicitis, cholecystitis, etc.) showed high rather than low vals. In most cases the vals. could be correlated with the (I) content of the diet; with particularly low vals. a disorder of the endogenous metabolism of (I) may be involved.
NUTR. ABS. (*b*)

Ergosterol increases the prolific capacity of animals, and normal sexual functions intensify their resisting power against the toxicity of ergosterol. E. AGDUHR (Z. Vitaminforsch., 1935, 4, 54—66).—With mice, the males are much more susceptible than the females to an overdose of irradiated ergosterol (I). Administration of (I) causes heat, considerably increases the prolific capacity of the animals, and influences the post-natal development of several endocrine glands. Mice allowed normal sexual intercourse show considerable increase in resistance to the toxicity of (I). P. W. C.

Is it possible to confer antirachitic activity on phosphorus sub-oxidation derivatives by introduction of a benzene ring? M. L. BARBAN (Compt. rend. Soc. Biol., 1935, 118, 771—773).—Na dimethylaminophosphinite and hydroxybenzylphosphinite and guaiacol phosphite are without antirachitic effect.
R. N. C.

Action of activated ergosterol in the chicken. III. Evidence for the existence of only one provitamin-*D* in crude ergosterol. C. E. BILLS, O. N. MASSENGALE, F. G. McDONALD, and A. M. WIRICK (J. Biol. Chem., 1935, 108, 323—330).—Ergosterol (I) from different sources does not vary in its effect on the blood and bones of chicken after irradiation. Vitamin-*D* (II) of irradiated (I) has a greater effect on Ca and P of serum than on the calcification of the bones, whilst the reverse is true for (II) from cod-liver oil. H. G. R.

Influence of vitamin-*D* on the p_H of fæces. A. QUERIDO (Acta Brev. Neerl. Physiol., 1933, 3, 96; Chem. Zentr., 1934, ii, 2547).—Vitamin-*D* feeding decreased the p_H of rat fæces. A. G. P.

Supplementary action of vitamin-*B* and -*D* and their joint influence on blood chemistry. H. J. JUSATZ and F. WENZEL (Klin. Woch., 1934, 13, 1082—1083).—The onset of hypervitaminosis-*D* in rabbits could be delayed by giving at the same time large doses of vitamin-*B*, which delayed and lessened the severity of the hyperphosphatæmia produced by the excess of vitamin-*D*.
NUTR. ABS. (*b*)

Preparation and properties of vitamin-*E* concentrates. H. M. Evans, E. A. Murphy, R. C. Archibald, and R. E. Cornish (J. Biol. Chem., 1935, **108**, 515—523).—The vitamin-*E* (I) activity of the unsaponifiable fraction of wheat-germ oil (II) decreases with the age of the germ. (II) retains its activity for > 3 years stored in glass in vac. The Marcus process (A., 1929, 103) does not give complete extraction and destroys a part of the (I). The loss of (I) caused by saponification with EtOH–KOH is avoided by distilling the EtOH from NaOH, or by using anhyd. MeOH. Saponification at room temp. causes a loss of (I). Et_2O is the best solvent for extraction of the unsaponifiable residue; the extracts of (II) by AcOH, HCO_2H, and $(CH_2{\cdot}OH)_2$ are not (I)-active whilst the residues are. H. D.

Appearance of paresis in adult rats suffering from chronic avitaminosis-*E*. A. Ringsted (Biochem. J., 1935, **29**, 788—795).—Characteristic neuropathic disturbances developing in adult albino rats fed on various vitamin-*E*-free food mixtures for a long time (4—7 months) are described. P. W. C.

Hormonal nature of the [growth-]inhibiting action of leaves of *Bryophyllum crenatium*. A. Uhrova (Planta, 1934, **22**, 411—427; Chem. Zentr., 1934, ii, 2403).—Application of cut leaf stem to one side of the shoot stump inhibits development of axial buds on that side. The active material diffuses into agar and occurs in the expressed juice and Et_2O extract of tissues. A. G. P.

Integration of plant behaviour. V. Growth substance and traumatic curvature of the root. F. Keeble and M. G. Nelson (Proc. Roy. Soc., 1935, B, **117**, 92—119).—Root tips of *Zea mais* contain growth substance (I) which inhibits growth of root. The supposed wound substance previously mentioned (New Phytol., 1930, **29**, 289) as occurring at the surface of stumps (II) after amputation of tips is an exudation of preformed (I). (II) do not differ from intact roots as regards sensitivity to the action of gravity, but no geotropic curvature takes place in (II) until they have acquired sufficient (I). The distribution (III) of (I) and the effect on (III) of wounding suffice to explain the traumatic behaviour of the root without invoking sp. wound stimulus. Secretion (IV) of (I) is most active in the extreme tip of the root and the concn. rapidly decreases with distance from the tip [no (IV) beyond 2 mm. from tip]. Curvature (VII) of wounded roots is due to gradient (V) of concn. of (I) on opposite sides. There is no quant. relation between growth (VI) and (VII), (VI) being determined by concn. of (I) and (VII) by (V). W. McC.

Phototropic sensitivity in relation to wavelength. E. S. Johnston (Smithsonian Misc. Coll., 1934, **92**, No. 11, 1—17).—The phototropic sensitivity curve of the coleoptile of *Avena sativa* deduced by use of the plant photometer rises sharply from 410 to a max. at 440 mμ. It then shows a min. at 457·5, rising again to a max. at 470—480 mμ. There is a rapid fall to 500, and then a gradual fall to the threshold at 546 mμ. A. L.

Intimate problem of radicular assimilation. A. Oriol i Anguera and M. Vidal de Càrcer (Arxius, 1935, 122—141).—The isolation of inorg. and org. colloids of the soil is described. In most of the colloids the electric charge can be reversed, and an isoelectric point exists. The application of this fact to the mechanism of assimilation by the roots of plants is discussed. The idea of base exchange is extended to PO_4''' and other essential anions. R. N. C.

Assimilative activity and growth of *Ficaria verna*. F. Mudrack (Planta, 1934, **23**, 71—104).—Effects of light and temp. on rates of assimilation and respiration and dry-matter increases are examined. A. G. P.

Importance of leaf-colour in the breeding of white and Swedish clovers. K. Boekholt (Züchter, 1933, **7**, 157—159; Bied. Zentr., 1934, A, **5**, 66—67).—Darker leaves of clovers have higher chlorophyll and protein contents, which serve as characteristics in the selection of plants for breeding. A. G. P.

Relation between the presence of anthocyanin colours and the assimilative capacity of some cultivated plants. IV. K. Hirosi (J. Dept. Agric. Kyushu, 1933, **3**, No. 9; Bied. Zentr., 1934, A, **5**, 56).—The occurrence of anthocyanin pigments or the chromogens in plants is associated with increased assimilative power. A. G. P.

Chemical changes during the formation and germination of the rice grain. D. L. Sahasrabuddhe and M. M. Kibe (J. Univ. Bombay, 1934, **3**, No. 2, 121—134).—Determinations are recorded of the % H_2O, proteins, Et_2O extract, crude fibre, and sol. carbohydrates (dextrin, glucose, sucrose, starch) in the stem and inflorescence of the rice plant from the time of flowering to that of complete maturity of the grain. Similar study of the seed from the time of sowing until it is completely depleted of its food constituents shows (1) that the seed begins to absorb H_2O rapidly and retains a high H_2O content throughout the whole period, (2) very little dry matter remains at the end of the period, (3) crude fibre and ash are utilised to only a small extent, (4) proteins are utilised to the extent of 90%, (5) the Et_2O extract increases for some time due to formation of fatty acids, (6) the sol. carbohydrates are first converted into glucose and finally utilised by the growing parts of the new plant. The presence of an amylohydrolytic enzyme in the H_2O extract of germinating rice seed is established. The extract contains some starch which is transformed into glucose, and added starch is similarly converted. H. W.

Carbon dioxide : carbohydrate ratio in the aërobic and anaërobic respiration of rice. R. H. Dastur and R. M. Desai (Ann. Bot., 1935, **49**, 53—69).—In rice germinating in air, periods of high total sugar content are associated with high output of CO_2. When germination occurs in N_2 no hexoses occur in any stage; sucrose is present only in small amounts but EtOH is formed. In aërobic and anaërobic respiration CO_2 is produced in amounts > equiv. to the carbohydrate lost. The excess is probably derived from the oxidation of org. acids formed during protein synthesis. A. G. P.

Interconvertibility of glucose and fructose in plant tissue. M. Nurmia (Nature, 1935, 135, 345; cf. A., 1934, 1420).—Glucose and fructose are readily converted into each other in the plant tissues, especially the stems, of grasses and legumes. L. S. T.

Variation in the methoxyl and cellulose values of the fibre of the fruit of *Cocos nucifera* during its growth. S. R. K. Menon (Biochem. J., 1935, 29, 282—284).—OMe and cellulose vals. reach a max. and min. respectively in the fibre of nuts ten months old. A. L.

Translocation in seedling tomato plants. I. W. Selman (Ann. Rept. Exp. Res. Sta. Cheshunt, 1933, 93—97).—The rates of translocation (I) and of assimilation are proportional in summer but not in winter. (I) increases with light intensity with a min. at 1000 ft. c.p. The H_2O content of the tissues is a secondary factor. (I) is also influenced by the enzyme content and the relative amounts of phloem in leaves and stems. Ch. Abs. (*p*)

Water content and assimilation of seedling tomato plants. R. Melville (Ann. Rept. Exp. Res. Sta. Cheshunt, 1933, 87—92).—The H_2O content (I) of plants increases gradually from summer to winter. Assimilation rates increase with rising (I) to an optimum val. and subsequently fall rapidly as (I) continues to increase. Ch. Abs. (*p*)

Influence of light and temperature on the assimilation rate of seedling tomato plants, variety E.S.1. B. D. Bolas (Ann. Rept. Exp. Res. Sta. Cheshunt, 1933, 84—87).—Light intensity (I) had little effect on assimilation rates (II) at $<$ 15·5°. Above this temp. (I) and the temp. of max. (II) increased simultaneously in the ranges 100—1000 ft. c.p. and 17—32°. Ch. Abs. (*p*)

Water and [sugar] cane ripening. C. E. Hartt (Hawaiian Planters Rec., 1934, 38, 193—206).—Synthesis of sucrose in leaf blades is favoured by watering the plants. Some photosynthesis occurs at the wilting point. Differences in sugar and polysaccharide contents in sheaths and stems of watered (I) and unwatered plants are attributable to greater utilisation or better translocation (II) in (I) plants. In (II) sucrose moves against the diffusion gradient. Ch. Abs. (*p*)

Influence of temperature on respiration and carbon dioxide assimilation of certain green algæ. F. van der Paauw (Planta, 1934, 22, 396—403; Chem. Zentr., 1934, ii, 2237).—Changes of temp. produce parallel effects on respiration (I) and CO_2 assimilation (II) in *Stichococcus bacillaris*. In *Oocystis* variations in (I) and (II) are similar below 22° but at higher temp. (I) increases more rapidly than (II). At lower ranges of temp. the (I) of *Chlamydomonas* responds more strongly than (II) to changes of temp. A. G. P.

Influence of light on the nutrient intake of plants. M. Gračanin (Bull. Soc. Bot. Czechoslov., 1932, No. 11; Bied. Zentr., 1934, A, 5, 61).—The intake of PO_4''' is not affected by light. A. G. P.

Removal of oxygen from water by cut branches. W. A. Cannon and E. A. Purer (Science, 1935, 81, 100).—Cut flowers and the cut ends of leafy branches of several shrubs and trees remove O_2 from distilled H_2O. Contrary to the case with rooted plants, temp. has little effect on the rate of removal of O_2, which may, however, be decreased by exposure to light. L. S. T.

Carbohydrate supply as a primary factor in legume symbiosis. F. E. Allison (Soil Sci., 1935, 39, 123—143).—Current literature indicates that the development and distribution of nodules in the root system are directly dependent on the carbohydrate supply in the roots. In plants generously supplied with NO_3' nodulation is restricted as a result of the lowered C reserve in the roots. A. G. P.

Constancy of the ratio of carbon to nitrogen in natural systems undergoing oxidation, and the problem of protein synthesis. N. R. Dhar (J. Indian Chem. Soc., 1934, 11, 883—891).—Analysis of different soils shows a const. ratio C to N of 10 : 1, and a similar ratio is observed in the starvation metabolism of different animals. The carbonaceous matter in the soil protects the soil-protein from oxidation. F. R. S.

Determination of carbon dioxide assimilation. Comparison of apparatus of Warburg with that of van der Paauw. F. van der Paauw (Planta, 1934, 22, 393—395; Chem. Zentr., 1934, ii, 2237).—Warburg's method is suited for general work with algæ and gives more rapid results. The author's apparatus is superior for special work since a film of single-cell thickness is examined on a natural culture medium. A. G. P.

Pollen and pollen extracts. XI. Chemical nature of pollen allergens. L. Unger, M. B. Moore, H. W. Cromwell, and C. H. Seeber. **XII. Enzyme digestion of pollen allergens.** M. B. Moore and L. Unger (J. Allergy, 1934, 5, 115—123, 338—340).—XI. The allergen (I) in ragweed and grass pollens has a protein-like character. The polysaccharide fraction has no part in the sp. activity.

XII. Ordinary proteolytic enzymes slowly digest (I). Ch. Abs. (*p*)

Preservation of pollen extracts by drying and preparation of concentrated pollen solutions. B. Z. Rappaport (J. Allergy, 1933, 5, 13—18).—Dried ragweed pollen may be stored for 18 months without loss of activity and solutions of any concn. may be made from the product. Ch. Abs. (*p*)

Ultrafiltration of ragweed pollen extracts. W. C. Spain and J. M. Newell (J. Allergy, 1934, 5, 455—465).—The allergic substance can be removed from solution by ultrafiltration (No. 12,000 Cellophane). Non-protein-N is similarly removed from ragweed pollen extracts without appreciable reduction of their activity. The N precipitable by phosphotungstic acid does not correspond exactly with allergic activity but affords the most practical means of standardisation. Ch. Abs. (*p*)

Apparent lignin and skeleton substance of the leaves of plants. R. S. Hilpert and R. Wagner (Ber., 1935, 68, [*B*], 371—380).—Investigation of green and faded leaves of beech, plane, and hazel shows that the customary methods of investigating wood and cellulose are not applicable. Extraction with EtOH–C_6H_6 removes so much material, either lignins (I) or producers of lignins (II), under the action of acids, that the pre-treatment becomes an integral part of the analysis. The actual wax content, determined by use of EtOH-free solvents, is 2—6%. Fading of the leaves is accompanied by considerable change in a portion of the carbohydrate resulting in increased solubility in org. media and decreased solubility in H_2O. Treatment with acids shows increase in (I) but, as in the case of sugars, the % of (I) found frequently varies greatly according as HCl or H_2SO_4 is used. Elementary analysis of leaf-(I) gives results comparable with those of (I) in general, but the leaf-(I) [or (II)] differ from those of straw or wood in their partial solubility in H_2O. From these solutions they are pptd. by acids; they have only 1·5% OMe. The vals. obtained by determining (I) in the whole leaf are considerably different from the sum of the vals. observed in the residue and aq. extract of the leaf and vary also according as HCl or H_2SO_4 is used. Even when the acid is greatly cooled, formation of (I) is observed, the leaves appearing to contain material which is much more sensitive to acid than is fructose. Treatment of wheat, straw, papyrus stalks, or lucerne with Na_2CO_3 at 160° removes the bulk of the (II) to a const. amount which is probably associated with the fibres, leaving an almost white residue. Similar treatment of foliage leaves affords brown and scarcely fibrous products and the relative decreases in (I) and total substance differ little from one another. Even with a large excess of NaOH it is not possible to remove (II) from leaves in the same measure as from straw and wood and the residues are dark brown masses differing in composition from cellulose. Alternate treatments with Cl_2 and Na_2SO_3 give a white residue in 60% yield from wood after 4 repetitions, but in the case of leaves 10 repetitions does not reduce the % of (II) below 19%, although nearly 80% of the total material is dissolved. The skeleton matter of foliage leaves therefore differs entirely from known cellulose carriers and it is doubtful whether any cellulose is present. (II) appear chemically united with other carbohydrates, with which they pass into solution. As in wood, OMe appears closely associated with the (II), the content of which can be approx. calc. from % OMe. H. W.

Beech-wood lignin, a reaction product of carbohydrates in the determination of lignin. R. S. Hilpert and H. Hellwage (Ber., 1935, 68, [*B*], 380—383).—Treatment of red beech-wood with saturated HCl at −10° leaves after 2 hr. only 12% of residue intermediate in composition between wood and lignin; after 24 hr. the amount of ppt. increases. The stage of the reaction is so characteristic that the presence of a component in wood, liberated by acids, is postulated. By use of HCl (*d* 1·19) reaction can be so decelerated that only 30—40% passes into solution; the residue has the composition of the original wood and when treated with 43% HCl at 15—20° passes into lignin. Dilution of the acid solutions with H_2O causes pptn. (about 50% of the wood) of a methylated cellulose anhydride (I), $2C_6H_{10}O_5-H_2O$, with 1 OMe per 2 anhydride residues which with conc. HCl at 15—20° gives lignin of normal elementary composition but with 21% OMe. The filtrate from (I) contains only carbohydrates and materials sol. in H_2O, but no lignin in the accepted sense. The total lignin of beech is therefore not a component of the wood but a product of the reaction, derived by the action of acids on carbohydrates. H. W.

Cellulose of marine algæ. T. Dillon and T. O'Tuama (Sci. Proc. Roy. Dublin Soc., 1935, 21, 147—152).—Cellulose was prepared from dried *Laminaria digitata* by steeping in 1% HCl followed by aq. NH_3, and repeated boiling with 5% NaOH, in the form of a cream-coloured powder. The only product of complete hydrolysis is glucose. P. G. M.

Preparation and properties of alginic acid; extraction of marine algæ with various solvents. V. Barry and T. Dillon (Sci. Proc. Roy. Dublin Soc., 1935, 21, 165—166).—Boiling H_2O extracts 41% of the dried fronds of *Laminaria digitata*. A finely divided material separates out from this extract and this, after extraction with methylated EtOH, gives a non-viscous solution in alkali, from which gelatinous alginic acid is pptd. on acidification. P. G. M.

Chemical constituents of Irish lichens. *Lecanora gangleoides*. I. J. Hardiman, J. Keane, and T. J. Nolan (Sci. Proc. Roy. Dublin Soc., 1935, 21, 141—145).—An Et_2O extract of the dried lichen yields a product from which light petroleum removes a red oil, leaving a residue from which are obtained a product (I), m.p. 196·5°, and *gangleoidin* (II), $C_{18}H_{14}O_7Cl_2$, m.p. 214—215°. (I) is probably atranorin mixed with chloroatranorin. (II), a depside, yields a *monoacetate*, m.p. 245—246°, and a *compound* $C_{16}H_9O_5Cl_2(OMe)_3$, m.p. 198·5°, on treatment with MeOH–KOH. Further quantities of (I) are obtained by extraction of the lichen residue with $COMe_2$ and $CHCl_3$. (II) contains 2 OMe and gives no colour with EtOH–$FeCl_3$. P. G. M.

Fermentable sugars of wheat flour. L. Genevois and M. Pavlov (Compt. rend., 1935, 200, 690—692).—Determination of the reducing sugars before and after hydrolysis, and of the readily fermentable sugars, in H_2O-macerations of flour indicate that those which are rich in factor *Z* contain sugars readily fermentable in 3—5 hr., in addition to the slowly fermented sugars (maltose) (0·0025 and 0·001 g., respectively, from 0·1 g. of flour after extraction for 1·5 hr.). J. W. B.

Composition of maple sap. J. Brodil (Vestn. Czechoslov. Akad. Zemed., 1934, 10, 258—261; Chem. Zentr., 1934, ii, 2237).—Fresh sap from *Acer platanoides* and *A. pseudoplatanus* contains much diastase and catalase with smaller proportions of zymase, invertase, emulsin, and proteases. Oxidase,

peroxidase, tyrosinase, and lipase were absent. Analytical data include 0·08 g. of malic acid per litre.
A. G. P.

Alkaloid of *Eurycles amboinensis*. L. B. Oliveros and A. C. Santos (Univ. Phillipines Nat. Appl. Sci. Bull., 1934, **4**, 41—42).—A substance $C_{16}H_{17}O_4N$, m.p. 250°, was isolated and shown to be licorine (hydrochloride hydrate, m.p. 206·5°; picrate, m.p. 196°). Ch. Abs. (r)

Sugar grass (*Sorghum saccharatum*). V. Cuculescu (Z. Unters. Lebensm., 1934, **68**, 651—652).—The % of H_2O, N, fat, starch, H_2O-sol. substances, and sugars in the seeds, stem, and syrup of sugar grass are given. E. C. S.

Isolation of the poisonous principle of *Dimorphotheca cuneata*, Less. J. S. C. Marais and C. Rimington (Onderstepoort J. Vet. Sci., 1934, **3**, 111—117).—The poisonous constituent is linamarin (I). An enzyme linamarase was also isolated, which hydrolysed (I) but did not affect amygdalin, salicin, or α-methylglucoside. An aq. extract of yeast after purification by pptn. with EtOH liberated HCN from (I). *D. cuneata* yields approx. 280 mg. of HCN per plant. The min. lethal dose for rabbits was 14—20 g. of plant (at seeding stage), *i.e.*, 14 mg. of HCN per kg. body-wt. Ch. Abs. (p)

***Leonurus cardiaca*.** W. Peyer and H. Vollmer (Pharm. Zentr., 1935, **76**, 97—102).—The botanical characteristics, physiological action, chemical behaviour, and constituents of the plant are described. Alkaloids and tannins are present. The physiological action (on mice) is due to the tannins (5—9%).
E. H. S.

Chemistry and pharmacology of extracts obtained from different parts of the seed of *Strophanthus kombe*. B. Sanna (Boll. Soc. ital. Biol. sperim., 1934, **9**, 830—831).—The husk extracts reduce Fehling's solution, are least toxic, and contain mostly amorphous material. The other extracts are non-reducing and more toxic, the endosperm extracts being largely cryst. H_2SO_4 gives characteristic colours with all the extracts. R. N. C.

Presence of 2-acetylpyrrole in stabilised official valerian. E. Cionga (Compt. rend., 1935, **200**, 780—782).—The residues obtained from fresh valerian rhizome stabilised by EtOH are freed from EtOH and treated with Et_2O. After removal of the solvent an acid residue remains which is neutralised with 25% Na_2CO_3 and treated with Et_2O. The brown mass obtained after removal of Et_2O is hydrolysed by 10% KOH–EtOH. The EtOH is evaporated and the residue treated with H_2O and Et_2O. 2-Acetylpyrrole, m.p. 90°, is isolated from the Et_2O extract. It is probably identical with the alkaloid of Chevalier (A., 1907, ii, 193). H. W.

Seed oil of *Aegle marmeolos*, Corr. R. Child (J. Amer. Chem. Soc., 1935, **57**, 356—357).—The oil (25—35% of the seed) had d_4^{30} 0·918, n_D^{40} 1·4647, sap. val. 193·6, 196·8, I val. 108·0, 107·1, saturated acids 23·9%, unsaponifiable 1·58%. The acids consist of approx. 15·6% palmitic, 8·3% stearic, 28·7% oleic, 33·8% linoleic, and 7·6% linolenic acid. R. S. C.

Acids of Chinese and esparto grass waxes and the hydrocarbons of esparto and candelilla waxes. F. J. E. Collins (J.S.C.I., 1935, **54**, 33—35t).—The free and combined acids in Chinese (I) and esparto waxes (II) were investigated by fractional distillation of the corresponding Et esters, followed by mol. distillation. From (I) Et esters were obtained which melted between the limits 54° and 74° (22% between 62·5° and 70°); from (II) the esters melted between 58° and 72° (92% between 63° and 72°). *X*-Ray measurements indicate that the bulk of the acids present in (I) contain 24—30, and in (II) 26—34, C atoms. (II) contains 65—70% of the hydrocarbon $C_{31}H_{64}$, similar to that present in (I). The hydrocarbon from both sources was isolated, and the *X*-ray spacing, transition points, and m.p. were compared with those of an authentic synthetic specimen.

Origin and distribution of colour in the anther and pollen of petunia. M. C. Ferguson and B. Hunt (Bot. Gaz., 1934, **96**, 342—352).—In young anthers all cells except those of connective tissue contain chlorophyll. Formation of yellow pigment (I) in older anthers and pollen begins with the disappearance of chloroplasts. The mature anther and pollen always contain (I), although this is frequently obscured by anthocyanin (II). The presence of two flavones in (I) is demonstrated. A magenta pigment (III) [non-(II)] appears first in the cell sap of the sterile tissue on the inner side of the microsporangia. True (II) pigment is formed immediately prior to the dehiscence of the anther, its origin being related to (III). Both red and blue (II) pigments are present. In uniformly coloured anthers (II) occurs in all cells except the connective. Pigments of pollen and anthers are probably of common origin.
A. G. P.

Pigments of *Lactarius deliciosus*, L.—See this vol., 495.

Determination of the common carotenoids; analyses of β-carotene and leaf-xanthophyll in thirteen plant tissues. E. S. Miller (J. Amer. Chem. Soc., 1935, **57**, 347—349).—The MeOH–ligroin method, applied to synthetic mixtures of β-carotene (I) and leaf-xanthophyll (II), reveals only about 90% of the (I). A more rapid and accurate method of analysing such mixtures (using $COMe_2$ and Et_2O) is described. The (I) and (II) content of 13 grasses and sugar canes are determined. R. S. C.

Optical properties of autumn coloured leaves. H. Spohn (Planta, 1934, **23**, 240—248).—Changes in autumn leaf-pigments are examined spectrophotometrically. A. G. P.

Sugar, ash, nitrogen, and phosphorus of forage and of sugar beetroots, and of their hybrids. H. Colin and E. Bougy (Compt. rend., 1935, **200**, 853—855).—The ash, P, and N content of forage beet (I) is relatively (with respect to sugar) much > in sugar beet (II). About 1/6 of the P in (II) is sol. in dil. AcOH and < 1/2 in (I), although (I) is richer in mineral phosphates than (II). J. L. D.

Total nitrogen, phosphorus, and calcium contents of common weeds and native grasses in

Oklahoma. H. J. Harper, H. A. Daniel, and H. F. Murphy (Proc. Oklahoma Acad. Sci., 1934, 14, 36—44).—Analytical data for 50 species in various growth stages are recorded. In general weeds contained more N, P, and Ca than grasses. Ch. Abs. (*p*)

Distribution of total nitrogen in the orange tree. S. H. Cameron and D. Appleman (Proc. Amer. Soc. Hort. Sci., 1933, 30, 341—348).—Roots contain a higher % of N than the aërial parts, but the abs. quantity is relatively small ($\ngtr$ 21% of the total N). Ch. Abs. (*p*)

Photochemical aspect of nitrate assimilation in plants. W. E. Tottingham and E. J. Lease (Science, 1934, 80, 615—616).—A discussion. L. S. T.

Penetration of anions in *Valonia*, and its relation to cell growth. H. Ullrich (Planta, 1934, 23, 146—176).—The mechanism of intake of NO_3', Br′, and salicylate ions is examined. The cell membrane is not an important factor controlling intake since its permeability is much > that of the plasma. The passage of anions into the cell from external liquids is represented as a system of anionic exchange in the aq. phase, wherein CO_3'' and HCO_3' are significant factors and the size and mobility of the various ions exert a controlling influence. A. G. P.

Possible differentiation between pedigreed wheats based on variation in chemical composition of the expressed sap and ash components of the plant at different vegetative phases. F. Reichert and E. Paulsen (Rev. fac. agrón. vet., 1931, 7, 329—344).—Characteristic differences in sugar content, sugar : N ratios in sap, and in N, K, P, Ca, and SiO_2 contents of ash are examined. Ch. Abs. (*p*)

Effect of liming on the reaction of plant juices. B. Maláč (Věstn. csl. Akad. Zeměd., 1934, 10, 426—430).—The [H˙] of the sap of plants is little affected by liming the soil. The [H˙] and titratable acidity of the sap of the Trifoliaceæ are > those of the Gramineæ grown under similar conditions. Nutr. Abs. (*m*)

Action of heavy water on the germination of a pollen. L. Plantefol and G. Champetier (Compt. rend., 1935, 200, 423—425).—H_2O containing much H^2_2O (I) is not only non-toxic to germination (II) of pollen of *Narcissus papyraceus*, but in 57% H^2_2O (II) is greater, and bursting of grains much more rare, than in normal H_2O (III), suggesting that hydrolysis by (I) is slower than by (III). In presence of sugar, (II) proceeds even in 98% (I). E. W. W.

Effect of deuterium oxide on respiration of germinating seeds. G. J. Melot (Proc. Soc. Exp. Biol. Med., 1934, 32, 79—83).—Wheat seeds in 14·8, 38, and 94% H^2_2O germinate without showing any macroscopical difference from controls in H_2O under the same conditions. No significant differences are observed in the R.Q. of the seeds in H_2O and H^2_2O during the first and second days of germination. R. N. C.

Accumulation of electrolytes [in plants]. VII. Organic electrolytes. II. A. G. Jacques (J. Gen. Physiol., 1935, 18, 283—300; cf. this vol., 266).—The inorg. cations (I) of leaf-juices (*Rheum*, *Rumex*, *Oxalis*) and of ashed plant tissues are > the inorg. anions. The data indicate that the phenomenon is due to passage of (I) into the protoplasm as MOH and accumulation as org. salts (*e.g.*, oxalates) or non-polar compounds (II). K and Na occur as sol. ionisable compounds, whilst Mg and Ca are present probably as insol. org. salts or as components of (II). F. O. H.

Influence of boric acid on plants, especially on germinating pollen grains. T. Schmucker (Planta, 1934, 23, 264—283).—In a no. of species examined, 0·001—0·01% aq. H_3BO_3 favoured the germination of pollen grains, either by accelerating the growth of pollen tubes or by increasing the % germination. In the absence of B growth is restricted or ceases. Sensitivity of fungi to H_3BO_3 varied considerably. B influences the production of cell membranes. A. G. P.

Biochemistry of flowers. Mineral nutrition of the corolla. R. Combets (Compt. rend., 1935, 200, 578—580).—The mineral content of the corolla of *Lilium croceum* increases up to the time of full bloom and, contrary to Ivanov's view, declines until the flower fades. A. G. P.

Determination of soluble ash in plant material. J. G. Louw (Onderstepoort. J. Vet. Sci., 1934, 3, 191—195).—The material is dried at 103° for 3 hr., ignited at 450° for 2 hr., and the total ash (I) weighed. (I) is evaporated at 100° with 3 ml. of conc. HCl and dried at 100° for 1 hr. It is then heated for a few min. with 20 ml. of H_2O and 2 ml. of conc. HCl, cooled, and filtered. The filtrate and washings (vol. 100 ml.) are used for the determination of Ca, Mg, K, and Na. The insol. residue (II) is dried for 15 min. at 300—350°. The difference between the wt. of (II) and that of (I) is the wt. of sol. ash. Nutr. Abs. (*m*)

Absorption of germanium by plants. W. Geilmann and K. Brünger (Biochem. Z., 1935, 275, 387—395; cf. A., 1931, 455).—The roots and other parts of plants (I) (*e.g.*, oats, mustard, buckwheat, barley) take up Ge from soils which contain sol. Ge compounds, the amount (II) absorbed usually varying little with (I) species. (II) is large in the case of oats. Low concns. of Ge stimulate growth, but high concns. are toxic. *Aspergillus niger* absorbs (and is not poisoned by) relatively large amounts of Ge from a medium containing GeO_2. W. McC.

Molybdenum content in leaves. H. ter Meulen and H. J. Ravenswaay (Proc. K. Akad. Wetensch. Amsterdam, 1935, 38, 7—10).—Mo content in leaves remains const. or increases and Mo does not migrate to branches in autumn. A relationship seems to exist between leaf colour and Mo content. Brown leaves contain nearly twice as much Mo as the green variety. H. T.

Distribution of copper in the rice plant cultivated on soils containing copper. M. Shikata, I. Tachi, and N. Yasuzaki (J. Agric. Chem. Soc. Japan, 1934, 10, 368—373).—Cu contents (% of dry matter) were: roots 0·064, stems 0·006—0·010, leaves 0·007—0·011, ears 0·009, rice hulls 0·004, unpolished rice 0·002—0·007, polished rice 0·001.

The normal rice plant contains a small quantity of Cu. The root contains much Fe. CH. ABS.

Importance of copper for the development of plants in comparison with boron and manganese: copper-deficiency phenomena. E. BRANDENBURG (Angew. Bot., 1934, **16**, 505—509).—Cu-deficiency disease in oats is examined. A. G. P.

Action of vanadium on cultivated plants. K. SCHARRER and W. SCHROPP (Z. Pflanz. Düng., 1935, **37**, 196—202).—The growth of wheat in sand cultures was increased by small amounts and retarded by larger additions of $NaVO_3$. Barley, rye, oats, and (notably) peas were injured by all dosages examined. The effect on roots was relatively > that on tops. A. G. P.

Effect of chromium and chromate ions on cultivated plants. K. SCHARRER and W. SCHROPP (Z. Pflanz. Düng., 1935, **37**, 137—149).—Small additions of $Cr_2(SO_4)_3$ (I) to culture media improved the growth of oats and rye; wheat and maize responded to a smaller extent, but barley and peas were highly sensitive to injury. Large applications of (I) caused injury in all cases. In some instances small concns. of CrO_4'' proved beneficial, but in general the min. injurious concn. was much < that of (I). Replacement of $Fe^{\cdot\cdot\cdot}$ in nutrient media by increasing proportions of $Cr^{\cdot\cdot\cdot}$ produced generally unfavourable effects on the growth of aërial portions of plants but tended to increase the proportional wt. of roots when the proportion of Cr : Fe was < 7 : 1. A. G. P.

Iron content of pastures. ANON. (New Zealand Dept. Sci. Ind. Res., 8th Ann. Rep., 1933—1934, 18—19).—Since the Fe content of healthy and unhealthy [bush sickness (I)] pastures is low in every case (0·006%) no support is given to the theory that the sole cause of (I) is low Fe content of the pastures (II). The Fe and Mn contents of 10 species of legumes and grasses from different (II) are given. NUTR. ABS. (*m*)

Iodine in cabbage. J. F. McCLENDON and C. E. HOLDRIDGE (Biochem. J., 1935, **29**, 272—274).—A combustion tube for destruction of org. matter in dried cabbages, without loss of I, is described. A. E. O.

Mineral iodine in seaweeds. A. TROFIMOV (Planta, 1934, **23**, 56—70).—The distribution of I' in several species of algæ varied considerably. After heating fresh samples in H_2O 32—100% of the total I is in the form of I'. Grinding of the phylloid lamellæ of *Laminaria digitata* (I) resulted in the disappearance of I' and the deposition of a viscous gum-like substance from the cell walls. Ensilage of the algæ causes a rapid decrease in mobile I and a slow decline in total I content. Factors influencing the elimination of free I by (I) are examined. A. G. P.

Calcite formed under the influence of plants. J. WALLNER (Planta, 1934, **23**, 51—55).—The form of $CaCO_3$ derived from land and marine plants is discussed. A. G. P.

Phosphates in [plant] solution cultures. A. L. SOMMER (Ann. Rept. Alabama Agric. Exp. Sta., 1932, 14).—The min. [PO_4'''] for growth differs with different plants and in most field crops was inversely related to the root surface exposed to the solution. The no. of root hairs (I) was a dominant factor. Wheat and buckwheat with very numerous (I) were maintained by 0·1 p.p.m. of PO_4'''. Cotton did not maintain growth when P was removed from the nutrient although previously exposed to an excess for 64 days. CH. ABS. (*p*)

Phosphorus in alternate-bearing sugar prunes. C. COMPTON (Proc. Amer. Soc. Hort. Sci., 1933, **30**, 151—153).—The P content of wood, bark, and spurs, but not of leaves, reflected the alternate-bearing condition. CH. ABS. (*p*)

Factors affecting the absorption of magnesium by the potato plant. R. L. CAROLUS (Proc. Amer. Soc. Hort. Sci., 1933, **30**, 480—484).—Mg deficiency is characterised by very low Mg, rather low Ca, and high N contents in lower leaves. CH. ABS. (*p*)

Effect of potassium deficiency on the composition of the tomato plant. T. G. PHILLIPS, T. O. SMITH, and R. B. DEARBORN (New Hamps. Agric. Exp. Sta. Tech. Bull., 1934, No. 59, 16 pp.).—Deficient plants (I) had less ash and K and more Ca, Mg, and P (% of dry wt.) than those receiving a complete nutrient. On a fresh wt. basis, (I) were high in total solids, reducing sugars, and insol. N. Leaves contained much sucrose and stems had relatively low proportions of dextrin and starch. In the early stages of K deficiency there was no evidence of disturbed N metabolism. A. G. P.

Sulphur metabolism of plants. K. MOTHES and W. SPECHT (Planta, 1934, **22**, 800—803).—The significance of SO_4'' reduction in yeast and green leaf tissues is considered in relation to cystine formation and the redox system $\cdot SH \rightleftharpoons \cdot S \cdot S \cdot$ in plants. A. G. P.

Sulphur metabolism of maize and tobacco. E. HEISERICH (Z. Pflanz. Düng., 1935, **37**, 55—72).—The S metabolism of maize (I) and tobacco (II) is largely influenced by the nature of the N source. The total S in plants receiving NO_3' is much > that of those supplied with $NH_4^{\cdot}$, although the latter have the higher proportion of protein-S (III). Lower leaves of (II) in NO_3' media have approx. 20 times the SO_4'' content of $NH_4^{\cdot}$-fed plants. The glutathione-S (IV) is unaffected by N nutrition. Assimilation of S is dependent on reduction processes in the leaves. In S-deficient plants SO_4'' and (IV) are present only in minute amounts. N deficiency in (II) and S deficiency in (I) and (II) result in a large proportion of (III) becoming H_2O-sol. Feeding SO_4'' to such plants causes a return to normal S distribution. Carbohydrates increase in S-deficient plants but to a smaller extent than in N deficiency. In dormant maize seed > 50% of the (III) is H_2O-sol., but this proportion declines rapidly with the commencement of germination. A. G. P.

Effect of ultra-violet rays on growth and on calcium and phosphorus contents of plants. H. M. BENEDICT (Bot. Gaz., 1934, **96**, 330—341).—Rays of 290—310 mμ increased the dry matter production of all plants examined (except maize) and also the % of Ca. Rays < 290 mμ caused a decrease in dry wt. without affecting the % of Ca. No definite influence on PO_4''' intake was apparent. A. G. P.

Aberrations in the chemical composition of peas from plants affected with root-rot. Z. I. Kertesz, J. G. Horsfall, and A. H. Rouse (J. Agric. Res., 1934, 49, 799—814).—Peas from affected plants have lower H_2O contents, N, and ash and larger proportions of total carbohydrates. Of the latter, sugars are $<$ and starch is $>$ in normal plants. A. G. P.

Cause of wilt in flax. H. Grossmann (Phytopath. Z., 1934, 7, 545—583).—Culture solutions of *Fusarium lini* and other species induce wilt in flax. The toxic substance is non-volatile and thermolabile. A. G. P.

Influence of temperature on nitrogen content and rust-resistance of young cereal plants. G. Gassner and W. Franke (Phytopath. Z., 1934, 7, 315—326).—Protein content and sensitiveness to rust in wheat increased with falling growth temp. The sol. N in grain showed smaller and less definite changes. A. G. P.

"Little-leaf" or "rosette" of fruit trees. W. H. Chandler, D. R. Hoagland, and P. L. Hibbard (Proc. Amer. Soc. Hort. Sci., 1933, 30, 70—86).—Affected shoot-leaves and stems have subnormal Zn contents. Ch. Abs. (*p*)

Metabolic physiology of leaf-roll in potatoes. J. Hartisch (Planta, 1934, 22, 692—719).—Protein metabolism in healthy (I) and diseased (II) plants was not fundamentally different. Increased conversion of starch into dextrin in (II) is due to the greater activity of dextrinogen-amylase. Amylase activity in (II) occurs with p_H 3·5—4·5 and in (I) with 6·5—7·0. A. G. P.

Physiology of mosaic disease of tomato. W. H. Read (Ann. Rept. Exp. Res. Sta. Cheshunt, 1933, 64—67).—In healthy plants (*H*) the concn. of reducing sugars (I) in the laminæ remained const. and non-reducing sugars (II) increased during daylight to a max. at 3 p.m. In diseased plants (*D*), (I) increased to a max. at 3 p.m. and subsequently decreased rapidly, whereas (II) increased from noon to a max. at 6 p.m. Mean vals. of (II) in *H* were $>$ those in *D*. Differences in (I) were small. Starch contents were higher in laminæ of *D*. In petioles of *H* (I) was $>$ (II), the former showing max. at 6 p.m. and min. at 2 a.m., and (II) remaining approx. const. In *D*, (I) and (II) were practically equal between 8 a.m. and 7 p.m., with max. at noon and 6 p.m. Subsequently (II) fell to a very low val. Ch. Abs. (*p*)

Potato tests of the relationship between the potential of the tubers and the incidence of virus. E. Köhler and A. Hey (Zentr. Bakt. Par., 1935, II, 91, 255—267).—Active virus in potato results in a change of potential towards the negative side. A. G. P.

Deamination in virus-infected plants. A. V. V. Iyengar (Nature, 1935, 135, 345).—The increased production of NH_3 observed in spiked sandal is due to greater oxidative deamination in the diseased tissues. OH-acids, especially malic, are increased in the early stages, and in the more diseased tissues succinic acid is formed. An active deaminase appears to be present in infected plants. L. S. T.

Mill for fine grinding of difficult (especially plant) materials. R. Feulgen and M. Behrens (Z. physiol. Chem., 1935, 231, 85—87).—The coarsely ground material suspended in C_6H_6 is drawn between a rotor and stator of fine emery. J. H. B.

Preparation of semipermeable sac-membranes. J. Duckworth (Biochem. J., 1935, 29, 656—659).—A method for preparing collodion membranes of uniform permeability, and an apparatus for carrying out ultrafiltration with them, are described. W. O. K.

Determination of the acid–base balance in food materials. J. Davidson and J. A. LeClerc (J. Biol. Chem., 1935, 108, 337—347).—The acid–base balance is determined by titration to p_H 7·4 of the ash, with corrections for S and Cl lost during the ashing. The results are $<$ those obtained by the usual computation method. H. G. R.

Determination of chlorine in small amounts of tissue. W. Niemierko (Acta Biol. Exp. [Warsaw], 1932, 7, 101—106).—Tissue is decomposed by HNO_3 containing $AgNO_3$. The AgCl formed is dissolved in aq. NH_3 and treated with $(NH_4)_2S$. The Ag_2S ppt. is dissolved in HNO_3 and Ag determined by Volhard's method. Ch. Abs. (*p*)

Determination of selenium in animal matter and clinical test in urine. H. C. Dudley and H. G. Byers (Ind. Eng. Chem. [Anal.], 1935, 7, 3—4).—Earlier procedure (B., 1934, 798) is modified. E. S. H.

Physiological arsenic and the use of the Kjeldahl flask in its detection. G. Lockemann (Z. anal. Chem., 1935, 100, 20—29).—The As content of glass Kjeldahl flasks vitiates the analysis. SiO_2 flasks are recommended. R. S.

Comparative investigation of the methods of Mendel and Goldscheider and of Friedemann and Kendall for determination of lactic acid. G. Ingvarsson (Biochem. Z., 1935, 276, 297—308).—Using aq. solutions of lactic acid (I) and treating with HPO_3–$CuSO_4$–CaO (II) the Mendel–Goldscheider method (III) gave higher results than the Fürth–Charnass method as modified by Friedemann and Kendall (IV). When (I) is added to blood and (II) used for removal of protein and carbohydrate, a recovery of 87 and 98% of the added (I) is obtained by methods (III) and (IV), respectively. With both methods after administration of adrenaline there is always an increase of (I); after glucose in 16 cases an increase, and in one case a decrease, of (I) was obtained. P. W. C.