

BRITISH CHEMICAL ABSTRACTS

A.—PURE CHEMISTRY

JULY, 1935.



General, Physical, and Inorganic Chemistry.

Intensity of the electrodeless hydrogen spectrum as conditioned by pressure and discharge-tube dimensions. M. S. McCAY (*J. Elisha Mitchell Sci. Soc.*, 1934, 50, 55). CH. ABS. (e)

Doubly-excited helium atom. H. PRIESTLEY and R. WHIDDINGTON (*Proc. Leeds Phil. Soc.*, 1935, 3, 81—84).—A second double-excitation process in He produced by electron impact has an associated energy of 62.27 volts. This and the previous val. 59.25 volts agree with calc. vals. for the energy levels of doubly-excited He. An angular distribution curve is given for $(2s2p)P$ excitation using 400-volt electrons and compared with the $3P$ distribution for electrons of the same energy. W. R. A.

Zeeman effect in diatomic molecular states having L -uncoupling. J. K. KNIPP (*Physical Rev.*, 1935, [ii], 47, 672—677).—Mathematical. The He mol. is considered. N. M. B.

Perturbed series, especially in C III, B I, and O IV. N. G. WHITELOW and J. E. MACK (*Physical Rev.*, 1935, [ii], 47, 677—678; cf. A., 1933, 1220).—Corrections of series limits, based on the use of certain preferential series as indicated by possible extra-configurational perturbations in at. spectral series, are obtained. N. M. B.

Provisional wave-length standards for the extreme ultra-violet. J. C. BOYCE and C. A. RIEKE (*Physical Rev.*, 1935, [ii], 47, 653—657).—Criteria are discussed, and provisional vals. are given for a no. of lines of C, N, O, and A in the range 1850—800 Å. N. M. B.

Efficiency of excitation of the nitrogen first positive bands by electron impact. S. E. WILLIAMS (*Proc. Physical Soc.*, 1935, 47, 420—423).—The upper limit of the effective target area of N_2 for excitation to the triplet levels was determined. The rate of emission of quanta in each of the visible groups of the first positive system was evaluated and was extended to the whole of the first positive system. The cross-sectional area, for excitation by electrons of about 14 volts energy, is $5 \times 10^{-2} \pm 35\%$, in terms of the area of the first Bohr orbit. N. M. B.

Effective rotation temperature of the negative glow in nitrogen. N. THOMPSON (*Proc. Physical Soc.*, 1935, 47, 413—414).—Results previously reported are extended (cf. A., 1934, 711). N. M. B.

Intensity measurements on forbidden lines in the spectra of alkali metals. E. ROSA (*Nuovo*

Cim., 1934, [ii], 11, 380—389; *Chem. Zentr.*, 1934, ii, 3904).—Data are given for the series $2p$ — mp . J. S. A.

Continuous absorption by alkalis. A. THOMA (*Z. Physik*, 1935, 94, 621—648).—Theoretical. A. B. D. C.

Isotope shift in Mg I. R. F. BACHER and R. A. SAWYER (*Physical Rev.*, 1935, [ii], 47, 587—591).—Structure has been observed for several of the Mg I lines in the visible and infra-red, and is attributed to isotope shift. Separations and interpretation are discussed, and indicate that the observed structure cannot be due to mass effect alone. N. M. B.

Absorption spectrum of CaI. R. SAMUEL and M. ZAKI-UD-DIN (*Proc. Indian Acad. Sci.*, 1935, 1, A, 723—726).—Mol. proportions of CaI_2 and Ca heated in a steel bomb for 10—12 hr. at 800—900° and cooled at 0° yield a product containing highly reactive yellowish-brown crystals, giving an indefinite spectrum not containing bands, but showing continuous end-absorption at 2300 Å. attributed to CaI. The energy of the first Ca—I linking, calc. thermochemically, is approx. 2.5 volts. N. M. B.

Band spectrum of zinc. T. S. SUBBARAYA (*Proc. Indian Acad. Sci.*, 1935, 1, A, 663—667; cf. this vol. 3).—A preliminary analysis is given and the relation with the Rayleigh Hg bands is discussed. N. M. B.

Selenium arc spectrum. Se I. J. E. RVEDY and R. C. GIBBS (*Z. Physik*, 1935, 94, 808—809).—Polemical, against Meissner *et al.* (A., 1934, 1280). A. B. D. C.

Selenium arc spectrum. K. W. MEISSNER (*Z. Physik*, 1935, 94, 810—811).—A reply to the above. A. B. D. C.

Molecular spectrum of selenium vapour. I. New system of bands in the ultra-violet. B. ROSEN and M. DÉsirANT (*Bull. Acad. roy. Belg.*, 1935, [v], 21, 436—449).—A new band system for Se vapour is discussed and is due to Se_4 mols. W. R. A.

Emission spectrum in selenium vapour. B. ROSEN and M. DÉsirANT (*Nature*, 1935, 135, 913—914).—A new system of approx. 40 weak, diffuse bands on the short-wave side of the main ${}^1\Sigma$ — ${}^1\Sigma$ system appears at low temp. before the main system becomes visible. It is probably due to the excitation of the Se_2 group in a polyat. mol. of Se. L. S. T.

Influence of an electric field on the absorption spectra of rubidium and caesium. N. T. ZE and C. S. PIAW (*J. Phys. Radium*, 1935, [vii], 6, 147—153; cf. A., 1934, 823).—The absorption spectra were

photographed in an electric field range 260—1820 volts per cm. The no. of observable lines of the principal series diminishes with increase of field, and new lines for $S-D$ and $S-S$ transitions appear. A Stark effect for the higher members of the principal series and a displacement towards short wave-lengths for forbidden lines of the combinations $S-D$ and $S-S$ were observed.

N. M. B.

Hyperfine structure of the red Cd line λ 6438, and hyperfine structure of Sr, Sn, and Mg. H. WESTMEYER (Z. Physik, 1935, 94, 590—596).—Ferchmin and Romanowa's structure for the Cd line (A., 1934, 2) could not be reproduced. The nuclear moment of Sr^{87} is $3/2$, and of Sn^{117} and Sn^{119} $1/2$.

A. B. D. C.

Regularity observed in the second spark spectrum of iodine. J. B. SETH (Proc. Indian Acad. Sci., 1935, 1, A, 593—604).—From a special treatment of available data a series of wave-no. pairs giving a system of equal frequency differences is developed and discussed.

N. M. B.

Ultra-violet fluorescence spectra of iodine vapour. Resonance spectra. F. DUSCHINSKY, E. HIRSCHLAFF, and P. PRINGSHEIM (Physica, 1935, 2, 439—448).—The resonance lines of I_2 vapour excited by λ 1850—2600 Å. have been investigated at various temp. and pressures. The lines appearing at lower temp. belong to one band system, the lower level of which is the normal state and the upper levels states of greater nuclear separation. When excited by radiation of $\lambda > 2100$ Å. a second series appears of smaller separation. This increases in intensity with rise of temp. and equals the intensity of the first series at 800° . The results are discussed.

J. W. S.

Polarisation of the fluorescence bands 2540 and 2650 Å. of mercury vapour. G. ZIELIŃSKI (Compt. rend., 1935, 200, 1313—1314; cf. A., 1934, 2).—Partial polarisation ($5.5 \pm 0.5\%$) in the plane of excitation is confirmed.

N. M. B.

L Spectrum of mercury. (MLE.) Y. CAUCHOIS (Compt. rend., 1935, 200, 1314—1316; cf. this vol., 676).—Data and transitions for 17 weak lines are tabulated. Additional vals. for levels are given.

N. M. B.

Absolute intensities in the spectrum of quartz mercury arcs and their variation with temperature changes of the surrounding air. A. J. MADDOCK (Proc. Physical Soc., 1935, 47, 424—432).—Arc watts-intensity variation curves for temp. variation of air surrounding the burner are plotted. Abs. intensities of 30 lines in the range 7000—2300 Å. are tabulated and discussed.

N. M. B.

Night light and Northern lights in the long-wave spectral region. L. VEGARD and E. TØNSBERG (Z. Physik, 1935, 94, 413—433).—Measurements are given for red bands photographed at Oslo and Tromsø. Red bands of the night light correspond with the first positive group of N_2 afterglow.

A. B. D. C.

Vegard-Kaplan bands in the spectrum of the night sky. J. CABANNES and J. DUFAY (Compt. rend., 1935, 200, 1504—1506).—Bands observed by

the authors correspond with N_2 bands described by Kaplan (this vol., 424).

H. J. E.

Variation of relative width of stellar hydrogen lines with spectral type. P. ROSSIER (Arch. Sci. phys. nat., 1935, [v], 17, Suppl., 32—34).—The width of a stellar line depends on the intensity of the continuous spectrum in its neighbourhood. Passing from a hot star to a more advanced spectral type, the relative density diminishes in the ultra-violet and increases in the visible. The effect on the relative widths of H_α , H_β , H_γ , H_δ , and $H_\epsilon + H_\zeta$ is determined.

A. J. M.

Variation of relative width of stellar calcium and hydrogen lines with spectral type. P. ROSSIER (Arch. Sci. phys. nat., 1935, [v], 17, Suppl., 34—36).—The width of the Ca K line varies linearly with the spectral interval. A numerical criterion of spectral classification can be based on this.

A. J. M.

Ratio of widths of the $H_\epsilon + H$ and K lines in stellar spectrograms. P. ROSSIER (Arch. Sci. phys. nat., 1935, [v], 17, Suppl., 36—37).

A. J. M.

Spectral type of some stars of type A. P. ROSSIER (Arch. Sci. phys. nat., 1935, [v], 17, Suppl., 38—39).—Using the fact that the relative width of the Ca K line varies linearly with spectral interval it is shown that five stars are of a more advanced type than A_0 .

A. J. M.

Continuous spectrum of certain stars of the first spectral types. D. BARBIER, D. CHALONGE, and E. VASSY (J. Phys. Radium, 1935, [vii], 6, 137—146; cf. A., 1934, 824).—Using special apparatus, the spectra are photographed and compared with the spectrum of an artificial star consisting of a distant H_2 tube giving a spectrum rich in the ultra-violet and of known energy distribution. Data for 18 stars and their bearing on the constitution of the stellar atm. are given.

N. M. B.

Identification of neon in the spectrum of the B stars. M. NICOLET (Bull. Acad. roy. Belg., 1935, [v], 21, 459—466).—A no. of Ne II lines are observed in the spectra of the B stars, 10 *Lacertae*, γ *Cassiopeia*, τ *Scorpii*, β *Caius Majoris*, and β *Cephei*.

W. R. A.

Difference bands in the spectra of the major planets. A. ADEL and V. M. SLIPHER (Physical Rev., 1935, [ii], 47, 651—653).—Absorption bands found in the spectra of Jupiter, Saturn, Uranus, and Neptune, due to gaseous CH_4 , lie at 816, 802, 683, 673, and 584 μ .

N. M. B.

Measurements of small light intensities with a counter. I. K. H. KREUCHEN (Z. Physik, 1935, 94, 549—566).—Calibration curves are given for the spectral region 400 to 248 $m\mu$ using the emitters Al, Zn, Cd, Fe, Cu, and brass. The region from 248 to 185 $m\mu$ was also considered. Modification of readily oxidised metals with active H_2 increases their sensitivity in the short-wave region.

A. B. D. C.

Electrodeless discharges in gases. O. STUHLMAN, jun. (J. Elisha Mitchell Sci. Soc., 1934, 50, 61).—Data for the dependence of the intensity of H_α and H_β on discharge conditions are recorded.

CH. ABS. (e)

Gas discharges in the cloud chamber. H. RAETHER (Z. Physik, 1935, **94**, 567—573).—Discharges from wires and points in H_2 , N_2 , air, and CO_2 were photographed in Wilson's cloud chamber.

A. B. D. C.

Stark splitting of the 6S level of the manganese ion in crystalline fields. K. S. KRISHNAN and S. BANERJEE (Nature, 1935, **135**, 873). L. S. T.

Auger effect and forbidden transitions. H. R. ROBINSON (Nature, 1935, **135**, 826). L. S. T.

Absorption spectra in the ultra-soft X-ray region. V. H. SANNER (Z. Physik, 1935, **94**, 523—530).— L_{III} absorption limits are given for Al(13) and Mg(12), and the M_V limit for Se(34).

A. B. D. C.

Influence of temperature on the intensity of X-ray reflexion from silver. R. ANDRIESEN (Physica, 1935, **2**, 417—424).—For Ag the Debye X-ray reflexion factor M (intensity $\propto e^{-2M}$) varies linearly with temp. at 18—400°. At 400—600° deviations are observed which are attributed to anharmonic linking of the atoms in the crystal lattice.

J. W. S.

Dependence of photophoresis on pressure at high gas pressures. M. REISS (Physikal. Z., 1935, **36**, 410—413).—The photophoretic force of a photopositive sample of Se was determined for pressures (p) of 1—11 atm. It decreases with increasing p . The Hettner $1/p$ law is obeyed.

A. J. M.

Thermionic properties of tantalum. A. B. CARDWELL (Physical Rev., 1935, [ii], **47**, 628—630; cf. A., 1932, 105).—The photo-electric and thermionic properties of outgassed Ta were investigated simultaneously. Heat treatment at 2200—2500° abs. produced a final stable condition. Corr. thermionic consts. were determined. The photo-electric and thermionic work functions agree, for the same surface, irrespective of thorough outgassing.

N. M. B.

Determination of heats of vaporisation of electrons and their temperature coefficients for molybdenum, tungsten, and tantalum filaments by the cooling method. F. KRÜGER and G. STABENOW (Ann. Physik, 1935, [v], **22**, 713—734).—A method is described for this determination. For Mo the heat of vaporisation (h) of electrons could only be determined over the range 2140—2055° abs., owing to the rapidity with which the element vaporises. The temp. coeff. (k) could not be determined. For Ta and W, h was found over the range 2100—2600° abs. For both, k was positive. The vals. of h extrapolated to 0° abs. agree well in all cases with those calc. from the Richardson equation, but are usually slightly smaller.

A. J. M.

Number of free electrons in a metal. H. FRÖHLICH (Proc. Camb. Phil. Soc., 1935, **31**, 277—280).—Theoretical. The connexion between the no. of free electrons in a metal and valency is discussed.

A. J. M.

Suggested polarisation of electrons. M. HATOYAMA and M. KIMURA (Nature, 1935, **135**, 913—914; cf. A., 1934, 712).—The asymmetry previously reported (A., 1933, 3) could not be confirmed with Au at voltages from 150 to 190 kv.

L. S. T.

Sudden changes in speed and direction shown by the paths of high-energy electrons. L. LEPRINCE-RINGUET (Compt. rend., 1935, **200**, 1524—1526).—Observations are recorded on Wilson-chamber tracks of electrons of 1—10 $\times 10^6$ e.v. energy.

H. J. E.

Origin of positive electrons. G. RACAH (Nuovo Cim., 1934, [ii], **11**, 477—481; Chem. Zentr., 1935, i, 11).—Mathematical.

J. S. A.

Momentum of ions leaving a region of ionisation. L. TONKS (Physical Rev., 1935, [ii], **47**, 621—622).—A correction depending on geometrical configuration is examined.

N. M. B.

Ionic hardening. T. NEUGEBAUER (Z. Physik, 1935, **94**, 665—661).—Penetration of the anion into the electron cloud of the cation is used to extend point charge calculations for ionic lattices.

A. B. D. C.

High-velocity particle streams in the vacuum arc. E. C. EASTON, F. B. LUCAS, and F. CREEDY (Elec. Engr., 1934, **53**, 1454—1460).—Relations are given between arc current, mass of metal transported, gas pressure, force between electrodes, and velocity of vapour streams for Fe, Cu, C, W, and other electrodes.

CH. ABS. (c)

Negative proton. G. GAMOW (Nature, 1935, **135**, 858—861).—Indications of the existence of negative protons are discussed.

L. S. T.

Polarisability of the hydrogen molecule ion. G. STEENSHOLT (Z. Physik, 1935, **94**, 770—772).—Theoretical.

A. B. D. C.

Collisions of electrons with nitrogen molecules. R. WHIDDINGTON and E. G. WOODROOFE (Proc. Leeds Phil. Soc., 1935, **3**, 85—87).—The energy losses of electrons in collision with N_2 are 8.95, 12.89, 13.81, and 15.91 volts. Their interpretation in relation to spectroscopic data is discussed.

W. R. A.

Revision of the at. wt. of arsenic. Ratio of arsenic trichloride to iodine. G. P. BAXTER and L. D. FRIZZELL (J. Amer. Chem. Soc., 1935, **57**, 851—855).— $AsCl_3$ was hydrolysed with Na_2HPO_4 , the approx. equiv. of I added, the solution neutralised, and excess or deficiency of I determined by titrating with dil. arsenite or I and starch. At. wt. As 74.91 ($I = 126.916$) (cf. A., 1933, 442, 659).

M. S. B.

At. wt. of tellurium. III. Analysis of tellurium tetrachloride. O. HÖNIGSCHMID and H. BAUDREXLER (Z. anorg. Chem., 1935, **223**, 91—100; cf. A., 1933, 761, 1223).—32 argentometric analyses of $TeCl_4$ gave $Te = 127.63 \pm 0.01$, referred to Ag 107.880 and Cl 35.457. This is regarded as a max. val., on account of the liability of $TeCl_4$ to dissociate.

F. L. U.

Isotopes. F. W. ASTON (Nature, 1935, **135**, 686—687).

L. S. T.

Modified Aston-type mass spectrometer and some preliminary results. D. D. TAYLOR (Physical Rev., 1935, [ii], **47**, 666—671).—Ionisation is produced by controlled electron bombardment. The electric field is radial, and the magnetic pole faces are shaped to give the necessary velocity focussing. A special filament assembly, amplifier circuit, and

device for giving a continuous indication α (magnetic field)² are used. Results on the ionisation of N_2 , CO , NH_3 , and N_2H_4 are given. N. M. B.

Band spectroscopic observations of the isotopes of zinc and cadmium. G. STENVINKEL and E. SVENSSON (Nature, 1935, 135, 955; cf. A., 1933, 108).—The existence of Cd^{106} and Cd^{118} is established by band spectrograms of the hydride despite lack of confirmatory evidence for Cd^{118} by mass spectroscopic observations (cf. A., 1934, 937). The band spectrum of Zn hydride shows the Zn isotopes in the following order of decreasing abundance: 64, 66, 68, 67, 65, 63, and 70. The disagreement between spectroscopic and mass spectroscopic observations regarding the existence of isotopes does not indicate untrustworthiness of the former. L. S. T.

Isotopic constitution and at. wts. of hafnium, thorium, rhodium, titanium, zirconium, calcium, gallium, silver, nickel, cadmium, iron, and indium. F. W. ASTON (Proc. Roy. Soc., 1935, A, 149, 396—405).—An account is given of the analyses of 13 elements, some by the use of the favourable arrangement of the anode-ray apparatus previously used for the rare earths (A., 1934, 1150), others by the ordinary discharge with improved technique. The vals. of the chemical at. wts. calc. from photometric measurements are mostly in fair agreement with the International vals. 20 new isotopes were discovered, those of Hf, Th, and Rh being detected for the first time. L. L. B.

Radioactivity of potassium. C. HURST (Nature, 1935, 135, 905).—Klemperer's view (this vol., 558) that the radioactivity of K is due to ${}_{10}K^{40}$ is supported, but a nuclear spin of only 2 or 3 units, and not 4 or 5, is sufficient to increase the half-val. period of the isotope to a reasonable figure. L. S. T.

Investigation of weak radioactive elements in the absence of ultra-radiation. M. PAHL and R. HOSEMANN (Naturwiss., 1935, 23, 318—319).—The activity of K or of Rb, whether determined in the laboratory or at a depth of 800 m., was identical, showing that the radioactivity of weakly active elements is not due to the formation of radioactive elements by bombardment of inactive ones with ultra-radiation. The fact that the natural no. of an Al counter is $>$ that of a brass one is also shown not to be due to the effect of ultra-radiation on the metals. A. J. M.

α -Tracks in presence of strong γ -radiation. D. CAMERON (Nature, 1935, 135, 789).—Under the conditions described, it is possible to observe α -particles in the presence of strong γ -radiation by the Wilson cloud method. L. S. T.

Scattering of protons on protons. W. H. WELLS (Physical Rev., 1935, [ii], 47, 591—596).—Recoil particles from Cellophane bombarded by Po α -particles were used as a source of protons for obtaining large nos. of high-energy proton tracks in H_2 with a Wilson cloud chamber. The velocity distribution of 500 protons is given. From 33 intimate proton-proton collisions in 200,000 tracks, two were within the region of anomalous scattering of α -particles

by H_2 . The closest distance of approach was 6.1×10^{-13} cm. N. M. B.

Spontaneous emission of neutrons by radioelements. I. GUREVICH (Nature, 1935, 135, 956—957).—The neutrons spontaneously emitted by P previously bombarded by neutrons from a Rn+Be source may possess $> 4 \times 10^6$ e.v. Neutron emission is regarded as a secondary and not the primary process suggested by Curie *et al.* (A., 1934, 826). L. S. T.

Velocities of "slow" neutrons. P. B. MOON and J. R. TILLMAN (Nature, 1935, 135, 904).—The induced activity of Ag and Rh bombarded by neutrons retarded by passage through paraffin wax cooled with liquid O is $>$ that obtained with the wax at room temp. With I, the activity is less with the cooled wax, and the difference in behaviour from Ag and Rh indicates that it preferentially absorbs neutrons of velocities different from and probably $>$ those which are effective in other cases. The absorption of "slow" neutrons by a block of I is for an I detector $>$ for detectors of Ag or Rh. L. S. T.

Collisions between neutrons and diplons. C. H. COLLIE, J. H. E. GRIFFITHS, and L. SZILARD (Nature, 1935, 135, 903—904).—The artificial radioactivity produced in spherical detectors of Al, Si, and P by neutrons from a Be+Rn source slowed down by passage through 98.4% D_2O has been compared with that produced after retardation by H_2O . The results indicate that neutrons undergo a greater decrease in velocity on collision with protons than with diplons. L. S. T.

Slowing down of neutrons by protons. J. C. MCLENNAN, E. F. BURTON, and A. PITT (Nature, 1935, 135, 903).—Measurements of the activity produced in a Ag cylinder surrounding a neutron source when both were surrounded by air, H_2O at room temp., and by liquid H indicate that the induced activity is not affected by changes in temp. L. S. T.

Neutron excitation in beryllium. L. EMO (Nuovo Cim., 1934, [ii], 11, 452—460; Chem. Zentr., 1934, ii, 3901).—Neutron emission from Be is attributed to a resonance effect, and begins sharply at a definite range. J. S. A.

Concentration of artificially-produced radioelements by an electric field. F. A. PANETH and J. W. J. FAX (Nature, 1935, 135, 820).—In the bombardment of AsH_3 by slow neutrons from a Be+radio-Th source, the application of an alternating electric field resulted in the collection on the wire electrode of up to 30% of the total activity produced by the neutrons, together with only approx. 0.02% of the total inactive As. The method should be of use whenever thin layers of new radio-elements are required. L. S. T.

Disintegration of nitrogen and boron and possible emission of deuterons. E. POLLARD and W. W. EATON (Physical Rev., 1935, [ii], 47, 597—605).—The detection of nuclear particles by a proportional counter and the investigation of N_2 and B disintegration by α -particles are described. N_2 gave no group ascribable to deuterons; B gave a short-

range group of the expected energy. Particles from both elements were shown to be protons.

N. M. B.

Two new Curie-Joliot processes. H. FAHLENBRACH (Naturwiss., 1935, 23, 288).—Powdered Si, exposed for 18 days to α -rays from Th-B and Th-C, gives a product of half-life 17–18 days. The process is probably ${}_{14}\text{Si}^{29} + {}_2\alpha^4 \rightarrow {}_{15}\text{P}^{32} + {}_1\text{H}^1$; ${}_{15}\text{P}^{32} \rightarrow {}_{16}\text{S}^{32} + e^-$. The half-life and absorption coeff. of P^{32} obtained by Fermi by the process ${}_{16}\text{S}^{32} + {}_0n^1 \rightarrow {}_{15}\text{P}^{32} + {}_1\text{H}^1$ agree with those obtained by the new process. Mg was bombarded with α -rays of range 7.7 cm. in air (from Th-C') for 40 min. Two active products were obtained, one with half-life 2.1 ± 0.2 min., due to Al^{28} : ${}_{12}\text{Mg}^{25} + {}_2\alpha^4 \rightarrow {}_{13}\text{Al}^{28} + {}_1\text{H}^1$; ${}_{13}\text{Al}^{28} \rightarrow {}_{14}\text{Si}^{28} + e^-$; another of 7–8 min. Only the first was obtained when shorter-range α -rays from Po were used. The second may be Al^{29} or Si^{27} formed by the processes: ${}_{12}\text{Mg}^{24} + {}_2\alpha^4 \rightarrow {}_{14}\text{Si}^{27} + {}_0n^1$; ${}_{14}\text{Si}^{27} \rightarrow {}_{13}\text{Al}^{27} + e^+$, and ${}_{12}\text{Mg}^{26} + {}_2\alpha^4 \rightarrow {}_{13}\text{Al}^{29} + {}_1\text{H}^1$; ${}_{13}\text{Al}^{29} \rightarrow {}_{14}\text{Si}^{29} + e^-$, respectively. The excitation curve gives resonance levels at 4.15 and 4.90 cm. range of α -rays. These are identical with the vals. obtained by Duncanson and Miller (A., 1934, 1284), and ascribed by them to Mg^{25} . A. J. M.

Induced radioactivity. C. D. ELLIS (Nature, 1935, 135, 688–689). L. S. T.

Induced radioactivity. S. C. BISWAS (Current Sci., 1935, 3, 475–477).—Direct attachment of neutrons to Na, Al, and P atoms seems improbable, although this process does appear to be intermediate in the transmutations of heavier elements.

W. R. A.

Atomic physics. (LORD) RUTHERFORD (Nature, 1935, 135, 683–685).—An outline of the discoveries of the last 25 years. L. S. T.

Artificial radioactivity. H. FAHLENBRACH (Z. Physik, 1935, 94, 607–620).—Experiments are described of radioactivity induced in B, Al, and N with Th-B+C and Po. The following half-life periods were obtained: N^{13} 10.73 min., P^{30} 2.89 min., and F^{17} 1.1 to 1.2 min. A. B. D. C.

Production of positrons in different elements. S. DE BENEDETTI (Compt. rend., 1935, 200, 1389–1391).—The no. of positron+electron pairs produced by bombardment of Mg, Al, S, Cu, Zn, Sn, and Pb with Ra-Th γ -rays \propto the square of the at. no., but the no. emitted from C is $>$ this. J. W. S.

Sign and energy of electrons emitted by elements activated by neutrons. E. AMALDI and E. SEGRÉ (Nuovo Cim., 1934, [ii], 11, 452–460; Chem. Zentr., 1934, ii, 3901).—Negative electrons accompanied by γ -rays were detected by a Wilson chamber method. Energy data are given. J. S. A.

Induced β -radioactivity by β -particle bombardment. H. J. WALKE (Nature, 1935, 135, 905–906).—The emission of neutrons and the subsequent positron radioactivity which occur when Li is bombarded by α -particles suggest that proton emission from Li should also be detectable. Delayed emission of “negative” electrons should be observed when Li and B are bombarded by α -particles of suitable

energy. The production of β -radioactive isotopes by proton emission from ${}^8\text{O}^{17}$, ${}^{10}\text{Ne}^{21}$, etc. is also possible.

L. S. T.

Fermi proton effect in silver. S. KIKUCHI, S. NAKAGAWA, and H. AOKI (Nature, 1935, 135, 905).—The decay curve of Ag activated by neutrons retarded by passage through paraffin wax cannot be expressed as a single exponential curve. L. S. T.

Radioactivity produced by neutron bombardment. E. FERMI (Nuovo Cim., 1934, [ii], 11, 429–441; Chem. Zentr., 1934, ii, 3901).—A summary. The emission of negative electrons only has been observed. J. S. A.

Artificial radioactivity through neutron bombardment. V. E. AMALDI, O. D'AGOSTINO, E. FERMI, F. RASETTI, and E. SEGRÉ (Ric. Sci. Progr. tecn., 1934, 2, No. 5, 21–22; Chem. Zentr., 1934, ii, 3901).—Detailed results are given for Na, V, Cr, Mn, As, Rb, Rh, Cd, Ir, Au, Th, and U, with chemical evidence for the formation of elements of at. no. $>$ 92 in the case of U. J. S. A.

Investigation of atomic disintegration by means of a double ionisation chamber. B. ZIPPRICH (Naturwiss., 1935, 23, 319–320).—The use of two ionisation chambers, one behind the other, gives greater constancy of experimental conditions, and enables the range and relative no. of particles formed in at. disintegrations to be more accurately determined. A. J. M.

Energy released in certain nuclear transformations. M. L. E. OLPHANT, A. R. KEMPTON, and (LORD) RUTHERFORD (Proc. Roy. Soc., 1935, A, 149, 406–416).—The accurate determination of the ranges and energies of the swift particles emitted in certain transformations yields data which afford strong evidence of the validity of the laws of conservation of mass-energy, and of momentum, in some at. transmutations in which H^1 , H^2 , H^3 , He^4 , Li^6 , Li^7 , and the neutron are involved. The masses found for Li^6 and Li^7 (6.0143 ± 0.0002 and 7.0148 ± 0.0002 , respectively) are in good agreement with the mass spectroscopic vals. found by Bainbridge. Application of the laws of conservation of momentum and energy gives the mass of H^3 3.0152 ± 0.0002 . L. L. B.

Coincidence counter studies of the variation of intensities of cosmic-ray showers and vertical rays with barometric pressure. E. C. STEVENSON and T. H. JOHNSON (Physical Rev., 1935, [ii], 47, 578–580).—Coeffs. of decrease of intensity with rise of pressure were found. Showers are more sensitive than total cosmic radiation to pressure changes.

N. M. B.

Nature of cosmic radiation. W. F. G. SWANN (Physical Rev., 1935, [ii], 47, 575–577).—If the distribution of energy of the rays entering the atm. is adjusted so as to give an exponential law, the quality of the radiation is independent of altitude, and all phenomena produced by the radiation should increase with altitude \propto the intensity alone. N. M. B.

Cosmic rays. A. H. COMPTON (Nature, 1935, 135, 695–698).—The nature, origin, production, and action of cosmic rays on matter are discussed.

L. S. T.

Secondary effects of cosmic radiation below a water screen. B. ROSSI and S. DE BENEDETTI (Ric. sci. Progr. tecn., 1934, 2, No. 5, 93—94; Chem. Zentr., 1935, i, 15). J. S. A.

New component of cosmic radiation. B. ROSSI and S. DE BENEDETTI (Ric. sci. Progr. tecn., 1934, 2, No. 5, 95, 119—122; Chem. Zentr., 1935, i, 15).—The production of "showers" increases more rapidly with altitude than does the total intensity of the primary radiation, and is attributed to a new component of this latter. J. S. A.

Absorption of cosmic particles in elements of various atomic numbers. G. ALOCCO (Ric. sci. Progr. tecn., 1934, 2, No. 5, 91—93; Chem. Zentr., 1935, i, 194).—No difference was observed in absorption by Cu and by Pb under comparable conditions. H. J. E.

Secondary phenomena of penetrating radiation in lead. I, II. A. DRIGO (Ric. sci. Progr. tecn., 1934, 2, No. 5, 88—89, 89—91; Chem. Zentr., 1935, i, 15, 16).—Results support the views of Rossi *et al.* (cf. preceding abstracts). J. S. A.

Binding energy of atomic nuclei and the system of isotopes. L. SHTRUM (Physikal. Z. Sovietunion, 1934, 6, 29—52; cf. A., 1934, 1152).—Analysis of the curve giving the external mass defect shows that the at. nuclei contain only neutrons and protons, but no α -particles. Regularities in nuclear structure are pointed out and new isotopes are predicted. CH. ABS. (e)

Nuclear potential barriers. E. POLLARD (Physical Rev., 1935, [ii], 47, 611—620).—The corr. heights of nuclear potential barriers are derived from experimental data. Barriers differ markedly for different incident particles. The heights of barriers to α -particles increase with at. no., and the nuclear radius at the top \propto (at. wt.)^{1/2}. It is suggested that the anomalies in proton barriers are due to a first-order force effective outside their tops, and that the attraction operative in α -particle collisions is a second-order force. Energies of resonance levels increase approx. linearly with at. no. N. M. B.

Energy of disintegration and a possible structure of the radioactive nuclei. G. J. SIZOO (Physica, 1935, 2, 472—482).—When the vals. of the energies of α -ray disintegration or the vals. of the upper limits of the continuous β -ray spectra are plotted against $M - 1.5Z$ (M = mol. wt., Z = at. no.), separate parallel curves are obtained for atoms of odd and even Z , respectively. It is supposed that elements of even Z contain $Z/2$ α -particles and $M - 2Z$ neutrons, whilst odd elements have $(Z - 1)/2$ α -particles, $M - 2Z + 1$ neutrons and 1 proton. J. W. S.

Fundamental paradox of the quantum theory. G. TEMPLE (Nature, 1935, 135, 957).—It is deduced that any two operators which represent physical variables must commute. This would make Planck's const. zero. L. S. T.

Non-adiabatic character of variations of nuclear charge. L. GOLDSTEIN (Compt. rend., 1935, 200, 1294—1296).—The effect of the electrons

surrounding the nucleus on processes involving gain or loss of charges by the nucleus is examined.

N. M. B.

Deviations of atomic nuclei from spherical symmetry. H. SCHÜLER and T. SCHMIDT (Z. Physik, 1935, 94, 457—468).—The mechanical moments of Eu^{151} , 153 are 5/2, and the ratio of the magnetic moments 151/153 is 2.2. Spherical symmetry of nuclei of Eu, Lu, In, Sb, and Hg are discussed. A. B. D. C.

Eigenfunctions for electrons of heavy elements. L. PINCHERLE (Nuovo Cim., 1934, [ii], 11, 372—379; Chem. Zentr., 1934, ii, 3901).—Mathematical. J. S. A.

Determination of the elementary electric charge. E. SCHOPPER (Z. Physik, 1935, 94, 649).—Earlier work by Schopper (cf. this vol., 279) is corr. A. B. D. C.

Electron waves. M. STECK (Z. Physik, 1935, 94, 489—495).—De Broglie waves are shown to be high-frequency electromagnetic waves, similar to γ -rays. A. B. D. C.

Van der Waals interaction of hydrogen atoms. L. PAULING and J. Y. BEACH (Physical Rev., 1935, [ii], 47, 686—692).—Mathematical. Interaction at large internuclear distances is discussed by the use of a linear variation function giving a solution to any desired degree of accuracy. N. M. B.

Normal helium atom. J. H. BARTLETT, jun., J. J. GIBBONS, jun., and C. G. DUNN (Physical Rev., 1935, [ii], 47, 679—680).—Mathematical. A least-squares criterion for the merit of approx. wave functions is proposed. N. M. B.

Atomic wave functions for some excited states of helium. W. S. WILSON and R. B. LINDSAY (Physical Rev., 1935, [ii], 47, 681—686).—Mathematical. N. M. B.

Nuclear shells: angular and magnetic momenta of nuclei. P. G. KRUGER (Physical Rev., 1935, [ii], 47, 605—610).—An isotopic system, with proton and neutron shells, for the first 30 elements is examined. N. M. B.

Energy and angular momentum in certain optical problems. R. D'E. ATKINSON (Physical Rev., 1935, [ii], 47, 623—627). N. M. B.

Magnetic moment of the K^{39} nucleus. J. J. GIBBONS, jun., and J. H. BARTLETT, jun. (Physical Rev., 1935, [ii], 47, 692—694).—Mathematical. The calc. val. based on a Hartree wave function is 1.2 nuclear magnetons, compared with 0.38 based on a modified Goudsmit formula. N. M. B.

Ionisation area of He, and Bethe's theory. D. L. WEBSTER, W. W. HANSEN, and F. B. DUVEINECK (Physical Rev., 1935, [ii], 47, 699; cf. A., 1933, 760).—A correction. N. M. B.

Ratio 136/137 in atomic physics. W. N. BOND (Nature, 1935, 135, 825).—Vals. of e and e/m are discussed. The most trustworthy val. for e is $(4.7759 \pm 0.0004_3) \times 10^{-10}$ e.s.u. L. S. T.

Mass of the neutrino. W. J. HENDERSON (Proc. Camb. Phil. Soc., 1935, 31, 285—290).—Examination of the shape of the upper portion of the continuous

β -ray spectra curves of Th-C and Th-C'' gives the distribution of energy. Assuming, with Fermi (A., 1934, 579), that the shape of the curve is dependent on the mass of the neutrino, it is shown that this is zero, or at most $\frac{1}{2}$ a very small fraction of the electronic mass. A. J. M.

Equilibrium of black-body radiation. W. HEITLER (Proc. Camb. Phil. Soc., 1935, 31, 242—243).—Theoretical. The no. of electron pairs present in thermodynamic equilibrium and formed from two light quanta of total energy $\leq 2mc^2$ is calc. For temp. $< 10^7$, the density of electrons is zero, but it then increases rapidly to approx. 10^{30} pairs per c.c. at 5×10^9 . A. J. M.

Precision light absorption measurements with prism mirror spectrometers and thermoelements. H. GUDE (Z. Physik, 1935, 94, 816).—A reply to Leiss (this vol., 56). A. B. D. C.

Absorption of light by gaseous chlorine in the region 5040—5320 Å. F. W. JONES and W. SPOONER (Trans. Faraday Soc., 1935, 31, 811—813).—Measurable continuous absorption occurs between λ 5040 and 5320 Å. F. L. U.

Absorption spectrum of liquid hydrogen chloride in the far ultra-violet. R. TRÉHIN and B. VODAR (Compt. rend., 1935, 200, 1663—1665).—Absorption coeff. data for HCl at -90° are recorded for λ 2816—2200 Å., and compared with vals. for aq. HCl. In this there appear to be 2 absorbing mol. species (cf. Tréhin, A., 1933, 111, 1226). H. J. E.

Emission spectrum of the molecule CSe. B. ROSEN and M. DÉSIKANT (Compt. rend., 1935, 200, 1659—1661).—Data are recorded for bands observed in a discharge tube containing Se, S, and C, and attributed to CSe ($^1\Pi \rightarrow ^1\Sigma$ transition). H. J. E.

Isotopic shifts in the spectra of diatomic molecules. G. H. DIEKE (Physical Rev., 1935, [ii], 47, 661—665).—Mathematical. Corrections for the dependence of the energy of diat. mols. on the mass of the nuclei are examined. N. M. B.

Isotope effect with bismuth hydride (BiH/BiD). A. HEIMER (Naturwiss., 1935, 23, 287; cf. A., 1931, 664; 1932, 440).—The nuclear vibration consts. of BiH and BiD and the mass ratio of H to D are calc. from a study of the band spectrum. A. J. M.

Blue glow on surfaces at -180° attributed to NH or NH₂ molecules. R. W. LUNT and J. E. MILLS (Trans. Faraday Soc., 1935, 31, 786—791).—Neither at. H nor active N is concerned in the production of the blue glow observed when gases from an a.c. discharge in NH₃ or a mixture of N₂ and H₂ at 1 mm. pressure are led over a surface cooled to -180° . The emission probably arises from two excited NH₂ mols. from the decomp. of N₂H₄ formed in a reaction between two $^1\Delta$ NH mols. and a H₂ mol. in the ground state. F. L. U.

Schuster bands of ammonia. R. W. LUNT, J. E. MILLS, and E. C. W. SMITH (Trans. Faraday Soc., 1935, 31, 792—797).—The Schuster bands can be excited with great intensity in highly purified NH₃ and do not therefore depend on the presence

of O₂ or H₂O. The production of N₂H₄ in discharges is discussed. F. L. U.

Predissociation in the third positive group of carbon monoxide. F. BRONS (Nature, 1935, 135, 873). L. S. T.

Band spectrum of beryllium monoxide. A. HARVEY and H. BELL (Proc. Physical Soc., 1935, 47, 415—419).—A vibrational analysis, interpretation, and expression for certain band heads previously unaccounted for in the ultra-violet are given. N. M. B.

Band spectrum of vanadium oxide. P. C. MAHANTI (Proc. Physical Soc., 1935, 47, 433—445).—Vibrational and rotational analyses and consts. are obtained. N. M. B.

Absorption spectra of alkali dichromates. R. TITEICA (Compt. rend., 1935, 200, 1527—1528).—Absorption max. for aq. Li, Na, K, and NH₄ dichromates occur at λ 3520, 3535, 3575, and 3670 Å., respectively. The bands show structure, with a characteristic frequency of approx. 800 cm.⁻¹, attributed to CrO vibration. H. J. E.

Absorption spectrum of benzene at high temperature. V. HENRI and C. H. CARTWRIGHT (Compt. rend., 1935, 200, 1532—1535).—With rise in temp. from 20° to 460° fine structure disappears progressively in the 4 ultra-violet absorption bands of high frequency, and there is a large increase in general absorption. The phenomena are reversed on lowering the temp. The interpretation is discussed; it is suggested that predissociation produces 2 mols. of C₃H₃ which would not be completely separated. H. J. E.

Ultra-violet absorption spectra of some arylsulphonium salts. M. CHAIX (Compt. rend., 1935, 200, 1537—1538; cf. A., 1933, 1227).—Vals. of the extinction coeff. for SPh₃NO₃ are recorded. Changes occurring on replacing Ph by other groups are reviewed. H. J. E.

Far-ultra-violet absorption spectra of formaldehyde and alkyl derivatives of H₂O and H₂S. W. C. PRICE (J. Chem. Physics, 1935, 3, 256—259).—Absorption spectra of CH₂O and of compounds of the type HOH, ROH, ROR, HSH, RSH, and RSR have been observed in the region 2300—1000 Å. A heat of dissociation of 164 kg.-cal. has been deduced for the C:O linking and an ionisation potential of 10.83 ± 0.01 volt. The influence of dipole moments on ultra-violet absorption spectra and ionisation potentials is discussed. For alcohols and ethers the first ionisation potentials of approx. 10.8 and 10 volts, respectively, are predicted, and for mercaptans and sulphides 9 and 8.5. M. S. B.

Ultra-violet absorption spectra of α - and β -phenylglucosides. D. LEWIS (J. Amer. Chem. Soc., 1935, 57, 898—899).—These spectra are identical. R. S. C.

Ultra-violet absorption spectrum of pepsin. G. L. LAVIN and J. N. NORTHROP (J. Amer. Chem. Soc., 1935, 57, 874—875).—Pepsin has a no. of narrow absorption bands in the region 2500—3000 Å. The band at 2900 Å. is attributed to tryptophan, at

2850 Å. to tyrosine, and bands at 2500—2700 Å. to phenylalanine. M. S. B.

Spectral behaviour of methæmoglobin. R. M. MAYER (Naturwiss., 1935, 23, 288).—An addition to a previous note (this vol., 563). A. J. M.

Composition of Prussian and Turnbull's blues. III. A. K. BHATTACHARYA (J. Indian Chem. Soc., 1935, 12, 143—151).—The absorption spectra of Prussian- (I) and Turnbull's (II) blues have been investigated between λ 2316 and 7228 Å. The absorption curves of (I) and (II) are similar, and the differences diminish as the age of the solutions increases. The results are discussed with reference to the constitutions of (I) and (II). J. G. A. G.

Absorption of sunlight by the earth's atmosphere in the remote infra-red. A. ADEL, V. M. SLIPHER, and E. F. BARKER (Physical Rev., 1935, [ii], 47, 580—584).—Spectroheliometric observations were made for the range 5—21 μ . The long-wave limit of transmission is at 13.5 μ . N. M. B.

Extreme infra-red investigation of hindered rotation in water. C. H. CARTWRIGHT (Nature, 1935, 135, 872).—Measurements of the % transmission and reflexion of H₂O between 52 and 313 μ show that the mols. in H₂O are bound in a quasi-cryst. lattice, and, in agreement with Debye's hypothesis, execute only partial rotation. L. S. T.

Pure rotation spectra of NH₃ and ND₃. R. B. BARNES (Physical Rev., 1935, [iii], 47, 658—661).—Measurements and curves for the range 40—170 μ are given. 10 lines of NH₃ and 13 lines of ND₃ were measured, and expressions for ν are deduced. N. M. B.

Intensities of the vibration-rotation bands of HCl. E. C. KEMBLE (J. Chem. Physics, 1935, 3, 316—317).—A discussion of the disagreement between Bourgin's (A., 1927, 710; 1928, 1076) and Dunham's (A., 1929, 1126) results, and Bartolomé's (cf. Mulliken, A., 1934, 942, 1189). M. S. B.

Infra-red spectrum and molecular constants of hydrogen iodide. A. H. NIELSEN and H. H. NIELSEN (Physical Rev., 1935, [ii], 47, 585—586).—The fundamental and first overtone bands of HI were measured under high resolution, and an expression is found for the lines in the positive and negative branches in both bands. The consts. (cf. Colby, A., 1929, 974) are: ν_0 , 2309.58 cm.⁻¹; I_0 , 4.221 $\times 10^{-40}$ g.².cm.²; B, 0.822 $\times 10^{-5}$; C, 6.058. N. M. B.

Infra-red absorption spectrum of crystalline sodium nitrite. C. R. BAILEY and J. W. THOMPSON (Nature, 1935, 135, 913).—There appears to be a single linking between the N and each O, and the binding in the NO₂ group is of the same type as in SO₂, corresponding with a vertical angle of approx. 120°. L. S. T.

Atomic vibrations of Y molecules. I. Infra-red spectrum of acetone. C. CORIN (J. Chim. phys., 1935, 32, 241—268).—19 bands have been observed between 2.5 and 0.85 μ , which consist of simple harmonics of the ten fundamental frequencies or their combinations. Agreement with the Raman spectra is found. R. S.

Method of determining the heat of dissociation from a study of the long wave-length limit of the continuous absorption by gas molecules. A. K. DUTTA (Current Sci., 1935, 3, 477—478).—Polemical against Datta *et al.* (this vol., 570). W. R. A.

Deformation frequencies of heavy acetylenes. Y. MORINO (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1935, 27, 39—45; cf. this vol., 146).—From the deformation frequencies and force consts. of C₂H₂, the frequencies for C₂HD and C₂D₂ are calc. The cross terms for linking frequencies are discussed. N. M. B.

Influence of temperature on the Raman lines of crystals. L. S. ORNSTEIN and J. J. WENT (Physica, 1935, 2, 503—512).—The intensities of the Raman Stokes and anti-Stokes lines of quartz at various temp. are in accord with theory, but anomalies are encountered with calcite. The intensity of Stokes lines diminishes with rise of temp. The frequency of the Raman lines also diminishes with rise of temp., the effect being greatest at low frequency. The change is correlated to the expansion of the crystal. Explanations are suggested for the broadening of Raman lines with rise of temp. J. W. S.

Raman spectrum of trideuteracetic deuteracid. W. R. ANGUS, A. H. LECKIE, and C. L. WILSON (Nature, 1935, 135, 913).—Known displacements for AcOH are compared with those measured for CD₃-CO₂D. The origins of these displacements are tentatively assigned to the C-H, O-H, C-C, or C-O linkings and to the Me or CO₂H groups. L. S. T.

Raman spectra of some deuterium compounds. B. TRUMPY (Nature, 1935, 135, 764).—Raman frequencies of C₂D₂Cl₄ and *cis*- and *trans*-C₂D₂Cl₂ are compared with those of the corresponding H compounds. The isotope effect is clearly determinative in many cases, and indicates the participation of the hydrogens in the different oscillations. An approx. estimate of bond strength gives a val. for D > that of H in these compounds. L. S. T.

Raman spectrum of deuterobenzene. A. KLIT and A. LANGSETH (Nature, 1935, 135, 956).—Data for the Raman spectra of PhD, C₆D₅H, and C₆D₆ are given. All the Raman frequencies of C₆H₆ are lowered by the introduction of D in the mol. Greater isotopic shift is shown between C₆H₆ and PhD than between C₆D₅H and C₆D₆. The Friedel-Crafts reaction C₆H₆ + 6DCl \rightleftharpoons C₆D₆ + 6HCl has been used for the prep. of C₆D₆. L. S. T.

Results of new examinations on the structure of organic molecules. G. VÉSZI (Techn. Kurir, 1934, 5, No. 9, 1—2).—Raman spectra indicate a Kekulé formula for C₆H₆ with trigonal, rather than hexagonal, symmetry. CH. ABS. (r)

Raman effect and constitution of hydrogen peroxide. A. SIMON and F. FEHÉR (Z. Elektrochem., 1935, 41, 290—293).—The Raman effect has been investigated in 3—99.5% aq. H₂O₂. The H₂O band is observed, even in the most conc. solutions, indicating the linking H \cdot O. A line at 877 cm.⁻¹ corresponds with the O-O vibration. A band at 1421, with two

max. 27 cm.^{-1} apart, not previously observed by Venkateswaran (A., 1933, 337), is probably due to a deformation vibration corresponding with the valency angle between H-O and O-O. It practically disappears below 30% H_2O_2 . Another band, at 3410 cm.^{-1} , widens with dilution and splits into two max. in 50% H_2O_2 . The line 877, still visible in the 3% solution, disappears on addition of NaOH (0.1—1 equiv.) and the H_2O band only is left. Apparently there is not only dissociation into H^+ and HO_2^{\cdot} , but also a loosening of the O-O linking. In 10% H_2O_2 the 877 line is still faintly visible on addition of NaOH (approx. 1 equiv. to $2\text{H}_2\text{O}_2$), but is strong again on acidifying. M. S. B.

Raman spectrum of tribromosilane. J. M. DELFOSSE and R. GOOVAERTS (Bull. Acad. roy. Belg., 1935, [v], 21, 410—414).— SiHBr_3 gives Raman displacements of 115, 166, 362, 470, 770, 999, and 2236 cm.^{-1} ; their assignment is discussed. W. R. A.

Raman spectrum of sulphuric acid. R. M. BELL and M. A. JEFFERSEN (J. Chem. Physics, 1935, 3, 245—247).—8 lines have been found in the Raman spectrum of H_2SO_4 . These vary gradually in frequency, width, and intensity as the concn. varies from 5 to 100%. The results indicate a large concn. of SO_4^{2-} at 5—35% and the presence of HSO_4^- up to nearly 100%, but in largest amount in 5—45%. Two of the lines are attributed to SO_2 . The H_2O band first appears at 80% and broadens and increases in intensity with dilution. No lines corresponding with the S-H and O-H linkings were observed. M. S. B.

Raman effect in sulphuric acid-nitric acid mixtures. J. CHÉDIN (Compt. rend., 1935, 200, 1397—1398; cf. this vol., 281).—The Raman frequency of 1400 cm.^{-1} of these mixtures is obtained feebly in 99.6% HNO_3 free from H_2SO_4 , and is attributed to N_2O_5 . This is supported by the intensity of this line in solutions of N_2O_5 or P_2O_5 in HNO_3 . In H_2SO_4 - HNO_3 - H_2O mixtures the max. [H_2O] for the persistence of this line is the greater the greater is the [H_2SO_4]. A mixture of 85—90% H_2SO_4 and 10% HNO_3 , after boiling and cooling, shows a Raman line at 2320 cm.^{-1} , probably due to $(\text{NO})_2\text{SO}_4$. J. W. S.

Raman spectra of some molecules of the pentatomic type. D. H. RANK and E. R. BORDNER (J. Chem. Physics, 1935, 3, 248—251).—Raman spectra have been determined for nine org. compounds which may be regarded as of the pentat. type if Me is taken as a unit. The spectrum of $\text{CMe}_3\text{-CH}_2\text{D}$ (I) (Whitmore *et al.*, A., 1934, 507), compared with that of CMe_4 , exhibits the various types of isotope effects to be expected for a polyat. mol. The vibrations of (I) are also less degenerate than those of CMe_4 because of the partial destruction of dynamic symmetry. SiMe_4 has a fairly intense line at 863 cm.^{-1} which does not fit into the scheme of vibrations for a pentat. mol. Fermi's explanation of similar behaviour in CCl_4 (A., 1931, 1111) probably holds here also. Other Me_4 derivatives show practically complete removal of vibrational degeneracy. M. S. B.

Chemical reactivity and Raman spectra in the eugenol and vanillin group. E. BRINER, B. SUSZ,

and E. PERROTET (Arch. Sci. phys. nat., 1935, [v], 17, Suppl., 27—30).—Raman frequencies for eugenol, methyl- and *iso*-eugenol, and vanillin are recorded.

A. J. M.

Raman spectrum of $\Delta^{1,3}$ -cyclohexadiene. G. B. BONINO and R. M. ANSIDEI (Nature, 1935, 135, 873—874).—A comparison of the Raman spectra of $\Delta^{1,3}$ -cyclohexadiene (I) prepared by the Harries-Willstätter and the Crossley methods shows that when prepared by the latter method (I) contains C_6H_6 and cyclohexene. L. S. T.

Raman effect of oxalic acid in different phases. C. S. S. RAO (Z. Physik, 1935, 94, 536—543).—The cryst. form gives displacements at 473, 851, 1506, 1640, and 1758 cm.^{-1} , and in solution 248 (?), 480, 673 (?), 845, 1430, 1656, and 1744 cm.^{-1} . The 1430 cm.^{-1} displacement is ascribed to the OH. Simultaneous presence of the lines 1650 and 1750 cm.^{-1} , ascribed to the $>\text{C}=\text{O}$ linking, indicates that the CO_2H are not identical. Measurements are also given for solutions in EtOH and fatty acids.

A. B. D. C.

Raman spectra of isomeric citronellols and rhodinols.—See this vol., 865.

Fine structure of Rayleigh radiation. II. L. S. ORNSTEIN and P. H. VAN CITTERT (Physica, 1935, 2, 499—502; cf. this vol., 565).—Theoretical. Small deviations from the regular lattice structure lead to general scattering of light with unchanged λ . A strong central component of the spectrum of scattered light should be observed especially with liquids. J. W. S.

Convection currents in an unstable layer of fluid studied by optical methods. K. R. RAMANATHAN and V. N. KELKAR (Current Sci., 1935, 3, 473—475).—Horizontal layers of Et_2O and of CCl_4 on Hg when illuminated by a divergent beam of light reflect patterns which vary with the thickness of the layer.

W. R. A.

Variations in interference colours on copper and steel. F. H. CONSTABLE, M. NAZIF, and H. ELGIN (Nature, 1935, 135, 791).—The colour changes of burnished surfaces of Cu and steel observed at different angles are $>$ expected from the vals. of μ . The colour effects due to scratches on strips of metal cleaned with fine emery paper are described.

L. S. T.

Internal recombination during photo-dissociation of polyatomic molecules. A. N. TERENIN (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 482—487).—On irradiation of SnI_4 vapour at 10^{-1} — 10^{-2} mm. pressure with $\lambda\lambda$ 2500—2100 Å. a fluorescence spectrum of I_2 was observed, indicating that I_2 is eliminated from SnI_4 in one act. The process has a marked temp. coeff. indicating an activation energy. The photo-dissociation of BiI_3 also shows a fluorescence, and may resemble that of SnI_4 . H. J. E.

Dependence of the fluorescence spectrum on the viscosity of the solvent. L. A. TUMERMAN (Compt. rend. Acad. Sci. U.R.S.S., 1935, 1, 471—474).—It is shown for solutions of aesculin, quinine sulphate, rhodamin-B, and Magdala-red in H_2O , EtOH, and glycerol that the fluorescence is independent of the η of the solvent. H. J. E.

Relation between absorption and luminescence spectra in weak dyestuff solutions. V. L. LEVSHIN (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 474—482; cf. A., 1934, 830).—Measurements are recorded of the absorption and luminescence spectra of solutions of eosin-B in H₂O, isoamyl alcohol, and COMe₂, and of erythrosin and rhodamine-6G in H₂O and COMe₂. The absorption spectrum changes little, but the intensity of the luminescence spectrum changes considerably, with the solvent, this change depending on the dyes and not on the solvent. H. J. E.

Fluorescence spectra of phaeophorbides. C. DHÉRE and (MLLE.) A. RAFFY (Compt. rend., 1935, 200, 1367—1369).—The fluorescence spectrum of phaeophorbide-*a* (I) and -*b* (II) in Et₂O consists of bands at λ 730 and 670, and 725 and 659 m μ , respectively; in CS₂ the bands in the visible region are λ 679 and 633.5 m μ for (I) and (II), respectively. F. R. G.

Luminescence phenomena with benzhydrazide and benzenesulphonhydrazides. A. A. M. WITTE (Rec. trav. chim., 1935, 54, 471—475).—Benzhydrazide (I), benzenesulphonhydrazide, and their respective three (NO₂)₁-derivatives and phthalhydrazide showed chemiluminescence on mild oxidation, but some doubt is cast on the purity of the (I). D. R. D.

Sugar charcoal and the fluorescence of acid liquids. III. B. L. VANZETTI (Rend. Sem. Fac. Sci. Cagliari, 1933, 3, 47—50; Chem. Zentr., 1934, ii, 3484; cf. A., 1933, 1280).—The blue fluorescent substance formed by the action of conc. H₂SO₄ on carbohydrates is ultra-filterable, is removed by animal C, and is destroyed by sunlight or by pptn. of H₂SO₄ with Ba salts. The effects of various reagents on the fluorescence are described. Its spectrum is recorded. H. J. E.

Theory of contact resistance. S. KANEKO (J. Electrochem. Assoc. Japan, 1934, 2, 394—397).—Theoretical. CH. ABS. (e)

Relationship between photo-electric conductivity, light absorption, and photographic properties. J. H. DE BOER (Chem. Weekblad, 1935, 32, 327).—The mechanism of the absorption of light by the alkali-metal and Ag halides is compared and contrasted. D. R. D.

Photo-electric effect of caesium oxide cathodes under external fields. R. FLEISCHER and P. GÖRLICH (Z. Physik, 1935, 94, 597—606).—The long-wave photo-electric max. is displaced towards the red by an accelerating field. A. B. D. C.

Photochemical elementary process in alkali halide crystals. R. HILSCH and R. W. POHL (Nachr. Ges. Wiss. Göttingen, Math.-phys. Kl., 1934, [ii], 1, 115—127; Chem. Zentr., 1935, i, 360; cf. this vol., 9).—The no. of coloured centres produced in KBr per light quantum absorbed varies from 0 at low temp. to a max. of 1 at high temp. H. J. E.

Photo-electric behaviour of superposed surface layers at low temperatures. R. SUHRMANN and D. DEMPSTER (Z. Physik, 1935, 94, 742—759).—The selective photo-effect of cathodes formed of at. distributions of alkali metals separated from the metal in bulk by several mol. layers shows fatigue at low

temp. when light of max. spectral sensitivity is used; rise of temp. or illumination with red light removes fatigue. The time variation of fatigue can be quantitatively explained by the presence of active centres of long metastable life. A fall in temp. sharpens the selective max., and shifts the long-wave max. to shorter λ . K atoms separated from K by C₁₀H₈ and by K hydride were used as cathodes. A. B. D. C.

Relationships between chemical constitution and dielectric properties. P. DEBYE (Bull. Soc. chim. Belg., 1935, 44, 167—175).—A lecture. J. G. A. G.

Calculation of dipole moments. I. R. KRITSCHEVSKI and J. S. KASARNOVSKI (Z. physikal. Chem., 1935, B, 28, 461—477).—Combination of the thermodynamical and mol.-statistical equations for the heat effect on introducing a dielectric of dielectric const. ϵ and mol. vol. V into an electrostatic field gives $[T^2V/(\epsilon+2)^2](\partial\epsilon/\partial T)_T = -4\pi N\mu^2/27k$, where μ is the dipole moment and N , k , and T have their usual significance. This gives good results, much better than Debye's equation, when used to calculate μ for liquids of small ϵ , but fails for polar liquids of high ϵ . It is convenient for determining μ by the dil. solution method with a dipole-free solvent for which $(\partial\epsilon/\partial T)_T \neq 0$. Hedestrand's assumption that for a dil. solution of a polar substance ϵ and d are linear functions of the molar fraction of solute (A., 1929, 647) is incorrect. Equations are derived for the extrapolation to infinite dilution of ϵ and V for a solution. R. C.

Dipole moment of hydrogen chloride and the solvent. S. MIZUSHIMA, K. SUENAGA, and K. KOZIMA (Bull. Chem. Soc. Japan, 1935, 10, 167—168).—The dipole moment (μ , in Debye units) and mol. polarisation of HCl in different media are respectively: in C₆H₁₄ at 20° 1.04, 30.0; in C₆H₆ at 10°, 1.20, 38.7, at 20° 1.22, 38.5, at 25°, 1.21, 37.8; in PhMe at 20° 1.24, 39.5; in CHCl₃ at 30°, 1.03, 28.9; in Et₂O at 20°, 2.22, 111.3. The high μ in Et₂O is correlated with the Raman spectrum of conc. solutions, which differs from that of HCl gas. R. S. B.

Dielectric constants of air and hydrogen at high pressures. R. McNABNEY, W. MOULTON, and W. L. BEUSCHLEIN (Physical Rev., 1935, [ii], 47, 695—698).—Vals. were measured in the pressure range 71.8—334.7 atm. at 20° and 2500 kilocycles, and the Clausius-Mosotti function was calc. for each pressure. The change with pressure for air is small and irregular, averaging 1.43; for H₂ the val. decreases uniformly from 1.16 at 71.8 atm. to 0.99 at 334.7 atm. N. M. B.

Dielectric properties of heavy water. P. ABADIE and G. CHAMPETIER (Compt. rend., 1935, 200, 1590—1593).—The dielectric const. (ϵ) at 100 m. of H₂O containing 98% D₂O is 79 at 20°, relative to a val. of 81 for H₂O. The dipole moment calc. from the ϵ of solutions in dioxan is 1.87×10^{-18} compared with 1.86×10^{-18} for H₂O. The anomalous dispersion of these solutions at 17 and 28 cm. shows that the intermol. forces between dioxan and D₂O differ from those between dioxan and H₂O. J. W. S.

Dielectric polarisation of phenol. A. R. MARTIN (Nature, 1935, 135, 909).—Data obtained for the polarisation of PhOH in C_6H_6 at 70° are recorded. The behaviour of PhOH is similar to that of the lower alcohols. ∞P_2 is 71.0, giving 1.5 debyes for the dipole moment. L. S. T.

Dielectric polarisation. XII. Dipole moments and structure of thiopyrones and related compounds. F. ARNDT, G. T. O. MARTIN, and J. R. PARTINGTON. **XIII. Dipole moments of simple aliphatic nitriles.** E. G. COWLEY and J. R. PARTINGTON (J.C.S., 1935, 602—604; 604—609).—XII. The dipole moments (μ) of 2:6-diphenylthiopyran-4-one (I) (*cis*-form, 1.64; *trans*-form, 1.62), 2:6-diphenylthiopyrone (II) (4.39), and 2:6-diphenylthiopyrone 1-dioxide (III) (0.93) were determined. Vals. in *D* are given in parentheses. For (I), calc. and observed vals. agree. The calc. μ of (II) does not agree with the observed val., showing considerable interaction through the double linking. (III) has a much lower val. than that calc., and obviously behaves differently from (II). The val. for (II) is intermediate between those required by its two possible structures, agreeing with the theory of Arndt (A., 1931, 234) and of Sutton (A., 1934, 1156). Vals. for the heats of combustion measured by Lorenz and Sternitzke (*ibid.*, 1008) support the conclusions reached from the dipole determinations.

XIII. The vals. for μ of MeCN, EtCN, PrⁿCN, and BuⁿCN, all in C_6H_6 solution, are 3.44, 3.57, 3.57, and 3.57 *D*, respectively. These vals. are compared with those obtained for other series of compounds, e.g., the alkyl halides, where μ again remains const. after the Et compound. μ of the aromatic nitriles is discussed, and it is shown that the C-CN group is probably linear in both aliphatic and aromatic nitriles. The relative increase caused by induction in the nitriles is $<$ that in the case of the halides.

A. J. M.

Configurations of disulphoxides of thianthren. T. W. J. TAYLOR (J.C.S., 1935, 625—626).—The configurations assigned to the geometrically isomeric disulphoxides of thianthren on the basis of their dipole moments (μ) (A., 1932, 507) and of the physical properties of the compounds (A., 1934, 781) are probably incorrect. Consideration of the folded structure of these compounds leads to the conclusion that the α -disulphoxide ($\mu=1.7$ *D*) is the *cis*-form, and the β -compound ($\mu=4.2$ *D*) is the *trans*-form.

A. J. M.

Time formation of the dielectric constant of Rochelle salt in an electric field. H. GOEDECKE (Z. Physik, 1935, 94, 574—589).—The dielectric const. of K Na tartrate builds up in three distinct stages: electron polarisation occurs within 10^{-6} sec., followed by polarisation due to ionic movement in 10^{-6} to 10^{-4} sec., and beyond 10^{-4} sec. there is orientation of dipole groups; the last is the primary source of the high dielectric const.

A. B. D. C.

Dielectric constant. V. Anomalous dispersion of lecithin in viscous mineral oils. A. L. FERGUSON, L. O. CASE, and G. H. EVANS (J. Chem. Physics, 1935, 3, 285—290).—A receiver and cell for determining dielectric const. ϵ by the resonance

method is described. In order to determine the microscopic viscosity of solutions of lecithin, measurements of ϵ were made on 5 solutions in very viscous mineral oils at 18° , 25° , and 50° with 6 different frequencies, using the refractometric, resonance, and Wheatstone bridge methods. Comparison of the experimental curves with theoretical Debye curves indicates dispersion, but not of a simple type. A qual. explanation, based on varying viscosity of the components of the solvent, the presence of polar radicals in the solute mols., and the association of the solute, is discussed. M. S. B.

Unipolar interior conductivity of certain crystals. R. DEAGLIO. Note on the above. A. COTTON (Compt. rend., 1935, 200, 1303—1306, 1306).—The vol. conductivity of carborundum, differing relatively to the two opposite directions of the polar axis, was investigated. N. M. B.

Rotatory dispersion of organic compounds. XXV. Open-chain derivatives of arabinose, fructose, and fucose. Optical cancellation in penta-acetyl μ -fructose. W. C. G. BALDWIN, M. L. WOLFROM, and T. M. LOWRY. **XXVI. Acetoin.** T. M. LOWRY and W. C. G. BALDWIN. **XXVII. Menthone and carvomenthone.** T. M. LOWRY and R. E. LISHMUND (J.C.S., 1935, 696—704, 704—708, 709—713).—XXV. μ -Fructose penta-acetate shows optical cancellation (cf. A., 1933, 1231). In this case the three asymmetric C atoms have the same relative configuration as those in μ -arabinose tetra-acetate, in which the phenomenon has already been observed, but are of opposite signs. Data are also given for μ -fucose tetra-acetate. Cancellation did not occur with tetra-acetyl-*l*-arabonitrile, *l*-arabinose Et mercaptal, μ -*l*-arabinose tetra-acetate Et mercaptal, or μ -*d*-fructose penta-acetate Et mercaptal, which contain three asymmetric C of similar orientation, but have no C:O attached to the first asymmetric C. It is therefore probable that the C:O is essential to the balance of the opposite partial rotations observed in optical cancellation.

XXVI. CHAcMeOH (I) exists as an optically active liquid with $[\alpha]_{5461} 6.60^\circ$, increasing to 8.04° by fractionation. An optically inactive solid polymeride (II) separates slowly from it without altering $[\alpha]$ of the saturated solution. (II) is dimeric, contains no C:O, and is formulated as a derivative of cyclobutane. The absorption spectrum of the liquid in the homogeneous state and in solution in H_2O , EtOAc, and cyclohexane showed a definite ketonic band at 2750 Å. The racemisation of (I) depends on reversible polymerisation. Acetylation of (II) give a monomeric acetate which shows the ketonic band.

XXVII. The max. of circular dichroism of carvomenthone (III) is displaced by 110° from the max. of absorption in the direction of longer λ , exactly as in the case of camphor (A., 1931, 786). Menthone (IV) and (III) show anomalous rotatory dispersion. The absorption spectra of (III) and (IV) show marked points of contrast. In (III) a negative anomalous rotation with a range of about 2000° is superposed on a positive residual rotation of high frequency. In (IV), anomalous rotation of range $< 200^\circ$ is super-

posed on a composite negative residual rotation which rises steeply with decreasing λ . A. J. M.

Rotatory dispersion of α -halogeno-camphors. J. P. MATHIEU and J. PERRICHET (Compt. rend., 1935, 200, 1583—1585).—The mol. rotations of α -chloro- (I), α -bromo- (II), and α -iodo-camphor (III) have been measured at 2500—6500 Å. The vals. of $[M]_{5461}$ for (I) and (II) are in accord with previous data. (III), m.p. 52—54°, decomposes in bright light. For each compound the rotation increases with decreasing λ between 6500 and 3300 Å., and becomes negative at lower λ . The λ for zero rotation does not coincide with the max. of the first absorption band.

J. W. S.

Crossed axial plane dispersion in two organic compounds. A peculiar extinction phenomenon. W. M. D. BRYANT (Amer. Min., 1935, 20, 281—291).—The optic axial angles, approx. temp. coeff., and the $\lambda\lambda$ of uniaxiality of BiPh_3Cl_2 and triphenylethylpyrrolone have been determined. The extinction phenomenon described by Greenwood (A., 1932, 1080) does not depend on rotatory polarisation.

L. S. T.

Kerr effect of chloro-derivatives of methane, ethane, and ethylene. G. SACHSSE (Physikal. Z., 1935, 36, 357—367).—The polarisabilities of the various groupings in the Cl-derivatives of CH_4 , C_2H_6 , and C_2H_4 (viz., C-Cl, C-H, C-C, C:C) are determined. It is shown that these may be added tensorially to find the polarisation ellipsoid of substances containing these groupings. The work of Otterbein (A., 1934, 476) on the polarisabilities of aromatic compounds has thus been extended to aliphatic compounds.

A. J. M.

Refractive index of heavy water. W. J. C. ORR (Nature, 1935, 135, 793).— n for D_2 is < that of H_2 by $(123 \pm 2) \times 10^{-8}$ at 760 mm.

L. S. T.

Active hydrogen. G. R. SCHULTZE (J. Chem. Physics, 1935, 3, 317—318).—A discussion of the validity of the proofs for the existence of H_3 .

M. S. B.

Electronic structure of H_3^+ . C. A. COULSON (Proc. Camb. Phil. Soc., 1935, 31, 244—259).—The structure of H_3^+ is discussed using the method of mol. orbitals of Lennard-Jones, Hund, and Mulliken. Assuming the configuration of the ion to be an equilateral triangle, the val. obtained for the length of side, ρ_0 , at equilibrium, is 0.85 Å., and for the fundamental frequency, ν_0 , 3170 cm^{-1} . The vals. obtained by the perturbation and variational method are compared. All excited levels of H_3^+ are unstable. The configuration of H_3 is probably linear and not triangular.

A. J. M.

Theory of free radicals and organo-alkali compounds. E. A. HYLLEBRAS (J. Chem. Physics, 1935, 3, 313—314).—The treatment of the electron affinities of free aromatic radicals by Nilsen (this vol., 283) is not clear and is unsatisfactory.

M. S. B.

Theory of aromatic free radicals. L. PAULING and G. W. WHELAND (J. Chem. Physics, 1935, 3, 315; cf. preceding abstract).

M. S. B.

Valency. R. F. HUNTER and R. SAMUEL (Chem. and Ind., 1935, 467—468; cf. this vol., 431).—A

reply. The authors offer alternative interpretations consistent with their views (A., 1934, 1058). The distinction between the physical definition of stability and chemical reactivity is emphasised. J. G. A. G.

Theory of valency: development and problems. R. SAMUEL (Current Sci., 1935, 3, 461—467).—A review.

Pair linking theory of valency. H. LESSHEM and R. SAMUEL (Proc. Indian Acad. Sci., 1935, 1, A, 623—662; cf. this vol., 431).—Chemical union is shown to be mainly an effect of the degeneracy due to the electrons, this view leading to an electron-pair linking theory of valency. Spectroscopic evidence is given in support, and in contradiction of a relation between strength of linking and polarity. Degeneracy of the nuclear fields is reduced to an effect determining the polarity.

N. M. B.

Conception of tetrahedral atoms. R. REINICKE (Chem.-Ztg., 1935, 59, 385—388, 405—407).—The arrangement of atoms in crystal lattices accords with the view that chemical linkings are rigidly directed. Considering the atom as the centre of a tetrahedron, the corners and the centres of the faces are the active directions. The no. (≤ 4) of the tetrahedral corners or faces thus active constitutes the valency of the atom; a covalency involves junction by corners, and electrovalency junction of corners with face-centres.

D. R. D.

Constitution of the heterocyclic [ring] $\text{C}_2\text{N}_2\text{O}$. M. MILONE and G. MÜLLER (Gazzetta, 1935, 65, 241—249; cf. this vol., 684).—The structures of the furazan, azoxime, and oxadiazole rings are discussed from the point of view of quantum mechanics. Energies of formation, link energies, and resonance energies are calc.

O. J. W.

Statistical weights of the rotational levels of polyatomic molecules, including methane, ammonia, benzene, cyclopropane, and ethylene. E. B. WILSON, jun. (J. Chem. Physics, 1935, 3, 276—285).—Theoretical.

M. S. B.

Bond energies and valency angles in simple carbon compounds. W. G. PENNEY (Trans. Faraday Soc., 1935, 31, 734—746; cf. A., 1934, 1158).—Some fundamental C-H exchange integrals are determined and it is shown that the most stable form of the Me radical has plane configuration. The heat of the reaction $\text{H} + \text{Me} = \text{CH}_4$ is calc. to be 106 kg.-cal., in agreement with observation. Calculation of valency angles in substituted methanes indicates that if some or all of the H in CH_4 are replaced by other univalent groups, the resulting deviations from the tetrahedral angle are \approx a few degrees.

F. L. U.

Structure of nuclei of aromatic character. G. B. BONINO (Mem. R. Accad. Sci. Ist. Bologna, Cl. Sci. fis., 1933, [viii], 10, 12 pp.; Chem. Zentr., 1934, ii, 3916).—Theoretical. Modified centric formulæ are proposed.

H. N. R.

Can the ordinary attractive forces between the molecules or atoms of a substance in absence of polarity (dipoles etc.) be accounted for by electrical forces? J. J. VAN LAAR (Chem. Week-

blad, 1935, 32, 337—338).—It is argued that this view is untenable. D. R. D.

Thermochemical consideration of the carbonyl group. P. GOLDFINGER, W. LASAREFF, and M. LETORT (Compt. rend., 1935, 200, 1593—1595).—From thermochemical data it is calc. that the energy of the CO: in aldehydes, ketones, acids, and amides differs from the energy of activation to the $\alpha^3\Pi$ state by amounts which vary according to the groups present. The results are in accord with the frequencies of vibration of the CO: in these groups of compounds. J. W. S.

Calculation of free energy of polyatomic molecules from spectroscopic data. II. A. R. GORDON (J. Chem. Physics, 1935, 3, 259—265).—The methods of calculation previously used for diat. and triat. mols. have been extended to cases where one or more fundamental frequencies are degenerate. New tables are given and calculations made for N_2O , HCN, and C_2H_2 . M. S. B.

Lifetime of free hydroxyl. O. OLDENBERG (J. Chem. Physics, 1935, 3, 266—275).—The life of OH radicals (I) produced by an electric discharge through H_2O vapour and disappearing by chemical reaction after interruption of the discharge, has been investigated. The [OH] was measured by the intensity of the absorption spectrum and its variation with time could be observed. It is concluded that (I) persist up to 1/8 sec. instead of 0.001 sec. as previously supposed. The mode of consumption of (I) and the nature of the processes taking place in the discharge are discussed. M. S. B.

Surface tension of molten metals and alloys. V. Surface tension of Fe-C alloys, Hg_5Tl_2 , and $NaHg_2$, its variation with time in the case of thallium, and surface tension of slags. F. SAUERWALD, B. SCHMIDT, and F. PELKA (Z. anorg. Chem., 1935, 223, 84—90; cf. A., 1933, 1002).—The surface tension (T) of Fe-C alloys has been determined at 1300—1420°, in which range it has a positive temp. coeff., and increases with decreasing C content. Tl, when prepared and examined in a high vac., shows T which does not vary with time. Contact with H_2 causes T to increase with time. Vals. of T for Hg_5Tl_2 , $NaHg_2$, and three slags are given. F. L. U.

Absolute determination of the local strength of X-radiation from a mass-source. A. ROGOZINSKI (J. Phys. Radium, 1935, [vii], 6, 168—174).—Mathematical. N. M. B.

Back scatter for several qualities of X-rays. E. H. QUIMBY, C. D. LUCAS, and W. S. MACCOMB (Radiology, 1934, 23, 7, 43—50).—Data for back scatter from paraffin are recorded. CH. ABS. (e)

Laue symmetry exhibited by orthogonal crystals. W. H. BARNES and A. V. WENDLING (Amer. Min., 1935, 20, 253—259). L. S. T.

Crystal classification and symbolism. D. J. FISHER (Amer. Min., 1935, 20, 292—306). L. S. T.

X-Ray evidence of deformation in a crystal lattice under the action of an electric field. H.

HULUBEI (Compt. rend., 1935, 200, 1530—1532).—Observations on quartz are recorded. H. J. E.

Dendrites, single metal crystals, crystal grains, and the mechanism of grain growth. L. DLOUGATCH (Rev. Mét., 1935, 32, 23—31, 85—89).—Answers to a questionnaire sent to various metallurgists. W. P. R.

Existence of three alum structures. H. LIPSON (Nature, 1935, 135, 912).—X-Ray analysis shows that K, NH_3Me and Cs, and Na alums, previously regarded as isomorphous, have different structures, designated α , β , and γ , respectively. The question whether similar differences of structure exist in other supposedly isomorphous series is raised. Such pseudo-isomorphism is likely to occur only in the cubic system. L. S. T.

Dynamics of molecular crystal lattices. II. Solid nitrogen. V. DEITZ (J. Franklin Inst., 1935, 219, 565—571; cf. this vol., 686).—The distances between the atoms of a mol. of N_2 and its 12 nearest neighbours are calc. Calculation of the lattice energy per atom shows that the repulsion between two N atoms of different mols. in solid N_2 is less steep than that between two Ne or two A atoms. The orientation of mols. for min. lattice potential is deduced. The vibrations of the crystal lattice are considered and the frequencies of the max. Debye and other possible types of oscillation are calc. and checked by comparison of calc. and observed vals. of heat capacity. A. J. M.

Inner equilibria in solid phases. III. A. SMITS (Physikal. Z., 1935, 36, 367—371).—There is no evidence for heterogeneous transformations in solid phases of kinds higher than the first. The transition of NH_4Cl at -30° is discussed. There is no reason for supposing this transition to be of the third kind (cf. this vol., 155). The case of CH_4 is not analogous to that of NH_4Cl , the only point in common being the occurrence of hysteresis. The transition of CH_4 is homogeneous, whilst that of NH_4Cl is heterogeneous. A. J. M.

Orientation and pyroelectricity of crystals of magnesium ammonium phosphates in gall stones. E. PILLET (Compt. rend., 1935, 200, 1365—1367).—The cryst. structure, growth, and pyroelectric properties are described. N. M. B.

Crystallisation of melts. II. J. MEYER and W. PFAFF (Z. anorg. Chem., 1935, 222, 382—388; cf. A., 1934, 478).—The three *allocinnamic* acids give when melted identical liquids which, if filtered through a fine sintered glass filter, can be preserved in sealed vessels at room temp. for a year without solidifying. The liquid can yield crystals of any one of the acids by appropriate seeding. Similar results have been obtained with β -methoxy- and β -ethoxyphenyl styryl ketones. The substances are therefore polymorphic, not isomeric. F. L. U.

Twinning in α -iron. A. B. GRENINGER (Nature, 1935, 135, 916—917).—Abundant twinning has been observed in α -Fe (C 0.0022, Si 0.0018%) which has been passed slowly through the crit. range, and in α -Fe deformed and then recryst. below the crit.

range. The Widmannstätten figures observed in α -Fe after quenching from above the crit. range are attributed to twinning and macromosaic lattice movements. L. S. T.

Fine structure of X-ray absorption edges of alloys. I. γ -Alloys. R. SMOLUCHOWSKI (Z. Physik, 1935, 94, 775—784).—Kronig's theory is extended to complicated lattice types and alloys. Measurements are given for Cu_5Zn_8 and Ag_5Zn_8 , and the effect of small at. displacements on the fine structure becomes apparent. A. B. D. C.

X-Ray study of recovery and recrystallisation of aluminium single crystals. N. SELJAKOV and E. SOVS (Nature, 1935, 135, 764—765).—X-Ray photographs of single crystals deformed by 5—16% extension are reproduced. Some of the crystals deformed by 10, 12, and 16% extension again become single crystals after recrystallisation, but with an orientation different from that of the deformed crystal. L. S. T.

Diffraction of X-rays by the silver atom. (Factor of structure.) J. LAVAL (Compt. rend., 1935, 200, 1605—1607).—Corresponding vals. of the factor of structure (calc. from the intensity of reflected radiation) and of $\sin\theta/\lambda$ (θ = angle of incidence) are given for 19 reflexion planes of the Ag crystal. The vals. are $>$ those obtained by Chroback (A., 1933, 440). J. W. S.

Crystallographic uniformity of lineage structure in copper single crystals. A. B. GRENINGER (Amer. Inst. Min. Met. Eng., Inst. Metals Div., 1935, Tech. Pub. 596, 9 pp.).—The interpretation of fine structure within individual spots on unsymmetrical back-reflexion Laue photographs of Cu single crystals indicates that such crystals have a crystallographically uniform lineage structure. CH. ABS. (e)

Lattice dimensions of lithium hydride and lithium deuteride. E. ZINTL and A. HARDER (Z. physikal. Chem., 1935, B, 28, 478—480).—The vals. of a for the lattices of LiH and LiD are 4.085 ± 0.001 and 4.065 ± 0.001 Å., respectively, giving mol. vols. of 10.33 and 10.18 c.c. R. C.

Crystal morphology of quartz. IV. Morphology in relation to mineral origin. V. Development of form in β -quartz. G. KALB (Z. Krist., 1935, 90, 163—185).—External morphology only. B. W. R.

Silica framework crystals and their stability fields. M. J. BUEGER (Z. Krist., 1935, 90, 186—192).—Stable SiO_2 at high temp. (tridymite, cristobalite) is loose-packed compared with SiO_2 at low temp. (quartz). The stability of SiO_2 structures is discussed on the basis that the loose packing corresponds with the extra room needed for thermal agitation, and may be maintained at normal temp. if suitable foreign ions occupy the vacant space. B. W. R.

Transformation of aluminium oxide from the β - to the α -form. J. GALLUP (J. Amer. Ceram. Soc., 1935, 18, 144—148).—The conversion $\beta \rightarrow \alpha$ - Al_2O_3 begins in vac. or in H_2 at 1300° and is complete in 10 min. at 1400°. In air and A the conversion does not begin below 1600° and 1650°, respectively.

β - Al_2O_3 crystals have a transition stage before the characteristic α -form appears. It is probable that the expanded lattice structure of β - is due to the inclusion of alkalis and the $\beta \rightarrow \alpha$ change can be brought about only when the conditions permit the escape of the alkalis. J. A. S.

Constitution of lithium nitride. R. BRILL (Z. Elektrochem., 1935, 41, 266—267).—The hexagonal structure found for Li_3N by Zintl *et al.* (this vol., 433) appears to be correct (cf. A., 1928, 108). M. S. B.

Microstructure of active and inactive iron nitrides. G. L. NATANSON (Z. Elektrochem., 1935, 41, 284—290).—In spite of the larger surface of active Fe nitride (cf. Kobosev *et al.*, this vol., 829), X-ray examination indicates that its crystallites are practically the same size as those of the inactive nitride. The action of the activator appears to be the prevention of formation of a closely packed structure by inhibiting recrystallisation of the Fe formed as an intermediate stage in the production of the nitride catalyst from the oxide. A large free surface is thus obtained. M. S. B.

Zinc and cadmium phosphides and arsenides. Zn_3P_2 lattice. M. VON STACKELBERG and R. PAULUS (Z. physikal. Chem., 1935, B, 28, 427—460).— Zn_3P_2 , Zn_3As_2 , Cd_3P_2 , and Cd_3As_2 crystallise in the tetragonal system, with 8 mols. in the unit cell; space-group D_{2d}^8 . Lattice consts. are recorded. In the co-ordinated lattice the metalloid atoms constitute a slightly deformed closest cubic packing in the tetrahedral interstices of which are the metal atoms. ZnP_2 and CdP_2 form tetragonal crystals, with 8 mols. in the unit cell; space-group D_2^2 or D_2^1 . R. C.

Configuration of the tri-iodide group in ammonium tri-iodide crystals. R. C. L. MOONEY (Z. Krist., 1935, 90, 143—150).—The structure of NH_4I_3 is orthorhombic, a_0 6.64, b_0 9.66, c_0 10.82 Å.; the cell contains 4 mols., space-group $Pm\bar{c}n$. The I positions are directly located, the NH_4 surmised from analogous data on CsI_3 ; a very nearly linear tri-iodide group is found. B. W. R.

Molecular structure of germanium tetrachloride. L. BROCKWAY (J. Amer. Chem. Soc., 1935, 57, 958—959).—The mol. structure of GeCl_4 has been investigated by electron diffraction (cf. this vol., 18). About the same deviation from additivity of the radii is shown as for SiCl_4 and SnCl_4 . The sharp differentiation between these three and CCl_4 cannot be explained on the basis of gradations in electronegativity of the central atom. The Ge-Cl interat. distance, 2.10 ± 0.03 Å., agrees with Wierl's val. (A., 1931, 665). M. S. B.

Crystal structure of some hexachloro-salts. G. ENGEL (Zentr. Min., 1934, A, 285—286; Chem. Zentr., 1935, i, 18).—The salts $\text{R}^I\text{R}^{IV}\text{Cl}_6$ ($\text{R}^I = \text{Rb}, \text{Cs}, \text{NH}_4, \text{K}, \text{Tl}$; $\text{R}^{IV} = \text{Ti}, \text{Se}, \text{Zr}, \text{Sn}, \text{Te}, \text{Pt}, \text{Pb}$) are all cubic and of K_2PtCl_6 type structure, except K_2TeCl_6 , which is slightly distorted. Lattice consts. are recorded. J. S. A.

Crystal structure of some alkali tungsten chlorides $[\text{M}_3\text{W}_2\text{Cl}_9]$. C. BROSSET (Nature, 1935, 135, 874).—The NH_4 , Rb, Cs, and Tl compounds

are isomorphous: space-group C_{6h}^2 . $K_3W_2Cl_9$ has a 7.16, c 16.16 Å. and 2 mols. per unit cell. The at. positions are given and the structure of the W_2Cl_9 group, which exists as an ion in the crystals, is illustrated.

L. S. T.

Spinel and the cubic sodium-tungsten bronzes as new examples of structures with vacant lattice points. G. HÄGG (Nature, 1935, 135, 874).—X-Ray investigation shows that when MgO, Al_2O_3 dissolves Al_2O_3 the O excess is caused by the occurrence of vacant points in the metal lattices. $\gamma-Al_2O_3$ accordingly represents a spinel lattice where one ninth of the metal positions are vacant. Similarly, when Fe_3O_4 is oxidised to $\gamma-Fe_2O_3$ vacant points occur in the Fe lattice so that 8 out of 9 only are occupied. The lattice dimensions decrease at the same time. In the Na-W bronzes, Na_xWO_3 (x is 1, a is 3.850 Å.), W^{6+} ions are present and the bronze crystallises in a complete perovskite lattice. The deepening of colour from yellow \rightarrow blue \rightarrow red is accompanied by a continual decrease in dimensions and in Na content. As x decreases vacant points occur in the original Na lattice, and in the blue bronze (x 0.3—0.4, a 3.813 Å.) approx. two thirds of the original Na points are unoccupied. W^{6+} ions occur and probably cause the deepening of colour.

L. S. T.

Geometrical and optical properties and crystal structure of tenorite. G. TUNELL, E. POSNJAK, and C. J. KSANDA (Z. Krist., 1935, 90, 120—142).—The cell is monoclinic, a_0 4.653, b_0 3.410, c_0 5.108 Å., β 99° 29', containing 4 CuO; space-group $C2/c$. At. parameters are determined. The interat. distance Cu-O is 1.95 Å., 4 Cu being associated with each O and vice versa.

B. W. R.

Symmetry of the rhombic pyroxenes. T. ITO (Z. Krist., 1935, 90, 151—162).—From certain regularities in the appearance of (hkl) planes in the rotation photograph of $MgSiO_3$ it is suggested that the apparent rhombic nature is due to a twinning of a really monoclinic structure.

B. W. R.

X-Ray study of the structure of the phthalocyanines. I. Metal-free, nickel, copper, and platinum compounds. J. M. ROBERTSON (J.C.S., 1935, 615—621).—The crystals of phthalocyanine and its Cu, Ni, and Pt derivatives are all monoclinic, space-group $P2_1/a$, with 2 centro-symmetrical mols. per unit cell. The mol. consists of a large rigid framework, not distorted by the entrance of a metal atom, and is square, and probably flat. The metal atom and the four surrounding isoindole N atoms are necessarily coplanar. The chemical structure is discussed. The X-ray evidence in conjunction with stereochemical considerations (cf. Linstead, A., 1934, 1114) shows that the whole mol. with the possible exception of the two central NH-H atoms should be coplanar. Intensities of X-ray reflexions are in general agreement with the structure given by Linstead (*loc. cit.*). The mols. have approx. four-fold symmetry. The approx. orientations of mols. in the crystals have been determined.

A. J. M.

Scattering of X-rays by polyatomic liquids. n-Heptane. W. C. PIERCE (J. Chem. Physics, 1935,

3, 252—255).—The application of a Fourier integral analysis to Katzoff's data (this vol., 152) shows that the mol. consists of a zig-zag C chain. The arrangement of the mols. can be determined and is shown to be more random with rise in temp.

M. S. B.

Structure of the surface of oxidised iron. N. A. SCHISCHAKOV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 1, 458—461).—A reply to Finch and Quarrel's criticism (A., 1934, 721).

H. J. E.

Errors of interpretation in the electronic diagrams of organic substances. J. J. TRILLAT and H. MOTZ (Compt. rend., 1935, 200, 1466—1468).—Many org. materials appear to give the same electronic diagrams the data of which are not in accordance with the X-ray data. This is apparently due to the presence of a film of aliphatic compounds which diffract the electrons practically completely. After removal of this film by Et_2O or C_6H_6 the true diagram can be obtained. The possible origin of the film is discussed.

M. S. B.

Electron diffraction at highly polymerised substances. H. MARK, H. MOTZ, and J. J. TRILLAT (Naturwiss., 1935, 23, 319).—The disagreement between electron diffraction patterns and X-ray diagrams for highly polymerised substances is due to the presence of impurities, especially fats and waxes. With careful purification better results are obtained with cellulose.

A. J. M.

Preparation of Rochelle salt crystals to give reproducible measurements. H. KÖRNER (Z. Physik, 1935, 94, 801—807).—Crystals have been prepared of reproducible piezoelectric modulus, conductivity, and dielectric const.

A. B. D. C.

Frequency-dependence of ferromagnetic permeability as a function of electrical tension. R. SANGER and G. FEJÉR (Helv. phys. Acta, 1934, 7, 664—665; Chem. Zentr., 1935, i, 362).—Experiments on the fall in permeability of Fe and Ni wires at λ 100—10 cm. are recorded and discussed.

H. J. E.

Hall and magneto-resistance effects. D. SCHOENBERG (Proc. Camb. Phil. Soc., 1935, 31, 271—276).—The assumption, questioned by Kohler (A., 1934, 1298), that the linear Hall effect is perpendicular to the current, has been proved to be correct by experiment with a Bi crystal. The disymmetry of the Hall effect is discussed.

A. J. M.

Limitations of crystal symmetry on physical phenomena with particular reference to diamagnetic magnetostriction. D. SCHOENBERG (Proc. Camb. Phil. Soc., 1935, 31, 265—270).—The calculation is applied to the longitudinal and transverse magnetostriction of a Bi crystal.

A. J. M.

Influence of fibre structure and cooling in magnetic fields on magnetisation. O. DAHL and F. PAWLEK (Z. Physik, 1935, 94, 504—522).—Fibre structure formation in Fe-Ni alloys (40 to 50% Ni) gives anisotropy and technical improvement of magnetisation curves. Cooling in magnetic fields also greatly effects these curves at this [Ni], but not at high [Fe].

A. B. D. C.

Optical constants of rhenium and gallium at the wave-lengths 589 and 436 μ . H. LANGE (Z. Physik, 1935, 94, 650—654). A. B. D. C.

Plastic properties of single crystals of silver and thallium halides. A. V. STEPANOV (Physikal. Z. Sovietunion, 1934, 6, 312—315).—Plastic properties of AgBr, TlCl, and TlBr resemble those of AgCl and are determined by polarisation properties of the lattice particles. CH. ABS. (e)

Plasticity of rock-salt and the Taylor and Becher-Orowan theories of crystalline plasticity. W. G. BURGERS and J. M. BURGERS (Nature, 1935, 135, 960).—Theoretical. L. S. T.

Survival of the molecular linking in the rock-salt crystal. R. REINICKE (Z. physikal. Chem., 1935, B, 28, 411—426; cf. this vol., 17).—Arguments in favour of the survival are developed. Replacing non-directed by directed valencies and spherical atom domains by tetrahedral, each Na atom may be regarded as bound in mol. union to a Cl atom by a three-fold axis of symmetry. It is deduced that the vals. at present accepted for ionic radii are erroneous. The appearance of electrostatic charges in the lattice is probably due merely to the Na and Cl tetrahedra being unable, for spatial reasons, to approach sufficiently close to form the normal neutral mol. In the crystal, therefore, the mol. is equiv. to a dipole. Lattices analogous to the NaCl lattice are treated similarly. R. C.

Exceptions to a rule giving the mol. wt. of a pure liquid. R. LAUTIÉ (Bull. Soc. chim., 1935, [v], 2, 722—725).—Exceptions to the author's rule (this vol., 435) are discussed. Liquid A, Kr, and Xe contain some diat. mols., whilst polar liquids exhibit association. R. S.

Temperature dependence of the paramagnetism of solid nitric oxide. E. LIPS (Helv. phys. Acta, 1934, 7, 663—664; Chem. Zentr., 1935, i, 362; cf. this vol., 436).—Measurements (63—90° abs.) are recorded. Solid NO has a weak paramagnetism, independent of temp. H. J. E.

Weiss constant of paramagnetic ions in the S-state. I. Aqueous solutions of manganous salts. II. Aqueous solutions of ferric salts. A. BOSE (Proc. Indian Acad. Sci., 1935, 1, A, 605—615, 754—763).—I. Investigations previously reported (cf. A., 1934, 241) are extended, and include $MnSO_4$. The Curie law is obeyed. The Curie const. of Mn^{2+} is almost the same for all the solutions, irrespective of the nature of the salt and its concn.; the corresponding moment is 29.3—29.4 Weiss magnetons.

II.—The investigations are extended to Fe^{III} salts. Susceptibilities deviate markedly from the Curie and Weiss laws. The connexion of the deviations of ψT from its theoretical val. 4.36 with the nature and concn. of the salt, the acid content, and the temp. is examined. The val. 4.36 is approx. reached at high acid concns., indicating that the anomalies are due to hydrolysis. N. M. B.

Properties of paramagnetic substances. Interpretation of fundamental characteristics. G.

DUPOUY (Compt. rend., 1935, 200, 1308—1310).—Experimental data on paramagnetic substances can be explained on the hypothesis that such substances contain, in general, \leq two simple magnetic forms having differing vals. of the magnetic const. θ and C . N. M. B.

Constitution of paramagnetic substances. Transformation points. G. DUPOUY (Compt. rend., 1935, 200, 1385—1387; cf. preceding abstract).—It is concluded that the transformation temp. is independent of the magnetic const. of a mixture, but is dependent only on the transformation temp. of each of the components. The magnetic properties of $CoCl_2$ solutions confirm the author's theory. An extension of the theory states that when two simple magnetic varieties combine to form several different magnetic species, the masses of each which combine bear whole-no. relations to one another. J. W. S.

Ozone and its magnetic properties. P. LAINE (Ann. Physique, 1935, [xi], 3, 461—554; cf. A., 1934, 477).—In view of previous anomalous results liquid O_3 was investigated. The sp. susceptibility was $(1.4 \pm 0.2) \times 10^{-7}$, and was independent of temp. A reported transformation, on keeping, to a state more paramagnetic than that of O_2 was not observed. The const. paramagnetism of liquid O_3 is attributed to a deformation of the mols. under the influence of an external field. Data on the solubility of O_2 in liquid O_3 , the stability of the latter, and its purification were obtained. No evidence of a substance O_n , where $n > 3$, was found. N. M. B.

Magnetic susceptibilities of cobaltic salts and the nature of the cobaltic ion. P. RAY and D. C. SEN (J. Indian Chem. Soc., 1935, 12, 190—193).—The susceptibility of Co^{III} in $Co(CN)_3$, $Co(CN)_3 \cdot 2H_2O$, $Co_2(SO_4)_3$, $(NH_4)_2SO_4 \cdot 24H_2O$, and $Co_2(SO_4)_3$ corresponds with 13.63, 15.16, 14.29, and 16.05 Weiss magnetons, respectively. The Co^{III} is probably in an excited or metastable state, and no redistribution of electrons, leading to the lowest energy state, occurs during the transformation $Co^{II} \rightarrow Co^{III}$. J. G. A. G.

Influence of "swelling" on the abnormal unidirectional diamagnetism of graphite crystals. K. S. KRISHNAN and N. GANGULI (Current Sci., 1935, 3, 472—473).—A crystal of graphite was converted into "blue graphite" by H_2SO_4 and HNO_3 , washed, and dried and the magnetic susceptibilities in the basal plane and vertical axis were examined. The magnetic anisotropy was diminished from 22 to 1.3×10^{-6} per g. W. R. A.

Surface waves in the electron theory of metals. A. W. MAUE (Z. Physik, 1935, 94, 717—741).—Theoretical. Conductivity due to surface electron waves is investigated. A. B. D. C.

Superconductivity. R. SCHACHENMESER (Z. Physik, 1935, 94, 812—813 and 815).—Criticism of Papapetrou (A., 1934, 949). A. B. D. C.

Superconductivity. A. PAPANETROU (Z. Physik, 1935, 94, 814).—A reply to the above.

Electrical resistance of pure aluminium at liquid helium temperatures. H. A. BOORSE and H. NIEWODNICZAŃSKI (Nature, 1935, 135, 827—

828).—The electrical resistance of Al containing only spectroscopic traces of Mg, Ca, and possibly Cu is const. between 4.2° and 2.2° abs. L. S. T.

Electrical resistance of cadmium, thallium, and tin at low temperatures. W. J. DE HAAS, J. DE BOER, and G. J. VAN DEN BERG (*Physica*, 1935, 2, 453—459; cf. this vol., 154).—The resistances of Cd, Tl, and Sn wires have been measured between 1° and 20° abs., but above the superconductivity temp. The "ideal" resistance curves for Cd and Sn, calc. by Matthiessen's rule, $\propto T^{4.5}$ and T^4 , respectively. That of Tl cannot be represented by a single power of temp. J. W. S.

Electrical properties of wires of high permeability. E. P. HARRISON, G. L. TURNEY, and H. ROWE (*Nature*, 1935, 135, 961).—Wires of Ni-Fe alloys show a pronounced "skin effect" at low audio-frequencies. L. S. T.

Effect of free electrons on the heat-conductivity of silver sulphide. B. M. HOCHBERG (*Physikal. Z. Sovietunion*, 1934, 6, 193—204).—When α -Ag₂S (I) changes to β -Ag₂S the heat-conductivity is doubled, due to the many free electrons in (I). CH. ABS. (e)

Variation of the f.p. of heavy water as a function of pressure. J. TIMMERMANS and L. DEFFET (*Compt. rend.*, 1935, 200, 1661—1663).—Data are recorded for the effect of pressure (1—1051 kg. per sq. cm.) on the f.p. of D₂O (cf. Deffet, this vol., 688). The f.p. of H₂O and D₂O at 1000 kg. per sq. cm. are respectively -8.72° and -4.50° . H. J. E.

Association in the gaseous and liquid state at the b.p. K. BILLIG (*Ber.*, 1935, 68, [B], 591—597).—Theoretical. A comparison of association in the gaseous and liquid states extending to crit. conditions is made. It is rendered highly probable that the b.p. of a substance \propto the product of the association factor and mol. vol. of the liquid. H. W.

Adiabatic demagnetisation of caesium titanium alum. W. J. DE HAAS and E. C. WIERSMA (*Physica*, 1935, 2, 438).—Demagnetisation of Cs₂SO₄.Ti₂(SO₄)₃.24H₂O with an initial field of 25,075 gauss and initial temp. of 1.314° abs. yielded a final temp. (calc.) of 0.0055° abs. J. W. S.

Propane total-heat curve. E. G. RAGATZ (*Petroleum World*, 1934, 31, No. 12, 43—44).—Calc. and experimental data are compared. CH. ABS. (e)

Physical constants of propane. E. R. COX (*Petroleum World*, 1934, 31, No. 12, 44—45, 56).—The physical const. of C₃H₈ are tabulated. CH. ABS. (e)

Continuation of the saturation curve of water vapour above the critical point. M. JAKOB (*Physikal. Z.*, 1935, 36, 413—414).—The curve of $(\partial C_p / \partial t)_p = 0$ for H₂O at pressures > 225 kg. per sq. cm. forms a direct continuation of the p - T curve for saturated H₂O vapour. The crit. vol. of H₂O obtained from the curve lies between 0.00305 and 0.00320 cu. m. per kg. The C_p - T diagram of H₂O in the neighbourhood of the crit. temp. shows a discontinuity which may be due to a third-order phase change. A. J. M.

Graphical thermodynamics of real gases. E. J. M. HONIGMANN (*Z. Dampfesselunters.*, 1934, 59, 19—24, 30—35; *Chem. Zentr.*, 1935, i, 363—364).—A discussion and review. H. J. E.

Vapour-pressure curves, m.p., and chemical constants of di- and tri-methylamine and isobutylamine. A. SIMON and J. HUTER (*Z. Elektrochem.*, 1935, 41, 294).—Redetermination of m.p. (cf. this vol., 290) has given the vals. -93.0° , -117.2° , and -84.6° , respectively, in good agreement with those obtained by Wiberg *et al.* (this vol., 574).

M. S. B.

Vapour pressures of magnesium, thallium, and zinc, and the determination of their chemical constants. F. F. COLEMAN and A. EGERTON (*Phil. Trans.*, 1935, A, 234, 177—204; cf. A., 1923, ii, 491).—Sources of error in the determination of v.p. by the effusion method have been investigated. V.-p. data are given for solid Mg and Zn and liquid Tl over the ranges 427 — 465° , 302 — 356° , and 574 — 632° , respectively, and the appropriate $\log p$ - $1/T$ relations derived. The results are in accord with previous measurements in different temp. ranges. Using a graphical method of integration of the thermal data, chemical const. in close agreement with the theoretical vals. were obtained, viz., Mg 0.47 ± 0.21 , Zn 1.21 ± 0.15 , Tl 2.37 ± 0.28 . Equations giving the v.p. of the metals over a wide range of temp. have been constructed. R. S.

Density of light water: ratio of deuterium to hydrogen in rain water. W. N. CHRISTIANSEN, R. W. CRABTREE, and T. H. LABY (*Nature*, 1935, 135, 870).—Light H₂O prepared by electrolyzing natural H₂O and burning the evolved gases has $d <$ that of natural H₂O by approx. 10^2 parts in 10^7 . Re-electrolysis reduces d again by approx. 14 parts in 10^7 and a third electrolysis by 12 parts in 10^7 . The product is then almost free from D₂O and at 27° has a difference in d of 127 in 10^7 , indicating that there is 1 mol. of D₂O in 8500 mols. of H₂O in rain-water. Fractional distillation of tap H₂O gave a difference in d of 200 in 10^7 between the first and last fractions. L. S. T.

The rectilinear diameter (critical temperature densities). E. MATHIAS (*Compt. rend.*, 1935, 200, 1643—1645).—A review and discussion. H. J. E.

Classification of energy losses according to types of irreversibility. J. VILLEY (*Compt. rend.*, 1935, 200, 1383—1385). J. W. S.

Application of statistical mechanics to the thermodynamics of a gas. (MLLE.) G. SCHOULS (*Bull. Acad. roy. Belg.*, 1935, [v], 21, 396—409).—Using de Donder's formula of general statistical mechanics and taking account of intramol. forces, the thermodynamic energy and entropy of a polyat. gas has been calc. Molar entropies of Cl₂, Br₂, and I₂ at at. pressure and 298° abs. are given. W. R. A.

Metallic binding. P. GOMBAS (*Z. Physik*, 1935, 94, 473—488).—Theoretical. Lattice const., heat of sublimation, and compressibility are calc. for K. A. B. D. C.

Change of properties of water around 40° . M. MAGAT (*J. Phys. Radium.*, 1935, [vii], 6, 179—

181; cf. A., 1934, 1055).—Curves for compressibility and n , as a function of temp., viscosity, mol. heat at const. vol. and const. pressure, expansion, solubility in C_6H_6 , solubility of Br and Et_2O , and diffraction of X-rays at different temp. all show irregularities in the range 35–45°, suggesting a change of mol. interaction forces. N. M. B.

Pressures of 5000 kg. per sq. cm. II. Absolute determination of compressibility of solid substances. H. EBERT (Physikal. Z., 1935, 36, 388–392; see this vol., 840).—The compressibilities of single crystals of Al, Fe, Au, Pb, Ag, Mg, and polycryst. Cu, manganin, and steel were determined by a comparator method. In general compressibility for single crystals was $>$, but the variation with pressure is $<$, that of the polycryst. substances. A. J. M.

Viscosities of fuming and diluted sulphuric acid and sodium sulphide. V. F. POSTNIKOV and L. L. KUZMIN (Khimstroi, 1934, 6, 527–529).—Data are recorded for fuming H_2SO_4 from -20° to 120° and for Na_2S from 10° to 170° . CH. ABS. (p)

Viscosity measurements of R. O. Herzog and collaborators. L. URBELOHDE (Cellulosechem., 1935, 16, 40).—Polemical. A. G.

Highly polymerised compounds.—See this vol., 728, 730.

Lattice distortion in a copper-beryllium alloy. G. W. BRINDLEY and F. W. SPIERS (Proc. Leeds Phil. Soc., 1935, 3, 73–80).—A Cu-Be alloy (0.72% Be) exhibits lattice distortion attributable to the method of powdering by filing and to the disparity in the size of the atoms in the lattice. The intensities of X-ray reflexions and at. scattering are discussed. W. R. A.

Two intermetallic compounds of beryllium and iron. L. MISCH (Naturwiss., 1935, 23, 287–288).—A ferromagnetic phase, $FeBe_2$, with magnetic transition point $521-524^\circ$ has been found in the Be-Fe system. The X-ray structure is of the $MgZn_2$ type, 12 atoms in unit cell. Another compound, $FeBe_5$, is also formed, which is not ferromagnetic at room temp., but slightly so at -180° . It has a face-centred cubic lattice, the structure being of the $MgCu_2$ type, 24 atoms in unit cell. A. J. M.

Molecular solid solutions in the system copper-gold. N. V. AGEEV and D. N. SHOYKET (Ann. Physik, 1935, [v], 23, 90–104).—The structure of $AuCu$ and $AuCu_3$ and their solid solutions has been determined by the X-ray method. The lattice structures of the two compounds show that about 10% of the atoms are out of place. With rise of temp. this proportion increases. In solid solutions, temp. and the presence of additional atoms affect the degree of disorder. The theoretical effect of additional atoms is calc. Observed effects are $<$ calc., but this is attributed to temp., the influence of which in solid solutions is $>$ in the pure compounds. The variation of conductivity and hardness of Au-Cu alloys with composition follows a similar course to the variations of the lattice structure. A. J. M.

Crystal growth and nucleus formation. I. N. STRANSKI and R. KAISCHEV (Physikal. Z., 1935, 36,

393–403; cf. A., 1934, 946, 1058, 1059).—Using the simple cubic model, the Thomson-Gibbs equation is shown to express the equilibrium between a crystal and its surroundings. The growth and dissolution of a finite crystal are considered in reference to the work of separation of the lattice constituents from the surface. A. J. M.

Variation of elastic constants of the metallic alloy Ni-Fe on magnetisation. K. NAKAMURA (Z. Physik, 1935, 94, 707–716).—Variation of Young's modulus on magnetisation is small for alloys with $< 30\%$ Ni, but is large at high [Ni]. A. B. D. C.

Solubility of copper in iron and lattice changes during ageing. J. T. NORTON (Amer. Inst. Min. Met. Eng., 1934, Tech. Publ. 586, 9 pp.).—The max. solid solubility of Cu in Fe is 1.4 wt.-%. It decreases with fall of temp. and is const. below 650° (0.35%). The main increase of hardness occurs prior to the pptn. of the Cu-rich phase. At all temp. at which hardening occurs, max. hardness occurs when approx. 20% of the available Cu has been pptd. Complete pptn. decreases the hardness. The chief cause of age-hardening is a pre-pptn. rearrangement of the solid solution. CH. ABS. (e)

Constitution of antimony-tin-zinc alloys. R. BLONDEL and P. LAFFITTE (Compt. rend., 1935, 200, 1472–1474).—Three ternary peritectic points, at 197.5° , 235° , and 395° , respectively, have been observed. $ZnSb$ is the only compound of Zn and Sb which is stable in the presence of Sn. M. S. B.

Superconductivity of alloys. C. J. GORTER (Physica, 1935, 2, 449–452).—The observation that the superconductivity of certain alloys persists at field strengths \gg the magnetic threshold field is reconciled with theory. J. W. S.

Superconducting alloys. K. MENDELSSOHN and J. R. MOORE (Nature, 1935, 135, 826–827).—The magnetic properties of a Pb-Bi alloy (30% Pb) have been investigated at temp. near 0° abs. where the alloy is superconducting. A possible explanation for the phenomena observed is that the threshold val. is high in some parts of the alloy, although in the main this has the same val. as the pure metals. L. S. T.

Fugacities of ethyl alcohol and water in their gaseous mixtures. Deviations from perfect solutions. H. ESSEX and W. R. KELLY (J. Amer. Chem. Soc., 1935, 57, 815–816).—The mol. vols. of 12 gaseous mixtures of $EtOH$ and H_2O , containing 0–99.83% $EtOH$, have been determined at 152.9° , 163.5° , and 173.9° , at pressures 1–5, 6, and 8 atm., respectively. Deviations from perfect solution have been calc. At 1 atm. the solutions are practically perfect. The solutions for which the mol. fraction of the component considered is > 0.2 deviate by $< 2\%$, even at the max. pressures recorded. M. S. B.

Statistical mechanics of fluid mixtures. J. G. KIRKWOOD (J. Chem. Physics, 1935, 3, 300–313).—Theoretical. A statistical treatment of fluid mixtures formally applicable to both real gases and liquids is described. M. S. B.

Densities of aqueous solutions of formaldehyde between 20° and 40°. S. N. DATAR (Current Sci., 1935, 3, 483—484).—Data are given for solutions containing 2.76 and 41.43 g. per 100 c.c. at 5° intervals.

W. R. A.

Densities of aqueous solutions of potassium acetate and *n*-dodecoate. C. R. BURY and G. A. PARRY (J.C.S., 1935, 626—628; cf. A., 1930, 1516).—Data for KOAc at 25° and for K *n*-dodecoate at 25° and 35° are recorded. The *d*-composition curve for the former is smooth, whilst those for the latter show abrupt changes of slope similar to those found for the *n*-octoate.

F. L. U.

Viscosity formula for binary mixtures, the association degrees of constituents being taken into consideration. X. Viscosity of aqueous solutions of electrolytes. T. ISHIKAWA and T. BABA (Bull. Chem. Soc. Japan, 1935, 10, 153—167).—Theoretical. The formula for η of Ishikawa (A., 1934, 723) has been applied to the data of Swearingen and Heck (*ibid.*, 591) for C_3H_5N -AcOH mixtures and to aq. salt solutions. "Negative" η ($< H_2O$) is considered to be due to the sp. solutorial η of the salt ($< \eta_{H_2O}$), and not to the depolymerising action of cations against solvent mols. With no hydration (*a*) negative η should be observed at all concns.; with slight hydration (*b*) negative η should be observed at low concns. only, whilst with marked hydration (*c*) η should be "positive." CsCl, RbCl, and CsNO₃ correspond with (*a*), RbNO₃, KCl, and KI with (*b*), 3RbNO₃.H₂O, 3KCl.H₂O, and 2KI.H₂O being formed, whilst NaCl, LiCl, and LiNO₃ correspond with (*c*) the compounds formed being NaCl.2H₂O, LiNO₃.3H₂O, LiCl.H₂O, LiCl.2H₂O, and 2LiCl.4H₂O.

R. S. B.

Relation of surface tension to other physical properties of liquid mixtures. R. M. CONRAD and J. L. HALL (J. Amer. Chem. Soc., 1935, 57, 863—866).—The compressibility-vol.-% composition diagram for MeOH-CHCl₃ mixtures at 25°, and the corresponding surface-tension diagram, are nearly ideal, although their slight deviations are in strict antitatic relation to each other. Fluidity and v.p. show wide deviations from the normal and have no apparent correlation with any other property. The index of refraction is strictly additive and the max. deviation of *d* from the straight-line function is very small. A simple apparatus for the measurement of compressibility under 2 or 3 atm. is described.

M. S. B.

Thermal dissociation and vapour pressure of boric acid and its volatility in steam. S. BEZZI (Annali Chim. Appl., 1935, 25, 121—122).—The contention that the distillation of H₃BO₃ in a current of steam is due to the formation of complexes of ortho- or meta-boric acid with H₂O in the gaseous phase (this vol., 24) is disputed (cf. A., 1933, 120).

T. H. P.

Determination of the internal latent heat of vaporisation of azeotropic mixtures. III. Determination of the internal latent heat of vaporisation of liquids. IV. N. DE KOLOSOVSKI and A. ALMOV. Determination of the latent heat of vaporisation of azeotropic mixtures. V. N.

DE KOLOSOVSKI and R. L. THÉODOROVITSCH (Bull. Soc. chim., 1935, [v], 2, 686—689, 690—691, 692—700; cf. A., 1934, 1164).—III. Vals. (*g*) have been determined for C₆H₆-Pr^oOH, PhMe-Pr^oOH, PhMe-Bu^oOH, CS₂-COMe₂, CCl₄-EtOAc, and CHCl₃-HCO₂Me, and the change in entropy ΔS , heat content ΔH , and free energy *A*, calc. for each mixture.

IV. Vals. of *g* are given for HCO₂Et, EtOAc, Pr^oBr (I), Bu^oCl (II), Bu^oBr (III), and the total latent heats of vaporisation λ and v.-p. equations derived for (I), (II), and (III).

V. An apparatus is described in which a weighed amount of the azeotrope is evaporated at the b.p. by a measured electrical current. ΔS , ΔU , and *A* are calc. for 18 mixtures and the variation with temp. of λ and ΔU is deduced for the six mixtures investigated in Section III.

R. S.

Electrical polarisation of concentrated solutions of nitrobenzene with special reference to the validity of the Sugden relation. H. O. JENKINS and L. E. SUTTON (J.C.S., 1935, 609—615).—The polarisation-concn. curves of conc. solutions of PhNO₂ in C₆H₆, CS₂, *n*-C₆H₁₄, cyclohexane, and CCl₄ have been obtained. The curve for PhNO₂ in cyclohexane is normal. The Sugden relation between the total polarisation of solute and the vol. polarisability of the solution (A., 1934, 474) is satisfied by certain solutions, but this is not generally the case. The actual relation depends on both solute and solvent. The method of calculating dipole moments proposed by Goss (A., 1934, 717) is not of general validity owing to the approx. nature of the Raman-Krishnan formula (A., 1928, 348) on which it is based.

A. J. M.

Dielectric properties of alcohols and ether in various solvents. F. H. MÜLLER and P. MORTIER (Physikal. Z., 1935, 36, 371—377).—The mol. polarisation of MeOH, PrOH, and Et₂O in C₆H₁₄, CCl₄, C₆H₆, CS₂ and decalin has been determined at various concns., the curves being extrapolated to infinite dilution. The vals. obtained do not agree with the view that mol. polarisation at infinite dilution is a simple function of the dielectric const. of the solvent. The effect of the solvent on polarisation is discussed with respect to the position of the dipole within the mol.

A. J. M.

Mutual solubility of flavone and its derivatives.

T. ASAHINA and K. YOKOYAMA (Bull. Chem. Soc. Japan, 1935, 10, 135—138).—The mutual solubility of flavone and 5:6-dihydroxy-, 5:7:4'-triacetoxy-, 5:6-diacetoxy-, 5-hydroxy-6-methoxy-, and 5:6:7-trimethoxy-flavone has been determined at 80—280°. In contrast to the system primetin-flavone (A., 1934, 365) no solid solutions are formed.

R. S. B.

Solubility of helium in water at 0°, 25°, 50°, and 75° and at pressures to 1000 atm. R. WIEBE and V. L. GADDY (J. Amer. Chem. Soc., 1935, 57, 847—851).—The calc. Bunsen and Ostwald absorption coeffs. are in good agreement with the best known vals., but it is shown that the Ostwald corr. coeff., determined at low pressures, cannot be used to calculate high-pressure solubilities. The min. solubility

for He in H₂O is at approx. 30°, which is < for H₂ or N₂. No indication of a hydrate was obtained.

M. S. B.

Solubility. XIV. Experimental tests of a general equation for solubility. J. H. HILDEBRAND (J. Amer. Chem. Soc., 1935, 57, 866—871).—An equation for the calculation of solubility from the properties of the components of the solution has been deduced and shown to be applicable to solutions of I, SnI₄, S, and P in different solvents. Lack of spherical symmetry and presence of dipole moment do not necessarily affect the results. The inequality between the attraction consts. of like and unlike mols. appears to be small.

M. S. B.

Solubilities of certain salts in liquid ammonia. II. Solubility of sodium chloride in liquid ammonia and the saturated vapour pressure of the solution at low temperature. S. ABE, S. SIGETOMI, and R. HARA (J. Soc. Chem. Ind. Japan, 1935, 38, 163—165B).—The solubility (g. NaCl per 100 g. NH₃) falls from 4.20 at -30° to 0.63 at -60°. In combination with previous results (A., 1933, 1240), the data are used to calculate the heat of vaporisation of the saturated solution and the heat of dissolution of NaCl. Below -9.6° the solid phase is NaCl.5NH₃; this is formed with the absorption of 11.56 g.-cal.

J. S. A.

Absorption of fogs from fuming sulphuric acid. H. REMY and C. BEHRE (Kolloid-Z., 1935, 71, 129—145; cf. A., 1934, 955, 1066).—The dependence of the rate of absorption of fogs, produced by blowing air through fuming H₂SO₄ and then saturating the air stream with H₂O, on the SO₃ content of the acid, the H₂SO₄ content of the air, the no. of droplets per c.c., the velocity of the air stream, and the type of absorption vessel, has been determined. F. L. U.

Formation of dew. N. FUCHS (Kolloid-Z., 1935, 71, 145—149).—Condensation of liquid from air saturated with H₂O, or from saturated H₂O vapour alone, occurs at a supersaturation < 0.15—0.20% even on "unwetable" solid surfaces. In the latter case droplets are formed, in repeated experiments, always at the same places on the surface. Such condensation centres consist of microscopic wettable impurities. With metals, liquid may separate above the dew point. Supersaturation of 10—20% is required for dew to separate on the surface of impure liquid mineral oils.

F. L. U.

Absorption of gases on mercury. R. S. BURDON (Proc. Physical Soc., 1935, 47, 460—470).—A Hg surface was formed in the presence of a gas which was pumped off after an interval, and the Hg surface then made to collapse, causing an evolution of the gas. For air, H₂, and CO₂ the limiting amount evolved corresponded with a unimol. layer which appears to be retained by the surface for a long period.

N. M. B.

Statistical derivation of Langmuir's adsorption isotherm. R. H. FOWLER (Proc. Camb. Phil. Soc., 1935, 31, 260—264).—Mathematical.

A. J. M.

Adsorption concepts in chemistry. E. K. RIDEAL (Nature, 1935, 135, 737—738).

L. S. T.

Interaction of hydrogen with micro-crystalline charcoal. I. R. M. BARRER and E. K. RIDEAL. **II. Activated sorption of hydrogen and methane by carbon.** R. M. BARRER (Proc. Roy. Soc., 1935, A, 149, 231—253, 253—269).—I. The sorption of H₂ on charcoals, for which the cryst. size was determined by X-ray analysis, has been studied. Sorption at 78°, 195°, and 273° abs. shows that the charcoal surface is composite. The total sorption may be represented by the sum of two terms: $x/m = ap/(1+bp) + a'p/(1+b'p)$. Saturation for the first type is reached at low pressures and is caused by active centres due to ash, whilst the second type is due to an ash-free C surface which shows no evidence of active centres. The kinetics of sorption of H₂, N₂, and O₂ at low temp. are in agreement with Fick's law. For all gases on ash-free charcoal the relations can be described by $(C_e - C_t)/(C_e - C_i) = b(e^{-at} + 1/9e^{-9at} + 1/25e^{-25at} + \dots)$, and over the later stages of sorption by $\log(C_e - C_t)/(C_e - C_i) = kt$. D₂ is more strongly sorbed than H₂ at 78° abs. Chemisorption of H₂ causes a decrease in the amount of van der Waals adsorption, without altering the velocity. No evidence is found for previously reported discontinuities in the isotherms.

II. Isotherms, isobars, and kinetics for the activated sorption of H₂ by charcoal have been measured between 623° and 1223° abs. Isotherms and kinetics for activated sorption of CH₄ have also been studied. At low pressures the gas phase is H₂ whether equilibrium is approached from the side of CH₄ or H₂. At higher pressures small quantities of CH₄ are slowly formed; this is detectable when activated sorption is completed. Sorption of H₂ is an activated chemisorption complicated by diffusion. Non-activated diffusion limits the reaction rates above 970° abs. The activation energy varies from 10,000 to 30,000 g.-cal. per g.-mol. at 20% saturation of the surface. The heat change at high temp. is const. at 50,000 ± 5000 g.-cal. per g.-mol. At low pressures CH₄ reacts with a C surface according to a unimol. law and const. activation energy (53,400 g.-cal. per g.-mol.).

L. L. B.

Adsorption on measured surfaces of vitreous silica. W. G. PALMER and R. E. D. CLARK (Proc. Roy. Soc., 1935, A, 149, 360—384).—The adsorption of vapours on specially prepared powdered vitreous SiO₂ has been measured. The areas covered by mols. on the surface agree with vals. from other sources. Langmuir's formula has been modified to connect adsorption potential with the amount adsorbed, leading to a new theoretical isothermal. Special experiments were made on the form of the adsorption isothermal at low degrees of adsorption.

L. L. B.

Effect of temperature on adsorption of electrolytes by charcoal. L. LEPIN and G. STRACHOVA (Z. physikal. Chem., 1935, 173, 129—140).—The adsorption of HCl and H₂SO₄ from aq. solution increases with rise of temp., whilst that of HCO₂H and AcOH decreases. This observation supports Schilov's hypothesis (A., 1930, 991) that the adsorption of electrolytes on C depends on a surface reaction between the ions of the electrolyte and the surface C oxide, thus differing entirely from the adsorption of non-electro-

lytes. The temp. coeff. for HCO_2H is somewhat < for AcOH , which is doubtless connected with the fact that almost half the adsorbed HCO_2H reacts with the surface oxide of the C (cf. A., 1931, 1006). Adsorption equilibrium is established more slowly for HCl and H_2SO_4 than for AcOH ; HCO_2H occupies an intermediate position. With HCl and HCO_2H there is evidence of a transition from ionic adsorption at low to mol. adsorption at higher concns. R. C.

Influence of complex formation on the adsorption of copper in ammoniacal solutions by precipitated ferric hydroxide. (MME.) L. S. MATHIEU-LÉVY (Compt. rend., 1935, 200, 1751—1754).—The adsorption passes through a max. with increasing $[\text{NH}_3]$. At low $[\text{NH}_3]$ colloidal $\text{Cu}(\text{OH})_2$ is formed, and this is adsorbed. With increasing $[\text{NH}_3]$ complexes are formed, and the adsorption decreases.

H. J. E.

Absorption of dyes by suspensions of kaolin. A. BOUTARIC and P. COULON (Bull. Soc. Chim. biol., 1935, 17, 620—626).—The adsorption by kaolin of colloidal or semi-colloidal electropositive dyes is greater and more stable to washing than that of electronegative dyes, that of methylene-blue being particularly marked. Addition of aq. H_2SO_4 increases the adsorption of electronegative and decreases that of electropositive dyes. Flocculation of the kaolin increases the adsorption of semi-colloidal dyes.

A. L.

[Adsorption by] humic acids. G. STADNIKOV, K. SISOV, and A. USCHAKOVA (Kolloid-Z., 1935, 71, 206—214; cf. B., 1929, 231).—The adsorption of $\text{Ba}(\text{OH})_2$ from aq. solution by humic acid is a chemical process in which both phenolic OH and CO_2H groups take part. When OH are methylated adsorption is correspondingly diminished, but when CO_2H are methylated there is no change in adsorption, since hydrolysis occurs and MeOH is found in the solution. Similar behaviour is observed with lignin and is characteristic of humic acids. F. L. U.

Inner adsorption in salt crystals. I. D. BALAREV [with M. VRANOVA and N. KOLAROV] (Z. anal. Chem., 1935, 101, 161—177).—The slow removal by washing of salts occluded in ppts. is attributed to their occlusion in capillaries of the mosaic structure rather than in superficial adsorption layers. During pptn. in presence of several electrolytes, an orderly preferential adsorption is observed. Isomorphous substances may be held partly by adsorption and partly by mixed crystal formation. Const. composition and elimination of zeolitic H_2O from capillaries are attained only after ageing (inner recrystallisation), which is promoted by subdivision of macro-crystals. Analytical ppts. do not reach stoicheiometric composition even after ignition. Kolthoff's views (A., 1932, 457) are criticised. J. S. A.

Adsorption of ovalbumin at the free surface of its solutions when the concentration of the latter varies from 10^{-2} to 10^{-8} . H. DEVAUX (Compt. rend., 1935, 200, 1560—1563; cf. this vol., 161).—The thickness of films on dil. solution is > that of a unimol. layer, and at const. p_{H} increases with the concn., but not so rapidly as the latter. The thickness-concn. curve has the characteristics of an

ordinary adsorption curve. A theoretical equation is developed which is in approx. accord with the results.

J. W. S.

Surface tension of solutions. G. JONES and W. A. RAY (J. Amer. Chem. Soc., 1935, 57, 957—958).—By a modification of the capillary rise method, surface tension, σ , may be determined with greater precision than hitherto possible. At very low concn. (< 0.006*N*), σ for aq. KCl is < for H_2O , but rises above the latter val. at higher concn., and is approx. a linear function of concn. This is not in accordance with the equations of Onsager *et al.* (A., 1934, 1068). K_2SO_4 and CsNO_3 give similar results, but sucrose at concn. 0.0005—0.005*M* gives an increased σ . An explanation is given on the basis of the ionic forces. M. S. B.

Surface tension and solvent action of organic liquids. S. PAPKOV (Kolloid-Z., 1935, 71, 204—206).—Org. liquids in which cellulose acetate dissolves or swells have surface tensions in the range 22—30 dynes per cm. for aliphatic and >37 for cyclic compounds. F. L. U.

Abnormal surface tensions of dilute aqueous phenol solutions. F. SEELICH (Z. physikal. Chem., 1935, 173, 121—128).—Addition of PhOH to H_2O causes a sudden fall in the surface tension, γ . Subsequently γ rises slowly, but this is not due to volatilisation of PhOH . Even the PhOH adsorbed on the wall of the vessel above the surface of the solution is sufficient to cause a considerable fall in γ . It is suggested as a possible explanation that the establishment of equilibrium between associated and non-associated PhOH mols. in solution takes time and that the associated mols. are the more surface active. Apparently the rate of transformation of these is a min. in the adsorbed state. R. C.

Surface relations of the xanthates. C. C. DE WITT, R. F. MAKENS, and A. W. HELZ (J. Amer. Chem. Soc., 1935, 57, 796—801).—A modification of Ferguson's balanced pressure surface tension apparatus is described. The surface tension, γ , of several xanthate solutions has been determined. The mol. lowering of γ is approx. the same for both Na and K ethylxanthates, and increases in the ascending homologous series from ethyl- to nonyl-xanthates in accordance with Traube's rule. Isomeric forms of K amyloxanthate differ considerably in their effect. The relation of the mol. lowering of γ to the efficiency of the normal xanthates (Et to heptyl inclusive) as collectors for malachite and chalcocite in flotation practice is discussed. M. S. B.

Range of action of surface forces. F. P. BOWDEN and S. H. BASTOW (Nature, 1935, 135, 828).—The resistances to flow of thin ($16\text{--}60 \times 10^{-5}$ cm.) liquid films of 1% NH_4 oleate, H_2O , EtOH , cyclohexane, AcOH , and Et palmitate between parallel surfaces show no evidence of rigidity. Thinner films (approx. 10^{-5} cm.) cooled to within 0.1° of the f.p. behave similarly, η being the same as that of the liquid in bulk. The view that oriented chains of H_2O mols. extend to a distance of 5μ from a solid surface is untenable (cf. A., 1934, 721). L. S. T.

Meaning of the exponential equation between surface pressure and concentration. B. TAMAGI

MUSHI (Kolloid-Z., 1935, 71, 150—159; cf. A., 1934, 1304).—The empirical relation $s = kc^{1/n}$ (s = surface pressure, c = concn.) can be regarded as a particular case of the general two-dimensional equation of state, from which it follows that k and n should depend on concn. and temp. Experiments on the variation of the surface pressures of a series of aq. fatty acids with concn. and temp. confirm this conclusion. At very small concns. $n=1$. F. L. U.

Drop-weight method for the determination of electrocapillary curves. S. R. CRAXFORD and H. A. C. MCKAY (J. Physical Chem., 1935, 39, 545—550).—An apparatus for the determination of electrocapillary curves by the drop-wt. method is described. These curves coincide to within 0.2% with those obtained by the use of the capillary electrometer; the method may therefore be applicable to non-wetting solvents for which this is unsuitable. M. S. B.

Formation and structure of uni- and bi-molecular layers of oily substances on metallic surfaces. J. J. TRILLAT and H. MOTZ (Compt. rend., 1935, 200, 1299—1301).—Films of mol. thickness deposited on Au leaf of thickness 50—80 μ and subjected to 40,000-volt electron beams show diffraction patterns indicating regular mol. orientation which is discussed in relation to the structure of the compounds. Clean films of Ag, Au, Pt, and Al, examined after several months, show similar patterns due to spontaneous accidental contamination. N. M. B.

Mechanism of flotation. Adsorption on particles of talc in aqueous suspension and its flotation. Z. V. VOLKOVA, N. N. SERB-SERBINA, and A. V. SAPOROSHEZ (Kolloid-Z., 1935, 71, 230—234; cf. this vol., 578).—*iso*Valeric acid (I) is adsorbed by talc particles suspended in H_2O , and at the same time Mg ions pass into the solution. For flotation the optimum concn. of (I) is about 0.5%. An explanation is offered. F. L. U.

Molecular strength of liquids. J. MEYER (Z. physikal. Chem., 1935, 173, 106—114).—Smekal's concept of mol. strength (Naturwiss., 1922, 20, 799) is applied to liquids. The conditions under which the mol. strength of liquids can be directly observed and the influence of temp. are discussed. The importance of eliminating the free surface in such observations is emphasised. R. C.

Ebullioscopic measurements with solutions of ketones and aldehydes in hydrogen fluoride. W. KLATT (Z. physikal. Chem., 1935, 173, 115—120).—The data for aldehydes, ketones, and ketonic acids in anhyd. HF afford no evidence of chemical change other than the formation of solvates, which may dissociate considerably. R. C.

Compressibility of electrolytic solutions. H. FALKENHAGEN and C. BACHEM (Nature, 1935, 135, 830).—The adiabatic compressibilities of strong electrolytes have been measured by a new optical method. The compressibility, k , and concn. are related by $k = Ac + Bc^{3/2}$. The limiting slopes derived from the interionic attraction theory by Gucker agree with the results for 1-1- and 1-2-valent salts, but with electrolytes of higher valency a slope $<$ the expected is obtained. L. S. T.

Influence of evaporation on the migration of salts. K. SCHULTZE (Kolloid-Beih., 1935, 41, 365—392).—The influence of evaporation, vessel wall, and diffusion on the migration of KCl, KNO_3 , kainite, and $KAl(SO_4)_2$ has been studied. The migration is not a sp. property of the salt, since salts previously described as non-migrating, e.g., kainite, can be made to migrate. The diffusion of the salts towards the bulk of the solution and the evaporation of the solution act oppositely, and the degree of dispersion of a disperse phase (as in soil) influences the net result. Erlenmeyer's theory (cf. B., 1934, 214) is criticised. R. S. B.

Aërosols. H. REMY (Chem.-Ztg., 1935, 59, 465—468).—A review of the occurrence, properties, methods of study, and practical applications of aërosols is given. G. H. C.

Preparation and properties of highly concentrated sols. IV. Thoriumhydroxide sol. N. R. DHAR and R. N. MITTRA (Kolloid-Z., 1935, 71, 172—176; cf. A., 1933, 123).—Sols containing up to 428 g. of ThO_2 per litre have been prepared. The coagulative effects of $KBrO_3 + K_2SO_4$ are additive, irrespective of the ratio ThO_2/NO_3 . KIO_3 and HIO_3 have abnormal coagulating powers, whence it is inferred that their solutions contain I_2O_6 . The viscosity (η) and electrical conductivity increase on ageing. The η -concn. curves are very steep. F. L. U.

Influence of temperature, especially above 100°, on inorganic colloids. T. KATSURAI (Kolloid-Z., 1935, 71, 169—172; cf. A., 1934, 729).—Observations of the behaviour of various hydrosols when heated in an autoclave are recorded. F. L. U.

Viscosity and plasticity of disperse systems. IV. Plastic and viscous properties of molten slags and rocks. M. VOLAROVITSCH (Kolloid-Z., 1935, 71, 159—165; cf. this vol., 579).—The viscosity (η) of several molten slags and rocks has been measured in a concentric cylinder apparatus at temp. up to 1400°. A series of Ti slags and basic rocks gave anomalous results attributed to crystallisation of a part of the constituents. Acidic rocks gave higher vals. of η and their η -temp. curves are of the same type as ordinary glass. F. L. U.

Mechanism of emulsification by ultrasonic waves. C. BONDY and K. SÖLLNER (Trans. Faraday Soc., 1935, 31, 835—843; cf. A., 1934, 26).—The formation of oil- H_2O emulsions by ultrasonic waves is due to the collapse of cavities of vapour formed by the vibrations. A similar mechanism brings about emulsification when an easily condensable vapour, e.g., steam, is introduced at the interface oil- H_2O . The effect of the presence of gases is discussed. F. L. U.

Influence of gases on mercury emulsions prepared by ultrasonic waves. C. BONDY and K. SÖLLNER (Trans. Faraday Soc., 1935, 31, 843—846; cf. preceding abstract).—Ultrasonic waves cause the formation of $Hg-H_2O$ emulsions by driving bubbles of H_2O beneath the Hg surface, where they unite and burst through a thin covering film of Hg , causing its dispersion. Emulsions so formed are quite unstable

in the absence of gases, but are stabilised by H_2 , O_2 , or N_2 , which are adsorbed at the interface.

F. L. U.

Effect of cathode rays on hydrophobic sols. (Miss) M. ANNETTS (J. Physical Chem., 1935, 39, 509—514).—The stability of both positive and negative sols decreases by bombardment with cathode rays, probably due to ionisation of the dispersion medium. The rate of heating of a sol by the rays is slightly $>$ the rate of heating of H_2O under similar conditions. No explanation can be offered on the basis of heat changes in the sol.

M. S. B.

Depolarisation of Tyndall scattering in colloids. I. D. S. SUBBARAMAIIYA. II. R. S. KRISHNAN (Proc. Indian Acad. Sci., 1935, 1, A, 709—716, 717—722; cf. this vol., 11).—I. The depolarisation is expressed in terms of ρ_u , ρ_v , and ρ_h , where ρ is the ratio of the intensities of the weak and strong components in the transversely scattered light, and u , v , h refer to unpolarised and plane polarised light with the electric vector vertical and horizontal, respectively. Measurements have been made for S- H_2O suspensions, castor oil- H_2O emulsions, As_2S_3 - H_2O solutions, and casein solutions at various p_H vals.

II. Assuming that the total scattering arises from that due to the finite size of the particles assumed spherical and isotropic, and that due to the varying orientations of the actual non-spherical anisotropic particles, the relation $\rho_u = (1 + 1/\rho_h)/(1 + 1/\rho_v)$ is derived; except for the protein solutions this agrees with the experimental data.

N. M. B.

Influence of alcohol on the viscosity of sols of benzopurpurin and chrysophenin. T. P. PAFKOVA-KVITZEL (Kolloid-Z., 1935, 71, 165—168; cf. A., 1934, 1171).—Addition of EtOH to aq. sols of the above at first reduces the structure-viscosity, which vanishes entirely over a certain concn. range. High EtOH concn. causes a further increase in viscosity without, however, the appearance of rigidity. The effects are attributed to ordered aggregation of mols. at low, and random aggregation at high, concns. of EtOH.

F. L. U.

Stability of emulsions as determined by the distribution of sizes. (Miss) S. BERKMAN (J. Physical Chem., 1935, 39, 527—539).—Distribution curves for C_8H_{18} - H_2O and "stanolax"- H_2O emulsions, with Na oleate as emulsifier, have been obtained. The influence of concn. of emulsifier, age of emulsion, and presence or absence of hydrolysis, on the distribution, has been studied. Integral distribution curves, and the corresponding differential curves, have been obtained, and are shown to reflect in their shape the influence of the various factors concerned.

M. S. B.

Lyophilic behaviour and particle size. F. L. USHER (Kolloid-Z., 1935, 71, 177—179).—When the radius of colloidal Au particles is $< 18 m\mu$ their behaviour becomes increasingly lyophilic as their size decreases, as shown by a steadily increasing divergence of the coagulating powers of Li^+ , Na^+ , and K^+ . This supports the view, for which reasons are given, that lyophilic behaviour generally is determined by a high ratio of sol. to insol. constituents of

the surface in contact with the dispersion medium, whether the former are mols., radicals, or ions.

F. L. U.

Coagulation of hydrosols of silver bromide and silver iodide. H. SCHNELLER (Kolloid-Z., 1935, 71, 180—184).—The rate of coagulation of 0.001M sols of AgBr and AgI has been studied in relation to the excess of Ag^+ or halide ion present. A max. of stability is observed with 100% excess of either ion for AgBr, and 30% for AgI. The observations are in agreement with the assumption that below the max. stability the determining factor is the stabilising charge, whereas above the max. instability is due to recrystallisation occasioned by increased solubility.

F. L. U.

Action of alcohol on gum arabic sols studied by the polarisation of diffuse light. C. TOURNEUR (Compt. rend., 1935, 200, 1756—1757).—Sols of gum arabic become turbid on adding EtOH. This change has been followed for varying [EtOH] by measuring the intensity and polarisation of light scattered at 90° by the sol. The results are correlated with the ease of flocculation by electrolytes.

H. J. E.

Lyophilic colloids. XXIV. Specific influences of cations in the auto-complex flocculation of negatively-charged lyophilic colloids (gum arabic sol + neutral salt + alcohol). H. G. B. DE JONG and R. STROOP (Kolloid-Beih., 1935, 42, 96—108; cf. this vol., 32).—The influence of the cation decreases in the order: $Al^{+++} > Ce^{+++} > La^{+++} > Co(NH_3)_6^{+++} > Pb^{++} > UO_2^{++} > Cu^{++} > Cd^{++} > Zn^{++} > Co^{++}$, $Ni^{++} > Mn^{++}$, $Ba^{++} > Sr^{++} > Ca^{++} > Mg^{++} > Ag > K > Na > NH_4^+ > Li^+$. Assuming that the polarisability of the CO_2' group of gum arabic is $>$ that of H_2O or EtOH, these results can be explained in terms of the charge, radius, and polarisation of the ions.

E. S. H.

Migration studies with colloids. III. Behaviour of gelatin-protected ferric oxide and manganese dioxide sols. F. HAZEL and G. B. KING (J. Physical Chem., 1935, 39, 515—526).—The migration velocities of gelatin-coated Fe_2O_3 and MnO_2 sols have been studied by an ultramicroscopic method for different concns. of gelatin and different p_H . When sufficient gelatin is added to coat the particles these have the properties of the protein. The effect of differences in valency of added electrolytes on the mobility of gelatin-coated hydrophobic sols is much $<$ their effect on adsorption by the uncoated particles. When electrolyte solutions and gelatin of the same p_H are mixed, the $[H^+]$ changes in the direction of the isoelectric point, and the order of the electrolytes in altering p_H is the same as their effectiveness in decreasing the mobility of gelatin-protected particles. This change in acidity is explained by the assumption that salts disperse the protein into smaller particles with the resultant increase in total no. of active groups.

M. S. B.

Highly polymerised compounds.—See this vol., 740, 745.

Colloid chemistry of compounds of sugars and fatty acids, particularly glucose stearate. D. SCHMALTZ (Kolloid-Z., 1935, 71, 234—235).—Glucose monostearate, m.p. 56.5 — 57° , forms temp.-reversible

thixotropic gels in paraffin oil. It is a good emulsifying agent, giving stable emulsions of the H₂O-in-oil type.
F. L. U.

Solubility rules for cellulose derivatives. Cellulose acetate and benzylcellulose. L. CLÉMENT, C. RIVIÈRE, and A. HONNELAITRE (Bull. Soc. chim., 1935, [v], 2, 707—722).—The action of solvents on cellulose acetate and benzylcellulose (I) is related to functional groups in the (I) micelle and in the solvent mol. Viscosity data show that the dispersive power is increased in solvent mixtures containing functional groups present in the micelle (*e.g.*, CO and OH, or C₆H₆ and OH) and also in pure solvents with functional groups in the same mol. Dispersive power is a max. for the first members of a homologous series or for the *n*-compound of a group of isomerides.
R. S.

Dependence of the viscosity of cellulose esters on the concentration. K. HESS and W. PHILIPPOFF (Ber., 1935, 68, [B], 688—699).—Data for solutions of technical cellulose acetate fractions (I) in AcOH and of cellulose nitrate in amyl acetate are recorded. At low concn., frequently < 0.1%, $\eta_{sp} \propto c$. At higher concn. breaks occur in the $\eta_{sp}-c$ and $\eta_{sp}-t$ curves, but the observations are not directly comparable with those obtained by osmometric measurements. Reproducible results can be secured only if all solutions of an experimental series are prepared from a parent solution. The variability of the relation between viscosity and mol. wt. is illustrated by the behaviour of cellobiose acetate, limit dextrin acetate, and (I), which at similar concn. have the same mol. wt. (calc. with respect to C₆) whereas the η_{sp} vals. are 1 : 10 : 100.
H. W.

Sol-gel transformations. I. Inverse sol-gel transformation of methylcellulose in water. E. HEYMANN (Trans. Faraday Soc., 1935, 31, 846—864).—A 1.6% aq. sol of methylcellulose (OMe 35.4%) becomes less viscous with rise of temp., and has min. η at about 46°, above which η rises rapidly and the sol sets to a gel below 50°. The transformation is reversible. The effect of salts is in general to lower the "m.p." of the gel. KI and KCNS raise it, however. The effect is due entirely to the anion, and the ordinary lyotropic series holds good. The vol. increases during the change sol \rightarrow gel. This, and the occurrence of hysteresis, are considered to indicate that gelation is accompanied by partial dehydration of the particles.
F. L. U.

Hydrosols of an alcohol-insoluble plant phosphatide ("oil-free planticin"). H. G. B. DE JONG, G. VERBERG, and R. F. WESTERKAMP (Kolloid-Z., 1935, 71, 194—198; cf. following abstract).—This phosphatide, after being freed from COMe₂-sol. impurities, gives clear sols which differ from those of ovolecithin and EtOH-sol. soya-bean lecithin in being coagulated by neutral salts with bi- or trivalent cations in the absence of sensitising substances. The coagulating action of various salts has been studied.
F. L. U.

Clear phosphatide sols from commercial phosphatide preparations. H. G. B. DE JONG, G. VERBERG, and R. F. WESTERKAMP (Kolloid-Z.,

1935, 71, 184—194; cf. A., 1931, 908).—Lecithin preps. from egg or soya bean can be obtained as clear sols under the following conditions: (1) sensitising impurities must be removed by pptn. with COMe₂ from the Et₂O solution; (2) a solution of the purified lecithin, of concn. $\geq 5\%$, in EtOH, or better Pr^{*o*}OH, must be rapidly mixed with four times its vol. of H₂O at a temp. not below 50°.
F. L. U.

Isoelectric point of gelatin. K. S. LJALIKOV, I. R. PROTAS, and G. P. FAERMAN (Compt. rend. Acad. Sci., U.R.S.S., 1935, 1, 615—622).—The influence of electrolytes on the p_H of the isoelectric point has been studied. Anions depress the p_H , cations exalt it. The charge and hydration of the ions influence the shift.
W. R. A.

Electrolytic phenomena related to chemical associations in gelatin. (MLLE.) S. VEIL (Compt. rend., 1935, 200, 1318—1319; cf. A., 1934, 861, 1172).—Fine metallic wires immersed in two separated drops of electrolyte on gelatin form electrolytic systems, the e.m.f. of which depends on the nature of the two electrolytes, and on the concn. for the same electrolyte.
N. M. B.

Isoionic point of proteins. G. SANDOR (Compt. rend., 1935, 200, 1371—1372).—In presence of electrolytes the isoionic and isoelectric points of proteins vary with the concn. and nature of the electrolytes. The p_H of serum-albumin, dialysed for 12 days, is const. at 4.8—4.89 at 18°, and independent of the concn., corresponding approx. with the isoionic point. The latter depends on the presence of neutral salts, the ions of which appear to react with those of the protein. The theory that protein chlorides, like strong electrolytes, are always completely ionised is not supported.
N. M. B.

Dilatometric study of the denaturation of albumin solutions by heat. F. HAUROWITZ (Kolloid-Z., 1935, 71, 198—204).—The vol. change during denaturation of four different albumins by heat is only 0.01—0.07 c.c. per 100 g. of dried material. It is inferred that the process involves no change in hydration or in the no. of free acid and basic groups. An alternative mechanism is suggested.
F. L. U.

Relations between colloidal and constitutive changes of proteins. II. Heat-denaturation of albumin outside the isoelectric region. W. PAULI and W. KÖBL (Kolloid-Beih., 1935, 41, 417—460; cf. A., 1931, 908).—Changes in $[\alpha]_D$, viscosity (η), and p_H for highly purified ovalbumin (I) and serum-albumin (II) have been correlated. From the quantities of acid and alkali needed to arrest coagulation on heating it is inferred that the negative charge on the protein must be somewhat $>$ the positive, which accords with the velocities of the oppositely charged protein ions. A possible explanation is the variation in length of the side-chains, which carry the charge. Heating in the isoelectric region to near the coagulation temp. produces no change in $[\alpha]_D$. Curves for $[\alpha]_D$, η , and Svedberg's coagulation const. at p_H 1—13 show no marked variation except at extreme vals. of p_H . The changes in $[\alpha]_D$ and p_H on heating differ in the alkali and acid regions; for (I) $\Delta p_H = 0$ at approx. p_H 1.5, 4, and 8.5 and for (II) at 2.2, 3, 8, and 13. The inhibition of coagulation by carbamide at

p_H 2—14 is explained by hydrolysis to $(NH_4)_2CO_3$. The changes of p_H with $[\alpha]_D$ suggest the union of carbamide and protein as in the formation of NH_2 -acids; $Na_4P_2O_7$ and Na salicylate act similarly. KCNS and $MgCl_2$ inhibit the coagulation of (II) but not of (I). The mutual coagulation of denatured and native albumin, and the p_H , electrical conductivity, and η of mixtures, have been studied. Native (I) exerts a disaggregating action on (II). R. S. B.

Relations between colloidal and constitutive changes of proteins. III. Casein and edestin. W. PAULI and L. HOFMANN (Kolloid-Beih., 1935, 42, 34—95; cf. preceding abstract).—The variation of $[\alpha]_D$ and η of K caseinate and edestinate with p_H and temp. and the effects of adding neutral salts, carbazide, Na salicylate, and lyophilic colloids have been investigated. Marked differences in the behaviour of the proteins are noted. Edestin forms a stable sol when added to a boiling sucrose solution. Two types of protein association are distinguished, characterised by the formation of compact and loose aggregates, respectively, and accompanied by a corresponding decrease or increase of η . E. S. H.

Modifications of periodic precipitates of the Liesegang type. G. V. STUCKERT (Invest. Labor. Quim. biol. Univ. Cordoba, 1933, 1, 208—213; Chem. Zentr., 1934, ii, 3490).—The influence of PO_4''' , F' , SO_4'' , and CO_3'' on the periodic pptn. of Ca salts in gelatin gel at varying p_H is recorded. H. J. E.

Electrokinetic potential of silver iodide. G. N. GOROCHOVSKY (J. Physical Chem., 1935, 39, 465—475).—The electrokinetic potential (ζ) of AgI sols, prepared in the presence of varying excess of either ion, has been measured electrophoretically. The ζ -concn. curves do not coincide with the endosmotic curves of Lange *et al.* (A., 1929, 758). As the concn. of dispersed AgI diminishes the $[Ag']$ necessary to charge it positively increases, and the isoelectric point is moved further from the point of equivalence in the direction of the excess of Ag' . Dilution by an isoelectrolytic solution also decreases the positive charge of the sol. Change in concn. of the dispersed phase does not cause any change in p_H . M. S. B.

Microscopical determination of electrophoresis velocities and determination of critical concentration of hydrophilic colloids. H. G. B. DE JONG and P. H. TEUNISSEN (Rec. trav. chim., 1935, 54, 460—470).—Two forms of apparatus are described and their use is exemplified by the determination of the concn. of $CaCl_2$, $LiCl$, and $NaCl$ required to flocculate lecithin. D. R. D.

Electrophoresis of sterols. II. Ergosterol. L. S. MOYER (J. Gen. Physiol., 1935, 18, 749—753).—The electrophoretic behaviour of ergosterol suspended in dil. acetate buffer at p_H 3.0—6.0 is identical with that of cholesterol (A., 1934, 1305); this is explained by similarity of preferential adsorption of H' or OH' . F. O. H.

Electrophotophoresis of antimony. G. ISSER and A. LÜSTIG (Z. Physik, 1935, 94, 760—769).—Recorded data show that electrophotophoresis is not due to particles surrounded by an ionic cloud. A. B. D. C.

Application of thermodynamics to gas equilibria. A. J. RUTGERS (Z. physikal. Chem., 1935, 173, 73—88).—The mass law has been deduced by a method which utilises an equilibrium box but is valid for dissociations such as $2HCl \rightleftharpoons H_2 + Cl_2$. The reaction isotherm and isochore have also been derived for such reactions. R. C.

Activity coefficients of gases. Application to calculation of effect of pressure on homogeneous chemical equilibria and to calculation of integral Joule-Thomson effects. R. H. NEWTON and B. F. DODGE (Ind. Eng. Chem., 1935, 27, 577—581).—Good agreement with experiment is obtained for the NH_3 synthesis up to 300 atm.; at 600 atm. the agreement is fair, and at 1000 atm. marked deviations occur. The equilibrium const. for the reaction $CO + 2H_2 \rightleftharpoons MeOH$ has been calc. at 250—400° and 0—1000 atm. An approx. method is developed for calculating changes in temp. due to the Joule-Thomson effect. R. S. B.

Statistical theory of regular solutions. A. GANGULI (Current Sci., 1935, 3, 478—479).—Mathematical. W. R. A.

Virial theorem and theory of strong electrolytes. B. N. FINKELSTEIN (Proc. Camb. Phil. Soc., 1935, 31, 281—284).—Theoretical. A. J. M.

Influence of ionic environment on the dissociation of weak electrolytes. H. M. DAWSON (Proc. Leeds Phil. Soc., 1935, 3, 88—91).—Results for two kinetic methods of measuring the dissociation of AcOH in NaCl are compared with those for two potentiometric methods. All indicate that K_e is a max. when the salt solution is about 0.5N. The kinetic methods provide the more consistent results for the influence of ionic environment. W. R. A.

First dissociation constant of carbonic acid. Y. KAUKO and J. CARLBERG (Z. physikal. Chem., 1935, 173, 141—149).—From measurements of the p_H of $NaHCO_3$ solution saturated with CO_2 by potentiometric and colorimetric methods, which give concordant results, and application of the Debye-Hückel theory the val. 3.12×10^{-7} for the first thermodynamic dissociation const. at 18° has been verified. The higher val. obtained by MacInnes and Belcher (A., 1933, 904) is in error owing to uncertainties involved in their extrapolation to infinite dilution. R. C.

Dissociation constant of eugenol. G. G. RAO (J. Indian Chem. Soc., 1935, 12, 161—163).—The dissociation const. of eugenol is approx. 1×10^{-10} from the conductivity at 25° of solutions in aq. NaOH at dilutions between 9 and 48 litres. J. G. A. G.

Temperature variation of ionisation constants in aqueous solution. A. W. WALDE (J. Physical Chem., 1935, 39, 477—484).—The equation given by Harned *et al.* (A., 1934, 732), involves unjustifiable assumptions. M. S. B.

Debye theory of strong electrolytes. S. KANEKO (J. Electrochem. Assoc. Japan, 1934, 2, 348—350).—Theoretical. An expression is derived leading to the same results as those given by Gronwall's equation (A., 1927, 626). CH. ABS. (e)

Determination of ionic activities. S. VON NÁRAY-SZABÓ and Z. SZABÓ (*Z. physikal. Chem.*, 1935, **173**, 103—105).—Hass and Jelinek's determinations (*A.*, 1933, 26) are of doubtful val., since to derive ionic activities from e.m.f. measurements with cells with transport the precision of measurement must be at least 0.1 mv. and diffusion potentials must be taken into account. R. C.

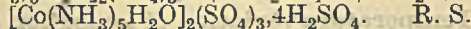
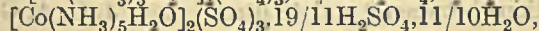
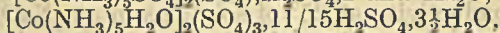
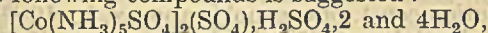
Application of the Debye theory to solutions of cadmium chloride. (MLLE.) M. QUINTIN (*Compt. rend.*, 1935, **200**, 1754—1755; cf. this vol., 826).—The Debye theory may be applied to aq. CdCl_2 ; deviations from calc. vals. occur at lower concns. than for aq. CuSO_4 . H. J. E.

Hydration of ions as a function of their electrostatic potential. H. BRINTZINGER, C. RATANARAT, and H. OSSWALD (*Z. anorg. Chem.*, 1935, **223**, 101—105; cf. this vol., 582).—The hydration of halide ions has been determined from measurements of their dialysis coeff. As with cations, the hydration is a linear function of the potential calc. from the ionic radii. F. L. U.

Composition and hydration of dissolved complex metal-thiocyanate ions. H. BRINTZINGER and C. RATANARAT (*Z. anorg. Chem.*, 1935, **223**, 106—112; cf. *A.*, 1934, 1305).—Dialysis coeffs., ionic wts., potentials, and ionic radii are given for complex (CNS) ions containing Ag, Cu^I , Zn, Cd, Co, Ni, Fe^{II} , Mn, Fe^{III} , Al, V, Cr, Th, and Ce. Hydrations are calc. F. L. U.

Hydration of the D' ion in heavy water and the dissociation of deutero-acids. P. GOLDFINGER and W. JEUNEHOMME (*Compt. rend.*, 1935, **200**, 1387—1389).—Existing data suggest that the free energy of the electrostatic action on a solute is about 0.05 kg.-cal. per g.-mol. less in D_2O than in H_2O , but free energy of hydration is greater in D_2O , the difference reaching 1 kg.-cal. per mol. for formation of D_3O^+ . The difference in free energy for acids and deutero-acids is of the same order. J. W. S.

Equilibria between the aquopentamminocobaltic sulphates and their sulphuric acid solutions at 45°. L. O. TAO and W. S. MO (*Bull. Soc. chim.*, 1935, [v], **2**, 911—916; cf. *A.*, 1929, 1409).— H_2SO_4 concns. up to 15M have been employed and the equilibria attained after prolonged stirring at 45° studied by Schreinemakers' method. The formation of the following compounds is suggested:



Cuprammonium compounds. III. Electro-metric determination of the complexity constants of cuprammine ions and of the equilibrium between cupro- and cupri-ammonium complexes in presence of copper. Light absorption of cuprammine ions. J. BJERRUM (*Kong. dansk. Vidensk. Selsk., mat.-fys. Medd.*, 1934, **12**, No. 15, 63 pp.; *Chem. Zentr.*, 1934, ii, 3491—3492).—Results with a Cu amalgam electrode are recorded. Even at

high $[\text{NH}_3]$ the diammine complex is formed. The cuproammines are much more stable than the cupriammines. Absorption curves of $\text{Cu}(\text{NO}_3)_2$ in aq. NH_3 are described. H. J. E.

Refractometric investigation of the formation in aqueous solution of compounds of higher order hitherto regarded as double salts. II. G. SPACU and E. POPPER (*Bul. Soc. Stiințe Cluj*, 1934, **8**, 5—128; *Chem. Zentr.*, 1935, i, 5; cf. this vol., 162).—Complex formation has been detected in the systems CuCl_2 - CdCl_2 , NiCl_2 - CdCl_2 , CoCl_2 - CdCl_2 , MnCl_2 - CdCl_2 , BaCl_2 - CdCl_2 , CuSO_4 - K_2SO_4 , CuSO_4 - MgSO_4 , $\text{Al}_2(\text{SO}_4)_3$ - K_2SO_4 , CuCl_2 - KCl , CdCl_2 - KCNS , FeCl_3 - KCl , BaCl_2 - KCl , and BaCl_2 - CaCl_2 , but not in K_2SO_4 - NH_4Cl , KCl - KI , CaCl_2 - KCl , RbCl - KCl , or BaCl_2 - MgCl_2 . J. S. A.

Oxides of nitrogen. I. Binary system N_2O_4 - N_2O_5 . T. M. LOWRY and J. T. LEMON (*J.C.S.*, 1935, 692—696).— N_2O_4 and N_2O_5 give a simple f.-p. diagram, with eutectic at -15.8° containing 10.8% of N_2O_5 . F. L. U.

Potassium borates. System B_2O_3 - K_2O . A. P. ROLLET (*Compt. rend.*, 1935, **200**, 1763—1765).—Data obtained by thermal analysis are recorded. The compounds B_2O_3 , K_2O (I), m.p. 950° , $2\text{B}_2\text{O}_3$, K_2O (II), m.p. 815° , $3\text{B}_2\text{O}_3$, K_2O (III), decomp. before melting, $4\text{B}_2\text{O}_3$, K_2O (IV), m.p. 857° , and $5\text{B}_2\text{O}_3$, K_2O (V), m.p. 780° , are formed. Eutectics occur at 787° [(I)-(II)], and 770° [(II)-(III)], and transition temp. at 825° [(III) \rightarrow (IV)] and 780° [(IV) \rightarrow (V)]. H. J. E.

Equilibrium of the reaction between ferric ion and silver. W. C. SCHUMB and S. B. SWEETSER (*J. Amer. Chem. Soc.*, 1935, **57**, 871—874).—The equilibrium $\text{Fe}^{3+} + \text{Ag} \rightleftharpoons \text{Fe}^{2+} + \text{Ag}^+$ has been determined at 25° using perchlorates instead of the nitrates employed by others. The mixtures were analysed potentiometrically for Fe^{2+} and Ag, using first KMnO_4 and then KSCN . Two series were carried out with a different const. ratio of HClO_4 to $\text{Fe}(\text{ClO}_4)_3$. $\log K + 2.02\mu^{\frac{1}{2}}$ was plotted against μ and extrapolated to zero ionic strength. K is 0.531 and the calc. Fe^{3+} - Fe^{2+} electrode potential 0.782 volt. These are $>$ the commonly accepted vals. M. S. B.

Lowering of the ice + potassium sulphate eutectic point. H. MULLER (*Compt. rend.*, 1935, **200**, 1391—1392; cf. *A.*, 1932, 691).—The effects produced by Na_2SO_4 and Li_2SO_4 suggest that these salts are completely ionised. H_2SO_4 lowers the eutectic point almost linearly with concn., but the reduction is not linear with KNO_3 or NH_4Cl . J. W. S.

Mechanism of displacement of noble metals from solutions of their salts by hydrogen under pressure. I. Displacement of palladium from solutions of palladium chloride. II. Displacement of noble metals from solutions of H_2PtCl_6 , H_2IrCl_6 , Na_3IrCl_6 , and Na_3RhCl_6 . V. V. IPATIEV and V. G. TRONEV (*Compt. rend. Acad. Sci. U.R.S.S.*, 1935, **1**, 622—626, 627—632).—I. In HCl solution the following equilibria are established: $\text{H}_2\text{PdCl}_4 \rightleftharpoons 2\text{H}^+ + \text{PdCl}_4^{2-}$; $\text{PdCl}_4^{2-} \rightleftharpoons \text{Pd}^{2+} + 4\text{Cl}^-$. H_2 gives rise to the reaction $\text{Pd}^{2+} + \text{H}_2 \rightarrow \text{Pd} + 2\text{H}^+$. Excess of HCl retards the separation of Pd and dissolves finely

divided Pd. NaCl, MgCl₂, NiCl₂, AlCl₃, and CuCl₂ do not retard the separation, but H₂CrO₄, FeCl₃, and HgCl₂ suppress it entirely.

II. The results of similar experiments with H₂PtCl₆, H₂IrCl₆, Na₃IrCl₆, and Na₃RhCl₆ are discussed.

W. R. A.

System bismuth iodide-sodium iodide-water. (MLLE.) M. L. DELWAULLE (Compt. rend., 1935, 200, 1401—1403).—The only double salts formed at 12—60° are BiI₃·NaI·6H₂O and BiI₃·NaI·8H₂O.

J. W. S.

Ternary system Na₂SO₄-NaBrO₃-H₂O and a sixth possible type of solid solution formation between two components in the Roozeboom classification. J. E. RICCI (J. Amer. Chem. Soc., 1935, 57, 805—810).—The data at 25° (A., 1934, 365) are supplemented by measurements at 10°, 30°, 37.5°, 45°, and 52°. No double compounds are observed, but solid solutions with 2—10% NaBrO₃ at 37.5° and 2—19% at 52° are formed between anhyd. Na₂SO₄ and NaBrO₃. These solutions may exist in equilibrium with the pure solid components. This is shown to be possible thermodynamically and represents a sixth type in addition to Roozeboom's five types.

M. S. B.

Solid-liquid equilibria in systems of three organic components. I. K. HRYNAKOVSKI and M. SZMYT (Z. physikal. Chem., 1935, 173, 150—163).—The equilibrium diagrams of the systems resorcinol-quinol-NHPhAc, resorcinol-CO(NH₂)₂-BzOH, and NHPhAc-salicylic acid-antipyrine have been obtained. With all these systems there is complete miscibility in the molten state and no miscibility in the solid state.

R. C.

Tonometry of saline solutions. J. PERREU (Compt. rend., 1935, 200, 1588—1590; cf. this vol., 579).—The v.p. of aq. solutions of BaCl₂, MnCl₂, and Na₂S₂O₃ has been determined at 20°; heats of dissolution and differential heats of dilution of solutions of various concns. are also recorded.

J. W. S.

Heats of organic reactions. II. Hydrogenation of some simpler olefinic hydrocarbons. G. B. KISTIAKOWSKY, J. R. RUHOFF, H. A. SMITH, and W. E. VAUGHAN (J. Amer. Chem. Soc., 1935, 57, 876—882).—Heats of hydrogenation of the following homologues of C₂H₄ have been determined at 355° abs., by a method previously described (this vol., 304), with an accuracy of ±60 g.-cal.: CHMe:CH₂ —30,115, CHEt:CH₂ —30,341, *cis*- (b.p. 3.73°, f.p. —139.3°) —28,570, and *trans*-CHMe:CHMe (b.p. 0.96°, f.p. —105.8°) —27,621, CMe₂:CH₂ —28,389. M. S. B.

Mobilities of organic anions. J. F. J. DIPPY and F. R. WILLIAMS (Chem. and Ind., 1935, 54, 535—536).—A reply to Vogel (*ibid.*, 487). In the calculation of Λ_0 (this vol., 581), solvent and hydrolysis corrections had been carefully considered, and the vals. of Λ_0 for AcOH, BzOH, and *m*-C₆H₄Cl·CO₂H agree with those found by methods involving mobilities determined by MacInnes (A., 1932, 914). E. W. W.

Measurement of the absolute rates of migration of ions by the method of moving boundaries. I. J. MUKHERJEE, R. MITRA, and A. K. BHATTACHARYYA (J. Indian Chem. Soc., 1935, 12, 177—189).—The velocity of the moving boundary between

equi-conducting aq. solutions of HCl and picric acid at 35° affords vals. of the mobility, *m*, of the picrate ion increasing from 38.3 to 42.2 ($\times 10^{-5}$) cm. per sec. per volt per cm. as the [HCl] is progressively diminished from 0.01*N* to 0.002*N*. The vals. of *m* found for Cl⁻ are markedly < those calc. by Onsager's equation, and during the course of an experiment, *m* of Cl⁻ decreases and that of the picrate ion increases correspondingly. The vals. of *m* probably depend on the potential gradient in the aq. HCl layer, and other significant factors are discussed (cf. A., 1929, 1014).

J. G. A. G.

Transfer of ions in anhydrous acetic acid solution. A. W. DAVIDSON and V. HOLM (Univ. Kansas Sci. Bull., 1933, 21, 463—477).—Transport measurements are recorded for NaOAc and NH₄OAc in AcOH, and for Na Zn acetate and NH₄ Cu^{II} acetate solutions. For alkali acetates the apparent transport no. of the cation is small, and decreases with dilution. This may be due to complex ion formation. In the double acetates the less positive metal does not migrate towards the anode.

CH. ABS. (c)

Conductivity and hydrolysis of sodium niobates. P. SUE (Compt. rend., 1935, 200, 1739—1741; see below).—Data are recorded. Nb₂O₅·3Na₂O is completely, 7Nb₂O₅·6Na₂O strongly, and Nb₂O₅·Na₂O slightly hydrolysed.

H. J. E.

Potential dissociation effect. F. MICHELS (Ann. Physik, 1935, [v], 22, 735—747).—The conductivity of AcOH under high potentials has been examined. The influence of concn. on the potential dissociation effect varies with concn. and is considerable at high concns. For KI, LiBr, CoCl₂, Co(NO₃)₂, HgCl₂ and CdI₂ in COMe₂ solution the effect increases with duration of collision. It is small with uni-univalent salts, but greater with uni-bivalent salts. The effect is considerable for agar-agar and SiO₂ gel, but negligible for gelatin. With the last, however, variation of frequency is accompanied by large variation in conductivity. Technical semi-conductors show an analogous effect; it is, however, due not to ionic, but to electronic, conduction.

A. J. M.

Neutralisation of aqueous solutions of sodium niobate. P. SUE (Compt. rend., 1935, 200, 1326—1328; cf. A., 1934, 742).—The change in the conductivity during the neutralisation by HCl of solutions of Nb₂O₅·3Na₂O indicates the formation of 6Nb₂O₅·7Na₂O and Nb₂O₅·Na₂O, crystallising with 32 and 7H₂O, respectively.

N. M. B.

Anomalous electrical conductivity. M. USANOVITSCH (Compt. rend. Acad. Sci., U.R.S.S., 1935, 1, 518—524).—A discussion of the phenomenon of decreasing equiv. conductivity with increasing dilution (*e.g.*, for the systems AsBr₃-Et₂O or H₂O-H₂SO₄). Compound formation is suggested as a general explanation of the anomalies.

H. J. E.

Electrical conductivity and chemical equilibrium of the electrolyte in gelatin solutions containing sodium, silver, and chlorine ions. W. EHRENBERG and P. WULFF (Kolloid-Beih., 1935, 42, 1—33).—The system has been investigated by measurements of conductivity, ρ_H , and Ag⁺ activity, and by

chemical analysis. The conductivity of aq. NaCl is reduced by adding electro-dialysed gelatin (I); the mobility of Cl⁻ is diminished > that of Na⁺. When AgCl is shaken with (I)+NaOH, dissolution occurs and the conductivity rises. Ag₂O also dissolves when shaken with (I), giving rise to a complex univalent anion, (AgG₂)_n. The equilibrium consts. for [G]ⁿ[Ag⁺][AgG₂⁻], when n=1 and ∞, have been calc. E. S. H.

The antimony electrode. II. A. HOLMQUIST (Svensk Kem. Tidskr., 1935, 47, 102—112; cf. A., 1934, 492).—Measurements in air-free solution show that the potential varies with [Sb⁺⁺⁺] according to the Nernst formula. In HCl solutions more conc. than about 0.05N the solid phase Sb₂O₃ changes to Sb₄O₅Cl₂, as shown by both solubility and e.m.f. determinations. The behaviour in citrate buffers is complicated by formation of an Sb-citrate complex. The effect of O₂ in making the potential more positive appears to be connected with the formation of H₂O₂. H₂O₂ is decomposed by Sb powder, the velocity varying with p_H. R. P. B.

Effect of mechanical agitation on electrode potential. F. O. KOENIG (J. Physical Chem., 1935, 39, 455—463).—The effect of vibration on a Ag electrode in 3N- or 3.5N-KCl saturated with AgCl is to cause an immediate rise of potential to a new const. val. increasing with the frequency of the vibration up to a max. Stirring produces a similar effect which persists if air is replaced by N₂, but the electrode at rest is more positive in air than in pure N₂. The effect is completely inhibited when NaHSO₃ is added, and there is likewise no effect in aq. AgNO₃ of concn. 10⁻³—1N. Procopiu's electrokinetic theory of the effect (A., 1931, 687) is discussed and it is shown that the results may be equally well explained as due to irreversible chemical processes. M. S. B.

Electrocapillary curve and its displacement with concentration and temperature. L. A. HANSEN and J. W. WILLIAMS (J. Physical Chem., 1935, 39, 439—453).—A modification of the Lippmann electrometer is described. Electrocapillary curves have been obtained for 1.0, 0.2, and 0.02M-NH₄NO₃ at 25°, 50°, and 75°. In the ascending portion of the curves, when the applied potential φ is low, the surface tension σ increases with rise of temp. for the same concn. At higher φ the curves cross, and, in the region of the max., σ falls with rise of temp. and the max. is displaced towards lower vals. of φ. At still higher vals. of φ, σ is depressed by rise of temp. Increase of concn. also decreases σ and shifts the max. towards lower vals. of φ. The results are discussed with reference to the decreased adsorption of anions and an increased tendency towards random distribution of solvent dipoles with rise of temp. M. S. B.

E.m.f. of cadmium chloride cells. (MILLER) M. QUENTIN (Compt. rend., 1935, 200, 1579—1580).—The e.m.f. of the cell Cd-Hg amalgam|aq. CdCl₂|AgCl|Ag has been measured for [CdCl₂] of 0.001—0.1 mol. per litre at 0—45°. The results suggest that in certain regions there exists, besides the normal reaction, a reaction involving combination of CdCl₂ and AgCl. J. W. S.

Potentials of cells involving moving boundaries. F. D. MARTIN and R. F. NEWTON (J. Physical Chem., 1935, 39, 485—492).—By treating the liquid junction in a cell between two electrolytes with a common ion as a moving boundary, an equation has been deduced for the potential of the cell. Potentials of several such cells, measured immediately after the interruption of the current used to establish the boundary, are not in agreement with the equation. Possible causes have been investigated, but without success. M. S. B.

Electrochemical behaviour of ammonium amalgam under pressure. S. VON NARAY-SZABÓ and L. SZLATINAY (Z. physikal. Chem., 1935, 173, 89—102).—The decomp. of NH₄ amalgam can be considerably retarded by increase of pressure. The electrode potential, E_i, at 0° under 30—600 atm. in contact with aq. NH₄Br is a linear function of the logarithm of the c.d., indicating that in the discharge of NH₄⁺ the delayed process which determines the potential of the process as a whole is NH₄⁺ + ⊖ → NH₄. The variation of E_i with the concn. of the solution is qualitatively similar to what would be expected from Nernst's formula. E_i does not vary with the p_H unless this is so high as to prevent discharge of NH₄⁺. R. C.

Electrolytic reduction potentials of organic compounds. XXI. Ascending part of the current-voltage curve of electrolysis; "adsorption current." M. SHIKATA (J. Electrochem. Assoc. Japan, 1934, 2, 275—280; cf. this vol., 706).—Observations have been made with a series of azo-, NO₂-, and keto-compounds. The interpretation of the polarographic curves is discussed. CH. ABS. (c)

Titration curves of protein fibres. (MISS) D. J. LLOYD and P. B. BIDDER (Trans. Faraday Soc., 1935, 31, 864—868; cf. A., 1934, 488).—Acid and alkali titration curves of silk fibroin, horsehair, collagen, and solid gelatin have been determined and compared. The isoelectric range decreases in the order named. The curves show a general similarity, and indicate the presence both of salt linkings and of another type of structural cross-linking between the peptide chains. At p_H vals. < 3 and > 11.5 there is a rapid increase in the amount of acid or alkali combining which is not determined by the NH₂-acid constitution, and is accompanied by disruption of the fibre structure. F. L. U.

Surface layers on iron demonstrated by the e.m.f. of the metal immersed in water. S. PROCOPIU and D. UMANSCHI (Compt. rend., 1935, 200, 1395—1396).—Electrolytic Fe kept in H₂O for 20—80 min. shows an e.m.f. of -0.11 to 0.17 volt against similar Fe newly immersed. This e.m.f. decreases and becomes zero in 40—90 min. In acidified H₂O the e.m.f. is 0.08—0.1 volt and becomes zero in 30—40 min. As a 250 m_μ film of electrolytic Fe dissolves in this acidified H₂O in 20—21 hr., the thickness of the superficial layer to which the abnormal properties are due is about 8 m_μ. Cu shows the same effect but to a smaller extent. The phenomenon is attributed to gases adsorbed in the surface. J. W. S.

Passivity of iron and steel in nitric acid solution. V, VI. Y. YAMAMOTO (Bull. Inst. Phys. Chem. Res. Japan, 1935, 14, 374—382, 383—395).—V. The $[\text{HNO}_3]$ necessary for the appearance of passivity decreases with the vol. of solution used.

VI. Passivity appears at lower $[\text{HNO}_3]$ with increasing thickness of the test-piece. R. S.

Electric phenomena accompanying the formation of organic magnesium compounds. P. BRUN (Compt. rend., 1935, 200, 1392—1394).—When electrodes of Mg and Pt are immersed in a solution of EtBr in anhyd. Et₂O, dissolution of 1 g.-atom of Mg liberates about 0.1 coulomb of electricity. The e.m.f. of the cell depends critically on the purity of the Mg. Max. current is obtained with 1 mol. of EtBr per 2 mols. of Et₂O. The conductivity of the solution increases during the reaction. The electrode potential is very low initially (0.1 volt), but increases to a max. of about 2.2 volts, and then falls to 1 volt. These results are in accord with the decomp. potential of MeMgI. J. W. S.

Recombination of hydrogen atoms. II. Relative recombination rates of atomic hydrogen and atomic deuterium. I. AMDUR (J. Amer. Chem. Soc., 1935, 57, 856—858).—The rates of recombination of at. H and D have been determined by a dynamic method. $k_{\text{H}}=2.05 \pm 0.07 \times 10^{-16}$ and $k_{\text{D}}=1.51 \pm 0.05 \times 10^{-16}$. $k_{\text{H}}/k_{\text{D}}=1.36 \pm 0.06$, which indicates that the at. diameter and interat. forces for H and D are equal. M. S. B.

Surface influence on certain homogeneous reactions depending on linking mechanism. M. PRETTE (Compt. rend., 1935, 200, 1321—1324).—The rise of reaction temp. and retardation of the rate of reaction of H₂-O₂ mixtures, at pressures 300—700 mm., in contact with glass surfaces treated with KCl are discussed. N. M. B.

Addition of ammonia to ethylene.—See this vol., 849.

Effect of gases and vapours on the explosibility of CS₂-air mixtures. C. RANDACCIO and S. BELLAVIA (Annali Chim. Appl., 1935, 25, 173—179).—The most explosive CS₂-air mixture, containing 352—378 g. of CS₂ per cu. m., may be rendered harmless by addition of 55% of inert gas ("burnt air," i.e., CO₂+4N₂). T. H. P.

Rôle of methyl and methylene radicals in the decomposition of methane. L. S. KASSEL (J. Amer. Chem. Soc., 1935, 57, 833—834).—The kinetics of CH₄ decomp. are best explained by the CH₂ mechanism (cf. A., 1932, 1209) rather than by the Me mechanism of Rice *et al.* (this vol., 191) based on the use of Te mirrors. M. S. B.

Action of bromine on butadiene. G. B. HEISIG and J. L. WILSON (J. Amer. Chem. Soc., 1935, 57, 859—863).—The rate of reaction between equiv. amounts of butadiene and Br has been determined in small, medium, and large spheres on glass and paraffin surfaces. The rate increases until the v.p. of *trans*-dibromobutene formed is reached and the walls are covered by a unimol. layer; it then becomes const. The results indicate a wall reaction, where, however,

the wall is covered with the condensed product of the reaction. M. S. B.

Kinetics of the decomposition of gaseous glyoxal. E. W. R. STEACIE, W. H. HATCHER, and J. F. HORWOOD (J. Chem. Physics, 1935, 3, 291—295).—The reaction at 410—450° is homogeneous and of the first order, but C and tar are deposited and the results are variable. Three modes of decomp. appear to occur. If (CHO)₂ is an intermediate product in the oxidation of C₂H₂, it must be oxidised and not decomposed during the reaction, since no appreciable quantities of C or tar are formed. M. S. B.

Thermal decomposition of acetone vapour. C. A. WINKLER and C. N. HINSHELWOOD (Proc. Roy. Soc., 1935, A, 149, 340—354).—The kinetics of the decomp. of COMe₂ have been re-investigated by a method involving the measurement of the rate of disappearance of the unchanged COMe₂. The reaction is first order for initial pressures >100 mm., and the new velocity coeffs. are given by $\log_e k = 34.34 - 68,000/RT$. The products of reaction at various stages have been analysed and the intermediate formation of keten has been studied quantitatively. In the range 100—2.5 mm. the curve of $1/t_{1/2}$ against initial pressure shows a composite form similar to that shown by the curves for N₂O and certain aldehydes. The energy of activation falls slightly at lower pressures. The influence of surface and vessel size shows the reaction to be almost entirely homogeneous. L. L. B.

Thermal decomposition of acetaldehyde. C. A. WINKLER and C. N. HINSHELWOOD (Proc. Roy. Soc., 1935, A, 149, 355—359).—A study of the influence of surface and vessel size yields no evidence that the reaction MeCHO=CH₂+CO is appreciably heterogeneous, or that it depends on a chain mechanism. Chemical analysis shows that the rate of reaction of MeCHO can be followed accurately by the rate of pressure increase. L. L. B.

Applications of the transition state method to calculation of reaction velocities, especially in solution. M. G. EVANS and M. POLANYI (Trans. Faraday Soc., 1935, 31, 875—894).—The reaction velocity coeff. of a chemical reaction, excepting a chain reaction or one the velocity of which is determined by the rate of energy supply, can be put = $\frac{1}{2}Kv$, where K is the "equilibrium const. of the transition state" and v is the thermal velocity of the representative point of the reacting system at the top of the energy barrier. The special case of the effect of hydrostatic pressure on reaction in solution is worked out in detail. F. L. U.

Orientation effects in bimolecular reactions. J. M. STURTEVANT (J. Chem. Physics, 1935, 3, 295—299).—Theoretical. Deviations from Brønsted's limiting formula for bimol. ionic reactions in solution cannot be explained by variations with concn. of electrostatic-orientation effects due to lack of symmetry in the ions, as suggested by La Mer *et al.* (A., 1931, 1132). M. S. B.

Kinetics of the alkaline hydrolysis of ethyl carbonate and of potassium ethyl carbonate.

N. F. MILLER and L. O. CASE (J. Amer. Chem. Soc., 1935, 57, 810—814).—The rate of reaction between Et_2CO_3 and KOH has been measured at 25° and 35°. A bimol. followed by a unimol. reaction takes place, $\text{Et}_2\text{CO}_3 + \text{KOH} \rightarrow \text{KEtCO}_3 + \text{EtOH}$ and $\text{KEtCO}_3 + \text{H}_2\text{O} \rightarrow \text{KHCO}_3 + \text{EtOH}$. Both velocity coeffs. have been determined by two methods which give satisfactory agreement. The temp. coeffs. for the two reactions for the 10° interval are 2.06 and 3.46, respectively. M. S. B.

Velocity of hydrolysis of dithionic acid. J. MEYER (Z. anorg. Chem., 1935, 222, 337—344).—Hydrolysis of $\text{H}_2\text{S}_2\text{O}_6$ proceeds as a unimol. reaction between 60° and 100°. It is catalysed by H^+ and the velocity $\propto [\text{H}^+]$. The temp. coeff. for 10° decreases from 3.7 at 60° to 2.7 at 100°. The undissociated mol. alone undergoes hydrolysis. F. L. M.

Kinetics of reaction between potassium thiocyanate and iodine in aqueous solution. R. O. GRIFFITH and A. McKEOWN (Trans. Faraday Soc., 1935, 31, 868—875).—The reaction has been studied in acetate, phosphate, oxalate, and phthalate buffers, in none of which is a simple kinetic equation obeyed. A possible mechanism is suggested. F. L. U.

Reaction of hydrogen chloride with methyl alcohol. C. N. HINSHELWOOD (J.C.S., 1935, 599—601).—The difference in the activation energies involved confirms that the mechanism of the interaction of H halides with simple alcohols differs from that of the esterification of carboxylic acids. Data are given for the reaction between HCl and MeOH. J. W. S.

Factors determining velocity of reactions in solution. Molecular statistics of the esterification of carboxylic acids. C. N. HINSHELWOOD and A. R. LEGARD (J.C.S., 1935, 587—596).—From a study of the rates and energies of activation (E) of 15 esterification reactions, it is concluded that for a series of alcohols the changes in rate are determined, not by the const. P in the formula $\text{rate} = PZe^{-E/RT}$, but by variations in E . Similarly for a series of acids. In general large vals. of E are associated with large vals. of P . On changing from a non-ionic catalyst to H^+ , P increases by about 10^4 , but differences between individual non-ionic catalysts seem to depend on the val. of E . Steric hindrance appears to depend on high E rather than on purely geometric factors. No positive evidence is obtained that the rate of esterification reactions depends on quantum-mechanical transition probabilities, or that the smallness of P in such reactions is connected with smallness of such probabilities rather than with the necessity for accurate orientation of the mols. at the moment of reaction. J. W. S.

Action constant, heat capacity, and energy of activation in the saponification of the esters of *o*-phthalic, 3- and 4-nitro-*o*-phthalic acids. G. SEMERANO (Gazzetta, 1935, 65, 252—272; cf. A., 1931, 1241).—Velocity coeffs. for 0—100° have been measured, and energies of activation calc. The stereokinetics of the reactions are discussed. O. J. W.

Rate of decomposition of some *p*-substituted nitrosoacetanilides in benzene. W. S. M. GRIEVE and D. H. HEY (J.C.S., 1935, 689—691).—The stability of substituted PhN_2 salts follows the order $p\text{-OMe} > p\text{-Cl} > p\text{-Br} > p\text{-Me} > \text{H} > m\text{-Me}$, the reverse of the order for substituted Na benzenediazotates. Substituted nitrosoacetanilides, which may be in tautomeric equilibrium $\text{Ar}\cdot\text{N}(\text{Ac})\cdot\text{NO} \rightleftharpoons \text{Ar}\cdot\text{N}(\text{N}\cdot)\text{OAc}$, follow the order of stability $p\text{-Cl} > p\text{-Br} > \text{H} > p\text{-Me}$, but the differences in the unimol. velocity coeff. for the decomp. are small. J. W. S.

Complex formation between polynitro-compounds and aromatic hydrocarbons. I. Finite reaction rates. D. L. HAMMICK and G. SIXSMITH (J.C.S., 1935, 580—584).—Crystallisation of a mixture of 1 mol. of Me 4 : 6 : 4' : 6'-tetranitrodiphenate with 4 mols. of indene (I) yields the compound $2\text{C}_{16}\text{H}_{10}\text{O}_{12}\text{N}_4\text{C}_9\text{H}_8$ (II), m.p. 159° (corr.), which does not react with Br in CCl_4 solution, but is decomposed into its constituents on recrystallisation from MeOH in absence of excess of (I). The rate of formation and decomp. of (II) in solution have been investigated and the equilibrium const. of the steady state reached evaluated on the supposition that in solution combined (I) is mainly in the form of (II). J. W. S.

Oxidation velocities of some unsaturated hydrocarbons with peracetic acid in acetic acid solution. J. STUURMAN (Proc. K. Akad. Wetensch. Amsterdam, 1935, 38, 450—452).—The bimol. coeffs. (k) for the reaction between unsaturated hydrocarbons and AcO_2H in AcOH have been determined at 25–8°, the reaction being $>\text{C}:\text{C}< + \text{AcO}_2\text{H} = \text{O} \left\langle \begin{array}{c} \text{O} \\ \text{C} \end{array} \right\rangle + \text{AcOH}$. AcO_2H was determined by liberation of I from KI. Replacement of H by Me increases $\log k$ by the same amount in all cases, but this does not hold for replacement of H by Ph. R. S. B.

Kinetics of the nitration of benzene. F. H. COHEN and J. P. WIBAUT (Rec. trav. chim., 1935, 54, 409—427).—The reaction in Ac_2O is of the first order with respect to C_6H_6 and third order to HNO_3 catalysed by HNO_3 , when effects of reaction with solvent were eliminated (formation of AcNO_3 and other products). Velocity coeffs. were found for 0°, 18°, and 25° and activation energies calc. AcNO_3 does not nitrate C_6H_6 in Ac_2O , nor does HNO_3 in glacial AcOH. HNO_3 nitrates C_6H_6 in CCl_4 in presence of a trace of Ac_2O , but the reaction is stopped by much Ac_2O . D. R. D.

Detonation of nitrogen iodide, $\text{NI}_3\cdot\text{NH}_3$. W. E. GARNER and W. E. LACHEM (Nature, 1935, 135, 832).—When moist $\text{NI}_3\cdot\text{NH}_3$ is suspended over P_2O_5 and the vessel evacuated by a Hg-vapour pump, the crystals detonate as soon as they are dry. Decomp. into I and permanent gases occurs without detonation if the pressure of the latter is kept $> 2 \times 10^{-3}$ cm. At room temp., decomp. is complete in 12—24 hr. At –20°, there is little reaction until H_2O is removed, after which the pressure rises linearly. As I condenses on the vessel the rate of gas evolution decreases and pressure ultimately becomes const., although some $\text{NI}_3\cdot\text{NH}_3$ is still undecomposed. The residue

then detonates when a high vac. is effected. The thermal reaction is retarded by H_2O and by the easily condensable products of decomp., and on removal of these $NI_3 \cdot NH_3$ detonates spontaneously. This accounts for its extreme sensitivity to a blow which creates fresh, unstable surfaces. L. S. T.

Mechanism of the thermal decomposition of active and inactive iron nitrides. N. I. KOBOSEV, B. V. JEROFEJEV, and S. I. SLUCHOVSKI (Z. Elektrochem., 1935, 41, 274—284).—The kinetics of the decomp. of Fe_2N (I), activated by Al_2O_3 for NH_3 synthesis, and of inactive Fe_2N (II) and Fe_3N (III) have been investigated at 300—600°. The reaction is not autocatalytic and the velocity of decomp. of (I) is 5—6 times that of (II) and (III). The surface N is present as adsorbed NH_3 . In (II) and (III) diffusion takes place from the interior to the surface, but in (I) this is restricted by the action of Al_2O_3 . As a result the mechanism of the reaction in (II) and (III) undergoes a sharp change at about 400°, but not in (I). The surface of (I) is about 8 times that of (II). The velocity coeffs. ($\times 10^{-8}$) of surface decomp. are (I) 6.9, (II) 8.4, (III) 27.8, and the true activation energies, when allowance has been made for the diffusion energy, are practically the same. Al_2O_3 has, therefore, practically no direct action on the Fe catalyst in NH_3 synthesis, but acts by increasing the surface as a result of its influence on the crystal lattice (cf. Natanson, this vol., 812). It probably inhibits diffusion by its adsorption on the diffusion centres, and similarly inhibits the recrystallisation of Fe during formation of the nitride. Nitride decomp. does not appear to take place at definite active centres, but over the whole surface. M. S. B.

Supercooling capacity of water and liquid velocity of crystallisation of ice in aqueous solutions. G. TAMMANN and A. BÜCHNER (Z. anorg. Chem., 1935, 222, 371—381).—Purified H_2O can be supercooled 14—19° with a cooling rate of 0.4—1.0° per min., and nearly pure D_2O slightly less. Powdered cryst. quartz and powdered vitreous SiO_2 diminish the supercooling possible by 6—7°, whilst corundum has no effect. The velocity of crystallisation of ice has been measured for a no. of solutions of electrolytes and non-electrolytes. At low concns. HCl, NaCl, NaOH, and sucrose increase the velocity. F. L. U.

Decomposition of nitric esters at low temperatures. LAMBREY (Mém. Poudres, 1934—1935, 26, 101—118).—Full details are given of results already noted (A., 1934, 1312). The rate of decomp., r , of guncotton (I) (60%) + glyceryl trinitrate (40%) at 30° is $>$ that of (I) at 36.5°. For pentaerythryl tetranitrate r is negligible at 43°. J. G. A. G.

Kinetics of the decomposition of diphenyl-iodonium iodide. C. J. M. FLETCHER and C. N. HINSHELWOOD (J.C.S., 1935, 596—599).—The activation energy for decomp. of $Ph_2I \cdot I$ is 26,300 g.-cal. for the solid state and 27,000 g.-cal. (uncorr. for change in viscosity) for solutions in PhI. Solubility data for $Ph_2I \cdot I$ in PhI are given for 0—95°. The rates of reaction observed are discussed in relation to different activation mechanisms. J. W. S.

Reaction rates of solid-liquid interfaces. C. V. KING (J. Amer. Chem. Soc., 1935, 57, 828—831).—The experimental results of Fage *et al.* (Proc. Roy. Soc., 1932, A, 135, 828—831) on fluid motion near a solid surface have been applied to the comparison of the rate of convection of fluid towards the surface with the rate of dissolution of Mg and Zn in acids under identical conditions. The results indicate that convection is negligible and that the acid reaches the metal surface by diffusion. Nernst's diffusion theory is criticised and modifications are suggested. M. S. B.

Mechanism of ionisation of hydrogen at a platinum electrode. J. HORIUTI and M. POLANYI (Mem. Manchester Phil. Soc., 1935, 78, 47—54).—The rate of ionisation of D_2 in EtOH-KOH was determined. If the rate is expressed in terms of first order reaction consts., $k \propto (\text{pressure})^{-\frac{1}{2}}$, but in EtOH-KOH solution only. The rate increases with rise of temp. according to Arrhenius' law. The activation energy of the ionisation process is slightly $>$ 10,200 g.-cal. A. J. M.

True activation energy of the desorption of the ketonic group from graphite. V. SIHVONEN (Suomen Kem., 1935, 8, B, 28).—A summarising discussion (cf. A., 1934, 978). R. S. B.

Catalysis of ester hydrolysis by D_3O^+ ions. J. C. HORNEL (Nature, 1935, 135, 909).—Determinations of the rate of hydrolysis of MeOAc in H_2SO_4 solutions show that the ratios of the catalytic coeffs. in heavy and light H_2O are $k_{D_3O^+}/k_{H_3O^+} = 1.86$ at 15° and 1.68 at 25°. These ratios are practically equal to those found for the inversion of sucrose (A., 1934, 1075). L. S. T.

Effect of electrolytes on the rate of hydrolysis of diethyl acetal. L. C. RIESCH and M. KILPATRICK (J. Physical Chem., 1935, 39, 561—569).—The primary kinetic salt effect in the hydrolysis of Et_2 acetal by strong acids in aq. solution has been determined for $NaClO_4$, LiCl, NaCl, KCl, $LiNO_3$, NH_4NO_3 , KNO_3 , $p\text{-}C_6H_4Me \cdot SO_3Na$, and $PhSO_3Na$. The average val. of k_{35}/k_{25} is 3.395 and the heat of activation is independent of the electrolyte concn. within the limits of experimental error. M. S. B.

Magnetic investigations of the mechanism of oxidation. O. BAUDISCH (Ber., 1935, 68, [B], 769—775).—Many examples are cited in favour of the view that the intermediate, intensely coloured, labile products obtained by the catalytic oxidation of nitrogenous compounds with $Fe(CN)_5$ compounds are $Fe \cdot NO$ derivatives which exert a very marked influence on the magnetic state of the central atom and play a part in the mechanism of oxidation. H. W.

Catalytic hydrogenation of unsaturated organic compounds by means of selenium. M. YOKOYAMA and M. KOTAKE (Bull. Chem. Soc. Japan, 1935, 10, 138).—Unsaturated org. acids, e.g., oleic acid, when heated with Se at 300° for 1—1.5 hr. are partly reduced. R. S. B.

Reaction between nitrous oxide and hydrogen on platinum. J. K. DIXON and J. E. VANCE (J. Amer. Chem. Soc., 1935, 57, 818—821).—The reac-

tion on smooth Pt wire has been studied at 260—271° by a flowing method. The rate approx. \propto the N_2O pressure and is nearly independent of the H_2 pressure. H_2O inhibits the reaction slightly. The energy of activation is 23,100 g.-cal. The possible factors governing the rate of reaction are discussed.

M. S. B.

Reaction velocity and quantity of catalyst. J. SIRKIN and V. G. VASSILIEV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 1, 513—517).—Bredig and Berneck's observations on the effect of the quantity of Pt on the rate of decomp. of H_2O_2 (A., 1900, ii, 213), were confirmed, using Pt deposited on SiO_2 gel. The same wt. of Pt distributed over varying amounts of gel has approx. the same activity. The application of the chain theory to surface reactions is suggested.

H. J. E.

Effect of salts and gelatin on the catalytic decomposition of hydrogen peroxide by activated sugar charcoal. D. FOWLER and J. H. WALTON (Rec. trav. chim., 1935, 54, 476—480).—Gelatin (0.1%) inhibits the decomp., and the effect is enhanced by $NaNO_3$, KCl , $BaCl_2$, K_2HPO_4 , and KH_2PO_4 at low concns. At higher salt concns., the velocity is increased. The first three salts exert no effect alone. The temp. coeff. of the reaction is slightly >1 .

D. R. D.

Effect of arsenic on corrosion of iron by sulphuric acid.—See B., 1935, 498.

Effects of fluorides on thermal synthesis of calcium aluminates. II. S. NAGAI and T. YOSHIIURA (J. Soc. Chem. Ind. Japan, 1935, 38, 157—160B; cf. A., 1934, 49).—The interaction of $CaCO_3 + Al_2O_3$ (1:1) at 1000—1350° is accelerated by the presence of 1% of CaF_2 , the temp. of reaction being lowered by 100—150° at the lower temp. The ratio $CaO : Al_2O_3$ is at first >1 , but afterwards decreases as the reaction is completed.

J. A. S.

Catalytic oxidation action of colloids. III. Y. SHIBATA and K. YAMASAKI (Bull. Chem. Soc. Japan, 1935, 10, 139—144).—Au and Ag sols have scarcely any influence on the O_2 uptake-time curve of alkaline pyrogallol at 25°. Pt sol greatly accelerates O_2 absorption in the order of effectiveness: sol prepared by reduction of H_2PtCl_6 by $CH_2O >$ Bredig sol $>$ sol prepared by reduction by illuminating gas. The red Pt sol prepared by reducing H_2PtCl_6 with CO gives irreproducible results, but the black sol formed from it gives results similar to those for the other Pt sols.

R. S. B.

Influence of a metal surface on the kinetics of oxidation of ethane. E. A. ANDREEV (Compt. rend. Acad. Sci., U.R.S.S., 1935, 1, 610—615).—Oxidation of a stoichiometric $C_2H_6-O_2$ mixture in a quartz vessel exhibits an upper pressure limit for the combustion. Experiments were made at 61 and 91 mm. at 652°. The curve showing the kinetics of the combustion at 61 mm. can be divided into three sections: (a) C_2H_6 oxidises with increase of pressure and H_2O and CO are formed in large quantities; (b) pressure remains const. for a time; then there is a flash followed by diminution in pressure due to CO being oxidised to CO_2 ; (c) slow oxidation of CO.

At initial pressure of 91 mm. no explosive oxidation of CO is evidenced, indicating that the kinetics are different in spite of good agreement for the final val. of CO_2 . Introduction of metal wire accelerates the reaction. The oxidation of a hydrocarbon presumably takes place in two stages; the first stage being the formation of CO, aldehydes, etc. which are ultimately converted into CO_2 .

W. R. A.

Hydrogenation by adsorbed hydrogen atoms. K. S. ABLEZOVA and S. Z. ROGINSKI (Compt. rend. Acad. Sci. U.R.S.S., 1935, 1, 490—493).—At. H adsorbed on a relatively inactive Cu or Ni film at -180° will hydrogenate C_2H_4 . No reaction was observed with H adsorbed on glass. On treating a Ni film at -180° in succession with at. H and C_2H_4 , and warming, no gas evolution took place at room temp. C_2H_6 was evolved at a higher temp. Intermediate compound formation is suggested.

H. J. E.

New type of promoter. K. S. ABLEZOVA and S. Z. ROGINSKI (Compt. rend. Acad. Sci. U.R.S.S., 1935, 1, 487—490).—In preparing Ni or Pt catalyst for the hydrogenation of C_2H_4 by evaporation of a Ni or Pt wire in vac., a much greater activity of the metal film resulted if evaporation took place in presence of a small amount of gas. Fresh quantities of gas were added as clean-up by the metal occurred. O_2 , N_2 , or H_2 was equally effective as promoter. The role of the added gas is discussed.

H. J. E.

Zinc oxide as catalyst. A. SCHLEEDE, M. RICHTER, and W. SCHMIDT (Z. anorg. Chem., 1935, 223, 429—83).—The catalytic activity of differently prepared specimens of ZnO in promoting decomp. of MeOH has been studied in relation to their fluorescence and sp. surface. ZnO prepared by heating $Zn(NO_3)_2$ shows red fluorescence and is almost inactive, whereas that prepared by heating hydrated ZnO or $ZnCO_3$ is very active but shows no fluorescence. By varying the conditions of prep. specimens with intermediate properties can be obtained. The active products have a looser structure with greater internal surface than the inactive.

F. L. U.

Synthesis of higher paraffins from water-gas. Use of promoters for activating iron-copper catalyst.—See B., 1935, 484.

Synthesis of benzine from carbon monoxide by catalytic reduction under atmospheric pressure. III. Influence of gas velocity.—See B., 1935, 484.

Catalytic properties of rhenium. M. S. PLATONOV, S. B. ANISSIMOV, and V. M. KRASCHENINNIKOVA (Ber., 1935, 68, [B], 761—765).—At 15—20°/1 atm. finely-divided Re causes very slow hydrogenation of maleic acid or cyclohexene (I). At 150°, reduction of (I) in presence of Re-clay (II) is very slow, whereas at 250° cyclohexane is produced. C_6H_6 is unaffected by (II) at 100° or 150°, whereas at 200° partial decomp. occurs with evolution of CH_4 . At 250°, $PhNO_2$ is appreciably reduced to NH_2Ph , whilst at 300° the reaction is violent. Max. production of NH_3 from NO (50.4%) is observed at 400°, free N_2 being also produced. MeCHO is formed from EtOH in 11—12% yield at 300° and 14% yield at 600°, the

curve of the contact process appearing to exhibit 2 maxima. With rise of temp. the % of CH_4 in the gases increases; CO first increases and then slowly diminishes. As oxidising catalyst Re has the disadvantage of yielding readily volatile oxides.

H. W.

Electrolytic production of heavy water. Y. HORI (J. Electrochem. Assoc. Japan, 1934, 2, 290—297).—Processes are reviewed. Electrolysis in 4 stages of H_2O containing 0.07% D_2O gave a concn. of 66.7% D_2O .

CH. ABS. (e)

Influence of the cation on the electrolytic formation of persulphate. O. ESSIN and E. ALFIMOVA (Z. Elektrochem., 1935, 41, 260—265).—The electrolytic production of the persulphates of K, NH_4 , Al, Na, Mg, and Zn has been studied. The results are in agreement with previous observations (A., 1933, 34; 1934, 38) on the dependence of current yield on the concn. of SO_5'' , SO_4'' , and $\text{S}_2\text{O}_8''$. The cations have, in general, a catalytic influence on the different reactions taking place at the anode.

M. S. B.

Electrolytic production of lithium.—See B., 1935, 502.

Electrodeposition of copper-nickel-zinc alloys from cyanide solutions.—See B., 1935, 554.

New electrolytic experiment. P. JOLIBOIS (Compt. rend., 1935, 200, 1469—1470).—If, in the electrolysis of aq. CuSO_4 or aq. AgNO_3 , the cathode is raised approx. 1 mm. above the surface of the solution and a sufficiently high potential is applied to cause a spark discharge to cross the gap, $\text{Cu}(\text{OH})_2$ and Ag_2O , respectively, are deposited in the cathode solutions. It is concluded that the separation of Cu and Ag observed under ordinary conditions is due to a secondary reaction with the H_2 from the electrolytic decomp. of H_2O . With the arrangement described H_2 escapes. The experimental result supports the theory of the existence of an envelope of H_2O around the ions.

M. S. B.

Electrodeposition of silver from iodide solutions.—See B., 1935, 555.

Existence of an oxide film on gold. W. J. MÜLLER and E. LÖW (Ber., 1935, 68, [B], 989—991).—Observation of a Au anode under the polarising microscope during electrolysis in 5N-HCl with a Pt gauze cathode shows the metal to be covered with a strongly reflecting or absorbing layer which is removed during electrolysis; its disappearance is followed by a non-polarising, strongly reflecting secondary film which by analogy with observations on chemical passivity can consist only of a Au oxide or hydroxide. Similar observations of a clean Au surface show the metal to acquire slowly an oxide film when exposed to air.

H. W.

Cadmium-zinc alloy plating from acid sulphate solutions.—See B., 1935, 555.

Alkali zincate storage battery with the cathode filled with zinc powder.—See B., 1935, 507.

Electrolytic separation of tantalum. M. L. HOLT (Z. Elektrochem., 1935, 41, 303—304).—Repetition of the experiments of Isgarishev *et al.* (A., 1934, 852) failed to give any separation of Ta

from solutions of the composition employed by them.

M. S. B.

Theory of chromium electrodeposition.—See B., 1935, 554.

Behaviour of sodium sulphite in the cathodic discharge of hydrogen ions. F. TÖDT (Z. Elektrochem., 1935, 41, 270—273).—The increase in the velocity of dissolution of Fe, observed on the addition of Na_2SO_3 (I) (cf. A., 1934, 973), takes place at $p_{\text{H}} < 7-8$ only, and becomes more marked as the p_{H} diminishes. (I) also increases the current strength between Fe and Pt or Cd and Pt electrodes, and acts as a poison towards the H electrode under similar conditions. These results may be explained by the oxidising action of (I) on H^+ . Fe with a high C content is much more readily dissolved than pure or even technical Fe at the same p_{H} . This is apparently due to smaller polarisability, and therefore greater facility for the discharge of H^+ , at the C surface.

M. S. B.

Influence of high-frequency field on the combustion of an acetylene-air mixture. V. ROSSCHIN and V. TIMKOVSKI (Nature, 1935, 135, 916).—

An increase in field frequency results at first in a decreased effect of the field in reducing the velocity of combustion and then, at a frequency of 1.8×10^7 sec.⁻¹, in accelerating the velocity of combustion. In the region of ultra-short λ , the acceleration increases and finally reaches 20% at the frequency 3.4×10^7 sec.⁻¹ This effect is due presumably to a kind of resonance energy exchange between the electrons and mols. of a reacting mixture.

L. S. T.

Photochemical hydrogen-oxygen reaction.

H. A. SMITH and G. B. KISTIAKOWSKY (J. Amer. Chem. Soc., 1935, 835—840).—The photochemical combination of H_2 and O_2 by λ 1719—1725 and 1850—1862 Å. has been reinvestigated (cf. A., 1930, 871). O_3 , H_2O_2 , and H_2O were obtained with the shorter λ and O_3 and H_2O_2 with the longer. H_2O formation in the latter case was not observed, due to incomplete absorption. The effect of pressure has also been studied and a possible reaction mechanism is discussed.

M. S. B.

Formation of hyponitrous acid as an intermediate compound in the oxidation of ammonia to nitrous acid.—See this vol., 787.

Influence of water on the sensitivity of photographic emulsions. A. CHARRIOU and (Mlle.) S. VALETTE (Compt. rend., 1935, 200, 1528—1530).—The sensitivity of rapid emulsions for blue rays is reduced to $\frac{1}{2}$ of its initial val. by soaking for 30 min. in H_2O . The effect is less marked for yellow and red rays and is much less on soaking in EtOH or COMe_2 instead of H_2O . Condensation of H_2O in aerial photography may reduce the speed of emulsions.

H. J. E.

Mechanism of photographic development. Induced reduction of silver halides by sodium sulphite in presence of organic developers and influence of alkali on the reaction. K. M. PANDALAI (J.S.C.I., 1935, 54, 169—172T; cf. A., 1934, 39).—Quinol is oxidised, during the development of Ag halides, to benzoquinone (I), which reacts with

alkali sulphite to re-form quinol. (I) has no action, by itself, on Ag halides, but reduction is considerable in the presence of Na_2SO_3 . Time and temp. have no great effect on the reaction. Na_2CO_3 , alone, has a strongly accelerating influence on the reduction, but, in presence of Na_2SO_3 also, high concns. seem unfavourable. The function of the alkali is probably to increase the velocity of ionisation of the developers and maintain the physico-chemical equilibrium in the developing bath, functioning also as halogen absorbents. Some results are also given for other developers and oxidation products. The formation of quinolsulphonic acid as an intermediate product during quinol development has been proved by its isolation as the Na salt.

J. L.

Micellar theory of the latent image. F. WEIGERT (Phot. Korr., 1934, 70, Suppl. 11, 41—51; Chem. Zentr., 1935, i, 187; cf. A., 1932, 29).—A summary.

J. S. A.

Photographic activity of irradiated ergosterol.—See this vol., 857.

Photochemical reaction between iodine and oxalate. N. R. DHAR, A. K. BHATTACHARYA, and B. L. MUKERJI (J. Indian Chem. Soc., 1935, 12, 151—160).—The reaction between excess of $\text{K}_2\text{C}_2\text{O}_4$ and aq. I in the absence of KI is unimol. in the dark and semi-mol. in homogeneous radiation of λ 3125—3536 and 8500—8750 Å., and is greatly retarded by adding KI. The velocity, V , varies as powers of the absorbed light between 0.33 and 1.25, and this index and the temp. coeff., k , diminish as the acceleration produced by the radiation increases. A val. of k 8.85 has been found for the dark reaction, and in general k diminishes as λ decreases. V is increased and k is lowered by stirring the reaction mixture. The absorption of light by oxalate solutions is increased by adding I.

J. G. A. G.

Photochemical reaction between ethylene iodide and iodine in carbon tetrachloride solution. D. S. NARAYANAMURTI (J. Indian Chem. Soc., 1935, 12, 173—176).—The data of Schumacher and Wiig (A., 1931, 180) are consistent with every collision between I atoms in solution resulting in the formation of I_2 mols.

J. G. A. G.

Sensitivity of organic substances to X-rays. G. KÖGEL (Fortschr. Röntgenstr., 1934, 50, 381—383; Chem. Zentr., 1935, i, 380).—Measurements with 1:4- and 1:5-OH· $\text{C}_{10}\text{H}_6\text{·SO}_3\text{Na}$, 1:4-, 1:5-, and 2:5-NH₂· $\text{C}_{10}\text{H}_6\text{·SO}_3\text{Na}$, and on 1:2- and 2:1-benzoquinone diazide show the effect of X-rays to be determined by the no., nature, binding, and position of the elementary constituents of the mol.

H. J. E.

Comparison between the oxidising effect of X-rays and the electric discharge on diamond and graphite. V. SIHVONEN (Suomen Kem., 1935, 8, B, 26—27).— O_2 at 0.04 mm., activated by X-rays or by an electric discharge for 1—3 hr., does not oxidise diamond (I) at room temp., and there is no surface corrosion. There is no reaction between (I) at room temp. and CO_2 at 0.02 mm. when activated by X-rays for 1.5 hr. With graphite (II) under the same conditions irradiation causes oxidation. Direct

exposure of the (II) in presence of O_2 gives CO_2 , but when the grains are screened by Pb, CO predominates. With coarsely powdered (II) the yield of oxidation products is increased.

R. S. B.

Chemical effects of radioactive rays. O. WERNER and V. SENFTNER (Angew. Chem., 1935, 48, 331—335).—A summary of published work.

E. S. H.

Heavy hydrogen and heavy water. E. A. HYLLERAAS (Tids. Kjem., 1935, 15, 7—11).—A review.

R. P. B.

Preparation of stable lithium iodide. Y. D. GNESIN and L. S. DOROSINSKI (Khim. Farm. Prom., 1934, No. 5, 30—32).—The cryst. LiI, after centrifuging, is fused in a SiO_2 vessel at 245—263°. This treatment insures stability.

CH. ABS. (e)

Reactions between dry inorganic salts. II. E. B. THOMAS and L. J. WOOD (J. Amer. Chem. Soc., 1935, 57, 822—827).—Previous X-ray measurements (A., 1934, 265) have been extended to cover the 18 possible double decomp. of the halides of the alkali metals in such mixtures as $\text{NaCl} + \text{KBr} \rightarrow \text{NaBr} + \text{KCl}$. 15 go to completion in the direction of diminution of the mean cube edge, and for these the algebraic sum of the heats of formation is always positive. It is invariably a member of the stable pair which has the highest m.p. of the four components concerned. In the stable pair also the heavier cation and anion unite to form one member and the lighter the other. In the case of $\text{KBr} + \text{RbCl} \rightarrow \text{KCl} + \text{RbBr}$ the average cube edge on the two sides of the equation is the same, and the X-ray data can be best explained by assuming a homogeneous solid solution of all four ions. The reactions $\text{KBr} + \text{RbI}$ and $\text{RbCl} + \text{CsBr}$, in which the algebraic sums of the heats of formation of reciprocal pairs are practically zero, do not go to completion in either direction.

M. S. B.

Borophosphates of copper and lead ($\text{M}^{\text{II}}\text{BPO}_5$). D. CHIRON and D. GRISCHOTT (Atti R. Accad. Lincei, 1935, [vi], 20, 391—394).—By fusion of the metallic oxide with B_2O_3 and P_2O_5 at 1100° the pure compounds CuBPO_5 and PbBPO_5 have been prepared. The corresponding Zn and Cd compounds contain ZnO and CdO, respectively.

O. J. W.

Salt-like properties of halogens. Products of the action of bromine on silver salts.—See this vol., 857.

Preparation of anhydrous perchlorates of magnesium and alkaline-earth metals by reactions between solids. G. F. SMITH and V. R. HARDY (Z. anorg. Chem., 1935, 223, 1—16).—By heating a finely-ground mixture of NH_4ClO_4 with MgCO_3 for 12 hr. at 250° and 1—10 mm. a 95% yield of $\text{Mg}(\text{ClO}_4)_2$ may be obtained. The yields of the Ba, Sr, and Ca compounds under similar conditions were 75%, 90%, and < 30%, respectively. Mixtures of NH_4ClO_4 with the oxides at 160° gave low yields. The yield increases with stability of the intermediate metal ammine perchlorate.

F. L. U.

Alkaline-earth metal ammine perchlorates. G. F. SMITH and E. G. KOCH (Z. anorg. Chem., 1935, 223, 17—27; cf. preceding abstract).—Ammine

perchlorates of Ca, Sr, and Ba having the following nos. of NH_3 mols. have been prepared: Ca 2, 4, 6; Sr 2, 6, 7; Ba 2, 6. The existence of di- and hexammine Mg perchlorates is confirmed. Dissociation pressures, solubility in Et_2O , and vals. of d_{425}^{25} are recorded. In all the hydrated perchlorates H_2O can be completely displaced by a stream of dry NH_3 , the hexammine salt being formed in each case. F. L. U.

Calcium aluminate. IV. **Properties of aluminium hydroxide crystallising from calcium aluminate solutions.** G. ASSARSSON (Z. anorg. Chem., 1935, 222, 321—336; cf. A., 1933, 1119).—Hydrated Al_2O_3 crystallising from aq. Ca aluminate has been examined chemically, microscopically, and by X-rays. Very unstable solutions give a granular ppt. containing about 4 mols. H_2O between 5° and 50° , the proportion decreasing to about 3 as 90° is approached. From less unstable solutions flakes, needles, plates, or spherites are obtained according to the conditions. All specimens show the structure of hydrargillite, except the needles, which appear to contain 4 mols. of H_2O . Optical data are recorded. F. L. U.

Ammoniates of alkaline-earth nitrates. M. A. PORTNOV and A. M. JURAVLEV (Z. anorg. Chem., 1935, 223, 45—48; cf. this vol., 159).—Nitrates of Ca, Sr, and Ba form compounds below 0° with 4 and 8 mols. of NH_3 . They are unstable at room temp. F. L. U.

Boron arsenate. G. E. R. SCHULZE (J. Amer. Chem. Soc., 1935, 57, 883).—A discussion of the possible reasons for the differences between the author's (A., 1933, 1004; 1934, 352) and Schumb and Hartford's vals. (this vol., 180) for d and n of BaAsO_4 . M. S. B.

Synthesis of emerald. A. AMSTUTZ and A. BORLOZ (Arch. Sci. phys. nat., 1935, [v], 17, Suppl., 39—41).—The solubility of SiO_2 , BeO , and Al_2O_3 in molten BeF_2 has been investigated. Two types of apparatus are proposed for obtaining large crystals of emerald. A mixture of BeF_2 , SiO_2 , BeO , Al_2O_3 , and traces of Cr_2O_3 falls periodically on to a small crystal in an electric furnace. The BeF_2 acts as a flux, and is continually driven off at the temp. of the furnace, leaving silicates of Be and Al with Cr_2O_3 . In the second apparatus a cyclic process is used in which the BeF_2 is condensed and used again. A. J. M.

Reduction of carbonic acid by means of nascent hydrogen. M. QURESHI and N. H. EFFENDI (J. Osmania Univ. Coll., 2, reprint).—Na and K amalgams, Ca, and Ba reduce aq. CO_2 solutions to HCO_2H . On prolonged reaction traces of CH_2O are formed. Mg gives no HCO_2H . All the above metals reduce a 10% solution of HCO_2H to CH_2O fairly rapidly. The reduction of HCO_2H to CH_2O (detected by Schryver's test) can be used for detecting 1 part in 10,000 of HCO_2H , if the presence of HCl is avoided. Ultra-violet light has no effect on the reduction of the CO_2 solutions. O. J. W.

Per-compounds. III. **Persilicates.** F. KRAUSS and C. OETNER (Z. anorg. Chem., 1935,

222, 345—370; cf. A., 1934, 741).—The following compounds and their properties are described: $\text{Na}_2\text{SiO}_3 \cdot \text{H}_2\text{O}$; $\text{Li}_2\text{SiO}_3 \cdot \text{H}_2\text{O}$, with and without H_2O ; $\text{BaSi}_2\text{O}_5 \cdot 2\text{H}_2\text{O}$, $3\text{H}_2\text{O}$; $\text{CaSi}_2\text{O}_5 \cdot \text{H}_2\text{O}$, $4\text{H}_2\text{O}$; $\text{SiO}_2 \cdot \text{H}_2\text{O}$ with and without $2\text{H}_2\text{O}$. Attempts to prepare K, Mg, and Zn salts were unsuccessful. F. L. U.

Zirconium pyrophosphate. A. KARL (Compt. rend., 1935, 200, 1668—1669).— $\text{ZrP}_2\text{O}_7 \cdot 2\text{H}_2\text{O}$ is sol. in conc. aq. alkali carbonates at the b.p., the solution depositing crystals of the type $\text{ZrP}_2\text{O}_7 \cdot 4\text{M}_2\text{CO}_3$ (I). Zr is not pptd. from solutions of (I) by aq. NH_3 or by alkali oxalates. The Zr is partly pptd. by H_2O_2 . (I) is decomposed by acids, forming ZrP_2O_7 . H. J. E.

Oxyhalides of lead. A. BAROUT (Atti R. Accad. Lincei, 1935, [vi], 20, 384—390).—Thermal analysis of the various systems at 250 — 900° shows the existence of the following compounds: $\text{PbCl}_2 \cdot x\text{PbO}$ ($x=1, 2, 4$), $\text{PbBr}_2 \cdot x\text{PbO}$ ($x=1, 2, 6$), and $\text{PbI}_2 \cdot x\text{PbO}$ ($x=2, 4, 6$). O. J. W.

Preparation of anhydrous titanium trichloride. M. BILLY and P. BRASSEUR (Compt. rend., 1935, 200, 1765—1767).— TiCl_4 is reduced by heating in a sealed tube at 340° with pptd. Sb, prepared by adding Zn to a HCl solution of SbCl_3 , washing, and drying in CO_2 at 50° . The product is washed in a CO_2 atm. successively with CCl_4 and dry Et_2O to remove TiCl_4 and SbCl_3 , respectively. The yield is theoretical. H. J. E.

Chloronitrides, nitrides, and hydroxynitrides of phosphorus. P. RENAUD (Ann. Chim., [xi], 3, 443—512).—The subject is reviewed historically, and the prep. of $(\text{PNCl}_2)_3$ (I) is described. X-Ray examination of the orthorhombic crystals gives a 14.30, b 6.25, c 13.03 Å. (I) polymerises during distillation, the more rapidly the lower is the temp., and the polymeride undergoes a process analogous to cracking at 400° . The thermal polymerisation of (I) in sealed tubes at 150° , 160° , 185° , and 200° has been studied and the increase of n [in $(\text{PNCl}_2)_n$] with time of heating t determined cryoscopically. H_2O favours the production of non-gelatinous polymerides, whilst high temp. and the existence of a temp. gradient yield gums. The variation of m.p. with n and t is plotted. Insol., infusible gums having the mechanical properties of rubber are produced at 200° . A transition temp. between amorphous and partly cryst. forms can be observed thermally and by X-rays, whilst mechanical transition to a brittle form occurs at -47° . The behaviour of the gums is discussed in relation to the theory of gels. The polymerides react vigorously with Na_2O_2 . H_2O reacts slowly with (I), but yields H_2O -sol. additive products with the polymerides, which decompose giving HCl. Black, impure $(\text{PN})_n$ is formed when (I) is heated with Na. Previous work on the interaction of NH_3 and PCl_3 is critically reviewed. A yellow, insol. powder (II) consisting of $(\text{PN})_n$ with adsorbed NH_3 and NH_4Cl is obtained by heating PCl_3 with NH_4Cl or by passing NH_3 into PCl_3 . The chemical properties and analysis of (II) are described. When heated in vac., (II) gives an insol., greyish-black powder of $(\text{PN})_n$ which is infusible, non-combustible,

and non-volatile up to 1000°. $(\text{PN})_n$ reacts vigorously with Na and molten nitrates, and gives a 90% yield of cryst. PNO_2H_2 (III) after refluxing with H_2O for 15 days. The cryst. properties of (III) have been studied: $a=b$ 7.57, c 7.60 Å.; mol. wt. 79; d 1.775; m.p. 195°; decomp. 210°. The m.p., d , and cryst. properties of (III) are practically identical with those of $\text{NH}_4\text{H}_2\text{PO}_4$, but analysis indicates the formula given.
R. S.

Explosive reaction of bismuth with perchloric acid. D. G. NICHOLSON and J. H. REEDY (J. Amer. Chem. Soc., 1935, 57, 817—818).—When Bi is heated in 70% HClO_4 below 100° it dissolves slowly with the formation of small amounts of chloride in solution. At about 110° a brownish coating, which explodes violently on further heating, is formed. This is not $\text{Bi}(\text{ClO}_3)_3$, nor an active form of Bi comparable with "active Sb," and apparently it is not due to impurities. Attempts to determine the composition of the brown coating were unsuccessful.
M. S. B.

alloTelluric acid. M. PATRY (Compt. rend., 1935, 200, 1597—1599; cf. this vol., 593).—Crude *allo*-telluric acid (I) formed by heating orthotelluric acid in a sealed tube is a mixture owing its properties to a complex acid $(\text{H}_2\text{TeO}_4)_n$, sol. in HNO_3 and in EtOH. The EtOH solution on evaporation yields the compound $(\text{EtHTeO}_4)_n$, a very hygroscopic white powder, sol. in H_2O and insol. in Et_2O , C_6H_6 , and CHCl_3 . Prolonged heating of the solution under reflux gives a 20% yield of the compound $(\text{Et}_6\text{TeO}_4)_n$, insol. in cold H_2O but sol. in Et_2O . The EtOH solution, when treated with Na, ppts. $\text{NaH}_3\text{Te}_2\text{O}_8 \cdot 1.5\text{H}_2\text{O}$. (I) prepared by prolonged heating at 150—305° contains the *anhydride* TeO_3 .
J. W. S.

Tellurates. E. MONTIGNIE (Bull. Soc. chim., 1935, [v], 2, 864—866).—The existence of $\text{Ag}_6\text{TeO}_6 \cdot 3\text{H}_2\text{O}$ and $\text{Ag}_6\text{Te}_2\text{O}_6 \cdot 3\text{H}_2\text{O}$ has been confirmed. $\text{Bi}_2(\text{TeO}_4)_3$, $\text{UO}_2\text{TeO}_4 \cdot 2\text{Na}_2\text{TeO}_4 \cdot 4\text{H}_2\text{O}$, $\text{BeTeO}_4 \cdot 7\text{Be}(\text{OH})_2$, and $\text{Ce}_2(\text{TeO}_4)_3$ have been prepared by the action of Na_2TeO_4 on the nitrates or chlorides.
R. S.

Formula of ferromagnetic chromic oxide. A. MICHEL and J. BÉNARD (Compt. rend., 1935, 200, 1316—1318).—Differential thermal analysis of the product formed by heating CrO_2Cl_2 shows the formation of a ferromagnetic oxide CrO_2 and a solid solution of O_2 in Cr_2O_3 , decomp. at higher temp. into green Cr_2O_3 and O_2 .
N. M. B.

Behaviour of chromic oxide towards alkali halogenate solutions. I. Reaction system chromic oxide-bromate. R. LYDEN (Z. anorg. Chem., 1935, 223, 28—32).—Strongly ignited Cr_2O_3 (insol. in acids) dissolves readily on warming with aq. KBrO_3 . For complete dissolution 6 mols. KBrO_3 for 5 mols. Cr_2O_3 are required. The reaction is represented by: $2\text{Cr}^{++} + \text{BrO}_3^- + 5\text{H}_2\text{O} = 2\text{H}_2\text{CrO}_4 + \text{Br}^- + 6\text{H}^+$.
F. L. U.

Reaction tungstic oxide-carbon-chlorine. G. W. SEARS and F. LOHSE (J. Amer. Chem. Soc., 1935, 57, 794—796).— WO_2Cl_2 , WOCl_4 , and probably WCl_6 are successively produced and free O_2 is evolved. C acts as a catalyst and does not disappear so long as a current of Cl_2 is maintained. C may therefore be used to catalyse the extraction of W from its ores by

Cl_2 . Cl_2 was removed from the residual gases by Hg before O_2 was determined.
M. S. B.

Identification of the 12-heteropoly-acids and their salts by means of X-ray powder photographs. J. W. ILLINGWORTH and J. F. KEGGIN (J.C.S., 1935, 575—580; cf. A., 1934, 479).—The crystal structures of the hydrates of a no. of 12-heteropoly-acids and of their NH_4 and alkali-metal salts have been investigated. They generally crystallise with 29 or 5 H_2O . The following compounds have been prepared: $\text{K}_3\text{AsW}_{12}\text{O}_{40}$, $\text{Cs}_3\text{AsW}_{12}\text{O}_{40}$, $(\text{NH}_4)_3\text{HSiMo}_{12}\text{O}_{40}$, $\text{K}_3\text{KSiMo}_{12}\text{O}_{40}$, $\text{Rb}_3\text{HSiMo}_{12}\text{O}_{40}$, $\text{Ce}_3\text{HSiMo}_{12}\text{O}_{40}$, $\text{Ti}_3\text{HSiMo}_{12}\text{O}_{40}$, $(\text{NH}_4)_3\text{HMnMo}_{12}\text{O}_{40}$, $\text{Cs}_3\text{HMnMo}_{12}\text{O}_{40}$. Attempts to prepare metatamolybdic acid, 12-boro-, -stanni-, -chromo-, -antimono-, and -vanado-molybdates were unsuccessful, and Mo and W were the only metals which could be placed in the outer sheath of the 12-acid.
J. W. S.

Iron, even when impure, is not oxidised by pure air at saturated humidity. P. RONCERAY (Bull. Soc. chim., 1935, [v], 2, 742—745).—Extraneous material has been excluded by the employment of bacteriological technique. Carefully cleaned commercial Fe or Fe partly plated with Sn remains bright in air saturated with H_2O under these conditions. The origination of rust in depressions or scratches is attributed to the presence of extraneous material.
R. S.

Autoxidation of the hydroxides of iron, manganese, and cobalt. O. LIÉVIN and J. HERMAN (Compt. rend., 1935, 200, 1474—1477).—An apparatus for measuring the rate of oxidation by O_2 of $\text{Fe}(\text{OH})_2$, $\text{Mn}(\text{OH})_2$, and $\text{Co}(\text{OH})_2$, respectively suspended in alkaline solution, is described. The oxidation to Fe_2O_3 is very rapid and appears to follow a simpler course than that of the other two. $\text{Mn}(\text{OH})_2$ oxidation stops at a stage intermediate between Mn_2O_3 and MnO_2 . The max. for $\text{Co}(\text{OH})_2$, Co_2O_3 , is attained much more slowly than in the other two cases. The oxidisability of $\text{Co}(\text{OH})_2$ appears to depend on the colour of the original ppt.
M. S. B.

Spectroscopically pure γ -ferric oxide in colloidal aggregation as a biological indicator. Preparation of $\gamma\text{-Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$, and $\gamma\text{-Fe}_2\text{O}_3$. O. BAUDISCH (Svensk Kem. Tidskr., 1935, 47, 115—119).—Pure O_2 -free $\text{C}_5\text{H}_5\text{N}$ through which a stream of CO_2 is passed is treated with a Congo-neutral solution of spectroscopically pure FeCl_2 . After keeping for 12 hr. under CO_2 , the yellow crystals of $[(\text{FeCl}_2)(\text{C}_5\text{H}_5\text{N})_4]$ (I) are washed with $\text{C}_5\text{H}_5\text{N}$ and dried. Through a 2% solution of (I) in pure H_2O , a current of O_2 or air is passed until $\gamma\text{-Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$ is quantitatively pptd. The air-dried product is dehydrated by heating in a quartz test-tube at 240—260° until it is converted into the ferromagnetic $\gamma\text{-Fe}_2\text{O}_3$. The applications of the latter in biology are discussed.
W. O. K.

Palladium-hydrogen. W. KRAUSE and L. KAHLENBERG (Trans. Electrochem. Soc., 1935, 63, 35—55).—Pd foil shrinks and thickens on repeated hydrogenation. The hydrogenation rate is a max. after 12 absorptions at 0°, three at 25°, and a single absorption above 56°. The total absorption decreases linearly up to 82°, above which it falls rapidly, whilst the

hydrogenation rate after 1 min., expressed as % of the total, is a max. at 56°. For succeeding time intervals, the rate is approx. const. up to 75°, but falls rapidly at higher temp. The linear dimensions of Pd foil have been determined after each successive expansion due to hydrogenation and contraction due to dehydrogenation until after ninety operations there was no further change, when the Pd was almost cylindrical in shape. The d and the total H_2 absorbed per g. now became const., whilst the Pd_2H reduced H_2SO_4 to H_2S and H_3PO_4 to PH_3 and exhibited pyrophoric properties. R. S.

Quantitative spectral analysis. H. TRICHÉ (Compt. rend., 1935, 200, 1538—1541).—A spark is established between a metal electrode to be examined and a metal sheet not containing the metal to be detected. On the other side of the sheet is a spark gap (in the same circuit) to a comparison electrode. The two sparks are focussed simultaneously on the spectrograph slit. Methods of matching are described. H. J. E.

Use of flame spectra in chemical analysis. H. W. LOHSE (Canad. J. Res., 1935, 12, 519—532).—As a method of quant. analysis spectra of flames produced by atomising aq. solutions by means of an air- C_2H_2 jet have been studied. Errors in the results are largely due to plate variation. Changes in pressure of C_2H_2 may also be significant, since a variation of 1 cm. of H_2O in the pressure gives a change of several % in the line intensity of Ca and Na. Results have been compared for several minerals using chemical and flame spectra methods, the discrepancies being of the same order as those due to plate variation. R. S. B.

Micro-chemical analysis. M. RAEDER (Tids. Kjem., 1935, 15, 14—16).—A review. R. P. B.

Solutions for colorimetric standards. IV. Ferric chloride. M. G. MELLON and C. T. KASLINE (Ind. Eng. Chem. [Anal.], 1935, 7, 187—189).—Data are given for the transmission of $FeCl_3$ solutions in the visible region at different HCl concns. Optimum vals. are $[FeCl_3]$ 0.5—0.02M, $[HCl]$ 5.0—0.05M. J. S. A.

Qualitative chemical analysis. V. MACRI (Boll. Chim. Farm., 1935, 74, 345—349).—Various modifications of the accepted method for the separation of the metals into groups are described, with special reference to methods for separating and detecting the alkali metals without going through the group separation for the other metals. The following method is preferred. The solution, or the liquid obtained on extraction of the solid with hot H_2O , is acidified, if not already acid, with dil. HNO_3 . If either $Ba(NO_3)_2$ or dil. H_2SO_4 produces a ppt., excess of the reagent is added. The filtrate is evaporated nearly to dryness with aq. $Ba(OH)_2$, evolution of NH_3 indicating NH_4 . The residue is extracted with H_2O and the Ba pptd. by addition of $(NH_4)_2CO_3$ or CO_2 . The solution is acidified with HCl, and evaporated to dryness. LiCl is extracted by means of EtOH-Et₂O and the residue tested for K and Na. D. R. D.

Titrimetric determination of water in organic liquids using acetyl chloride and pyridine. D. M.

SMITH and W. M. D. BRYANT (J. Amer. Chem. Soc., 1935, 57, 841—845).—The reaction of $AcCl$ and C_5H_5N with H_2O to form 2 mols. of titratable acid as C_5H_5N salts is much more rapid than the corresponding reaction with EtOH to form 1 mol. each of acid and ester. It can thus be used as a basis for the determination of H_2O in many org. compounds, including fatty acids. Substances interfering with the method are discussed. M. S. B.

Determination of moisture in liquid ammonia.—See B., 1935, 492.

Influence of acid in potentiometric chloride titration. L. GUZELJ (Z. anal. Chem., 1935, 101, 257—269).—The electrode potential at the equivalence point is considerably depressed (up to 0.1 volt) and the titre slightly raised ($\approx 1\%$) in presence of acids. The effect is \propto [acid], and approx. \propto the strength of the acid, i.e., greatest for HNO_3 , small for $AcOH$. J. S. A.

Volumetric determination of chlorides and sulphates in a mixture containing both, with the help of an adsorption indicator. M. B. RANE and K. R. APTE (J. Indian Chem. Soc., 1935, 12, 204—207).— $CdSO_4$ may be titrated directly with $Ba(OH)_2$, using fluorescein (I) as indicator. Cl' and SO_4'' in the same solution are determined by titrating successively with $AgOAc$, and $Ba(OH)_2$ after adding $Mg(OAc)_2$, using (I) as indicator (cf. A., 1932, 923). Acid solutions are first exactly neutralised with aq. NH_3 . J. G. A. G.

Volumetric micro-determination of chloride and potassium ions. Application of potassium method to sea-water. B. BULLOCK and P. L. KIRK (Ind. Eng. Chem. [Anal.], 1935, 7, 178—180).— Cl' is determined by titration with 0.005N- $AgNO_3$, using dichlorofluorescein as indicator. 2 vols. of $COMe_2$ are added to make the end-point more distinct. For determination of K, excess of aq. $PtCl_4$ is added and the solution evaporated to dryness. The residue is washed with 80% EtOH (I) saturated with K_2PtCl_6 (II), then with 20% NH_4Cl , and finally with (I) until free from NH_4Cl . Mg powder + H_2O is added, reducing (II) to Pt, and Cl' in the solution is titrated as above. J. S. A.

Volumetric determination of halides. Use of dichlorofluorescein as adsorption indicator. K. BAMBACH and T. H. RIDER (Ind. Eng. Chem. [Anal.], 1935, 7, 165—166).—Dichlorofluorescein may be used as indicator for titration of Cl' , Br' , or I' with $AgNO_3$ in EtOH or aq.-EtOH solution. J. S. A.

Detection and colorimetric determination of micro-quantities of bromide. V. A. STENGER and I. M. KOLTHOFF (J. Amer. Chem. Soc., 1935, 57, 831—833).—The determination of very minute quantities of Br' may be made with phenol-red by oxidation with $Ca(OCl)_2$ in borax buffer at p_H 8.7—8.8. A colour change, due to the formation of bromophenol-blue, is obtained, and can be best observed and measured by changing to p_H 5.0—5.4 by the addition of suitable buffers. M. S. B.

Determination of minute amounts of bromide in presence of very great excess of chloride. F. L. HAHN (Mikrochem., 1935, 17, 222—235).—(1) Free

Br is liberated by chloramine-*T* in acetate-buffered solution at p_{H} 5.5—5.6 in presence of fluorescein, which is thus brominated to eosin with only inconsiderable chlorination. 10^{-5} g. of Br may be so determined in presence of 0.1 g. of Cl. (2) Small [Br'] has a large effect on the potential of the calomel electrode. From measurement of potential in the solution under examination, using a Pt wire-Hg-Hg₂Cl₂ or a liquid Hg-aq. Hg₂(ClO₄)₂ electrode, [Br'] may be compared with that of known solutions.

J. S. A.

Microchemical detection of iodine. S. AUGUSTI (Mikrochem., 1935, 17, 113—117).—I' gives with a solution of Hg(NO₃)₂ in aq. NH₃ (*i.e.*, Hg₂N·NO₃) a yellow ppt. of Hg₂N·I; sensitivity 2.2×10^{-7} g. A brown ppt. is given by $< 9 \times 10^{-6}$ g. of I' with dil. aq. NaOCl+1% aq. MgSO₄.

J. S. A.

Iodide determination in acid solution. G. JÓNÁS (Magyar gyó. Társ. Ért., 1934, 10, 526—539; Chem. Zentr., 1935, i, 443).—Oxidation of I' with Cl₂ in HCl solution ($> N$) yields ICl. In determining I', CCl₄ and 3*N*-HCl are added, and the I' is converted into ICl with aq. NH₂Cl (stabilised with Na₂B₄O₇). The end-point is shown by the decolorisation of the violet CCl₄ solution. The HCl solution is then diluted with H₂O to 0.2—0.3*N*, the ICl is destroyed by adding KI, and the liberated I titrated with Na₂S₂O₃. The mean of the NH₂Cl and Na₂S₂O₃ titrations is taken. Large amounts of Br' do not interfere. Ag⁺, Hg²⁺, Pb²⁺, or Bi³⁺ may be present. In presence of Fe²⁺, the Cl titration gives the Fe²⁺+I', and the Na₂S₂O₃ titration gives the I'.

H. J. E.

Determination of fluorine in phosphatic material.—See B., 1935, 493.

Determination of oxygen in water by syringe pipettes.—See B., 1935, 528.

Determination of ozone. A. MACHÉ (Compt. rend., 1935, 200, 1760—1762).—At high [O₃] (*e.g.* 40 mg. per litre), Juliard and Silberschartz' method (A., 1928, 978) is exact. The fluorescein method (A., 1919, ii, 198) is suitable for low [O₃] if the p_{H} is strictly const.

H. J. E.

Adsorption indicator in the volumetric determination of sulphates. A colloido-chemical study. M. P. V. IYER (J. Indian Chem. Soc., 1935, 12, 164—167).—The colour changes observed during the titration by Ba(OH)₂ of MgSO₄ and MnSO₄, but not other sulphates, in the presence of Na fluoresceinate (cf. A., 1932, 923) are due to the pptn. of Mg(OH)₂ and Mn(OH)₂ at alkaline p_{H} vals. and the concomitant adsorption of fluoresceinate ions. The fading of the colour on ageing is correlated with growth of the particles of the ppt., and the nature of the adsorption process is discussed. J. G. A. G.

Sensitive reaction for thiosulphate ion. A. BLANCK (Z. anal. Chem., 1935, 101, 194).—CuSO₄+AcOH are added, and the solution is heated from above. In presence of S₂O₃²⁻ a black ring of CuS is produced. PO₄³⁻, CNS⁻, CN⁻, Fe(CN)₆⁴⁻, and S²⁻ interfere.

J. S. A.

Determination of sulphuric acid in clouds, as present in burner gases etc.—See B., 1935, 492.

Rational procedure for use of selenium in the Kjeldahl method. V. V. ILLARIONOV and N. A. SOLOVJEVA (Z. anal. Chem., 1935, 101, 254—257; cf. this vol., 596).—H₂SeO₃ dissolved in H₂SO₄ (0.005 g. of Se per c.c.)+CuSO₄+K₂SO₄ is used as catalyst.

J. S. A.

Determination of nitrogen trioxide in nitrosyl-sulphuric acid.—See B., 1935, 492.

Direct titration of soluble orthophosphates with lead acetate in presence of dibromofluorescein as adsorption indicator. A. W. WELLINGS (Analyst, 1935, 60, 316—318; cf. A., 1933, 798).—The aq. PO₄³⁻ is made neutral or slightly acid with HNO₃. The procedure for the subsequent titration is described.

E. C. S.

Photometric investigation of ceruleomolybdate determination of phosphate in waters. R. J. ROBINSON and H. E. WIRTH (Ind. Eng. Chem. [Anal.], 1935, 7, 147—150).—The methods of Atkins and of Truog and Meyer (cf. A., 1929, 1158) are more suited to very low [PO₄³⁻] than the Bell-Doisy method, but are subject to a large neutral salt effect. J. S. A.

Fajans' titration method. E. J. KOCSIS and L. POLLÁK (Acta Lit. Sci. Univ. Hung. Francisco Joseph., 1934, 4, 147—155).—A review of applications of the method in determining PO₄³⁻, MoO₄²⁻, C₂O₄²⁻, Fe(CN)₆⁴⁻, Hg²⁺, Zn²⁺, and coloured halide solutions. Suitable indicators are recorded.

CH. ABS. (e)

Detection of arsenic in presence of antimony. N. A. TANANAEV and V. D. PONOMARJEV (Z. anal. Chem., 1935, 101, 183—185).—As compounds are reduced to AsH₃ (detected with HgCl₂ paper) by Sn+HCl, whilst Sb is deposited as the metal. 0.01% of As in Sb may be so detected.

J. S. A.

Determination of very small amounts of carbon monoxide in air.—See B., 1935, 526.

Micro-alkalimetry. II. Micro-determination of alkali carbonates. J. MIKA (Z. anal. Chem., 1935, 101, 270—278).—The solution is titrated nearly to completion, stirring with a stream of air free from CO₂. Dissolved CO₂ is then removed completely by prolonged passage of air (15 min.), and titration completed to a permanent tint at p_{H} 5.0. Me-red is used as indicator, and matched against a Na₂HPO₄-citric acid buffer.

J. S. A.

Volumetric determination of potassium by the cobaltinitrite method. C. S. PIPER (J.S.C.I., 1935, 54, 157—158T).—Error may be introduced through the presence of NH₄⁺ in some brands of A.R. Co(NO₃)₂ (cf. this vol., 317).

C. W. G.

Gravimetric determination of silver. P. SPACU (Bul. Soc. Stiinte Cluj, 1934, 7, 568—570; Chem. Zentr., 1934, ii, 3531).—The neutral or feebly acid (HNO₃) AgNO₃ solution is treated with KCNS until the pptd. AgCNS redissolves. Conc. [Co en₂(CNS)₂]₂CNS (*trans*) (I) is added to the hot solution and the orange-red [Ag(CNS)₂][Co en₂(CNS)₂] (Ag 20.78%) is washed with 1% aq. KCNS containing 0.5% of (I), with 96% EtOH, and with Et₂O and dried in vac. at room temp.

H. J. E.

Indirect microchemical detection of alkaline-earth metals on hot cathodes of oxide [dull

emitter] valves. H. FRITZ (Mikrochem., 1935, 17, 191—209).—The valves are opened and filled with O₂-free N₂. The filament is heated, converting free Ba into Ba₃N₂, and is then cut out and distilled with aq. Na₂CO₃. NH₃ in the distillate is determined colorimetrically with Nessler's reagent. The amount of free metal so found is many times > that required for a unimol. layer. J. S. A.

Drop methods for identification of cations in presence of phosphate ion. N. A. TANANAIEV and V. A. SCHULEPOVA (Z. anal. Chem., 1935, 101, 179—182).—Removal of PO₄''' is necessary only for the detection of Ca, Sr, and Ba, and may be effected with either (NH₄)₂MoO₄ or Na₂WO₄. J. S. A.

Quantitative spectral analysis of calcium and barium in light alloys and solutions. H. TRICHÉ (Compt. rend., 1935, 200, 1665—1667).—Tests are described on the spectroscopic detection of Ca and Ba, using λ 3933.67 and 3891.78 Å., respectively. The influence of temp., concn., and the addition of foreign substances on the relative intensities was studied. H. J. E.

Volumetric determination of beryllium. B. S. EVANS (Analyst, 1935, 60, 291—293).—Be is pptd. as Be(OH)₂, which is exactly neutralised with HCl. A known vol. of 0.1N-HCl is added, the excess of which is determined by liberating I from aq. KIO₃+KI in presence of NaHCO₃ and titrating with 0.1N-As₂O₃. The separation of Be from a large amount of Pb is described. E. C. S.

Micro-determination of magnesium. G. CREUSS-CALLAGHAN (Biochem. J., 1935, 29, 1081—1085).—Mg \leq 20 \times 10⁻⁶ g. in 3 c.c. of solution can be determined by pptn. with 8-hydroxyquinoline, hydrolysis of the Mg complex, bromination with excess of Br, and volumetric determination of free Br. The error is \approx 10%. The presence of 4 times as much Ca causes no error with 50 \times 10⁻⁶ g. of Mg in 3.5 c.c. J. N. A.

Micro-detection of magnesium and aluminium with alkannin and naphthazarin. Relation of alkannin to naphthazarin. J. V. DUBSKÝ and E. WAGNER (Mikrochem., 1935, 17, 186—190).—Blue alkaline EtOH solutions of alkannin (I) (0.05%) and of naphthazarin (II) (0.03%) give bulky blue ppts. with 0.05 mg. of Mg. The purple solution of (II) made alkaline with (CH₂-NH₂)₂ gives a blue colour with 0.35 \times 10⁻⁶ g. of Mg. Al gives violet ppts. with (I) and (II) in presence of NH₃. J. S. A.

Qualitative micro-analysis by electrolysis and spectrography. A. SCHLEICHER (Z. anal. Chem., 1935, 101, 241—254).—Metals present in 0.1—2 c.c. of solution are deposited electrolytically on a thin Cu wire or C point cathode, and are identified from their most sensitive spectral lines in the interrupted arc, using the enriched deposit on a C point cathode as electrode. By electrolysis first from HCl, and then adding aq. NH₃, a separation is made into (a) metals electro-deposited from acid (Hg—Pt in the electrochemical series); (b) metals deposited from acid and alkaline solution (Cd—Ge); (c) those deposited from NH₃ solution (Zn—Al). Determination of the concn. at which spectral lines appear on progressive concn.

or dilution affords a measure of the concn. of the metals present. J. S. A.

Detection of cadmium as selenide. P. KRUMHOLZ and O. KRUH (Mikrochem., 1935, 17, 210—214).—Cd is pptd. as red-brown CdSe by addition of Na₂Se to the NH₃-KCN solution in presence of Cu, Ni, Co, or Zn in large excess. Confusion of CdS with flavianic or rubianic acids from H₂S+(CN)₂ is thus avoided. J. S. A.

Limits for spectroscopic detection of cadmium and palladium in silver.—See B., 1935, 552.

Volumetric determination of lead in alloys containing tin, antimony, and copper.—See B., 1935, 501.

Determination of traces of lead in drinking water.—See B., 1935, 527.

Colorimetric determination of traces of copper with sodium diethyldithiocarbamate. E. LAGET (Ann. Chim. Analyt., 1935, [iii], 17, 145—147).—The interfering white cloudiness due to hydrolysis of Na diethyldithiocarbamate is best avoided by working in 50% EtOH, and 10⁻⁷—10⁻⁴ g. of Cu may then be determined. The method may be used in the presence of Zn, Cd, and traces of Fe and Mn, but aq. NH₃ should then be added. A. G.

Reaction of copper with benzidine and new method of determining traces of copper. A. TETTAMANZI (Atti R. Accad. Sci. Torino, 1934, 69, I, 197—203; Chem. Zentr., 1935, i, 115).—The reaction between benzidine and Cu in presence of KI is due to liberated I. Free I may be so detected at a concn. of 1 in 500,000. J. S. A.

Micro-determination of copper. F. HECHT and R. REISSNER (Mikrochem., 1935, 17, 127—134).—In the micro-analysis of minerals Cu may be accurately determined with benzoinoxime, salicylaldoxime, or, best, with 5 : 7-dibromo-8-hydroxyquinoline. J. S. A.

p-Aminophenol hydrochloride as reagent for copper and iron cations. S. AUGUSTI (Mikrochem., 1935, 17, 118—126).—A 2% solution of *p*-OH·C₆H₄·NH₂·HCl in EtOH gives blue-violet ppts. with Cu⁺⁺ and Fe⁺⁺⁺; sensitivity 0.2 \times 10⁻⁷ g. of Cu, 0.06 \times 10⁻⁷ g. of Fe. Other heavy metals do not interfere. J. S. A.

Modified iodometric method of determining copper. H. W. FOOTE and J. E. VANCE (J. Amer. Chem. Soc., 1935, 57, 845—847).—Addition of a sol. thiocyanate near the end-point of the usual iodometric titration of Cu increases the sharpness of the end-point and the accuracy of the method. When the titration is complete the Cu ppt. is white. M. S. B.

Determination of copper in pharmaceutical specialities containing copper and iron.—See B., 1935, 523.

(A) Potentiometric determination of mercury. G. SPACU and I. G. MURGULESCU. (B) Volumetric determination of mercury. G. SPACU and V. ARMEANU (Bul. Soc. Științe Cluj, 1934, 7, 552—558, 621—630; Chem. Zentr., 1934, ii, 3530—3531).—(A) The Hg solution is treated with excess of KI and

titrated with $[\text{Cu en}_2](\text{NO}_3)_2$ solution (I), $[\text{HgI}_4][\text{Cu en}_2]$, (II) being formed. An amalgamated Pt wire serves as indicator electrode. The solubility of (II) is 1.34×10^{-4} .

(B) Hg^{I} salts are oxidised with aqua regia, Cl being eliminated by SO_2 or KHSO_3 . The solution is then titrated with (I), the first drop of which in excess gives a violet colour (cf. A., 1929, 901, 1259). Halides, SO_4^{II} , CNS^{I} , and nitrates of NH_4 , Mg, and the alkaline earths do not interfere. CN^{I} must be removed.

H. J. E.

Volumetric determination of mercury. M. SCHTSCHIGOL (Khim. Farm. Prom., 1934, No. 3, 29—32).—0.2—0.4 g. of the sample is dissolved in H_2O and 20—30 c.c. of 30% NaOH , treated with 5—10 c.c. of glycerol, and filtered. The ppt. is washed and dissolved in 15 c.c. of hot HNO_3 . The solution is diluted, KMnO_4 being added until pink and then FeSO_4 until colourless, and titrated with 0.1N- NH_4CNS .

CH. ABS. (e)

Titrimetric determination of manganese. J. LEROIDE and A. BRULTET (Bull. Soc. chim., 1935, [v], 2, 740—742).— KMnO_4 is added to a solution of MnSO_4 and K_2SO_4 (50 g.) or Na_2SO_4 in boiling H_2O (500 c.c.) until a permanent pink coloration is obtained.

R. S.

Sensitive polarographic test for the absence of rhenum in manganous salts. J. HEYROVSKÝ (Nature, 1935, 135, 870—871).—A method for the detection of 2×10^{-8} g. of ReO_4^{I} is described. Commercial Mn salts contain < 1 part of Re in 10^6 of Mn.

L. S. T.

Quantitative separation of iron and cobalt. P. SPACU (Compt. rend., 1935, 200, 1595—1597).—Treatment of a hot solution containing Fe^{III} and Co^{II} with $\text{C}_5\text{H}_5\text{N}$ separates all the Fe as $\text{Fe}(\text{OH})_3$, whilst the Co remains in solution and can be determined as $[\text{Co}(\text{C}_5\text{H}_5\text{N})_4(\text{CNS})_2]$.

J. W. S.

Drop reaction for ferricyanide. E. STORFER (Mikrochem., 1935, 17, 170—173).—Neutral solutions of $[\text{Fe}(\text{CN})_6]^{\text{III}}$ give with $[\text{CuR}_3]\text{Cl}$ [$\text{R} = \text{CS}(\text{NH}_2)_2$] a violet or grey ppt. of $[\text{CuR}_3]_3[\text{Fe}(\text{CN})_6] \cdot 2\text{H}_2\text{O}$. 100,000-fold excess of $[\text{Fe}(\text{CN})_6]^{\text{III}}$ does not interfere. Limiting concn. of $[\text{Fe}(\text{CN})_6]^{\text{III}}$, 1 : 100,000.

J. S. A.

Determination of ferrous and manganous oxides in steel by means of mercuric chloride.—See B., 1935, 499.

Detection of iron, lead, and tar in dust samples.—See B., 1935, 526.

Vanadous sulphate as a reducing agent. I. P. C. BANERJEE (J. Indian Chem. Soc., 1935, 12, 198—203).— $\text{VSO}_4 \cdot (\text{NH}_4)_2 \cdot 6\text{H}_2\text{O}$ (I), which is less easily oxidised by air than VSO_4 , is prepared by electrolysis, between Pb electrodes, of vanadyl sulphate in H_2SO_4 containing $(\text{NH}_4)_2\text{SO}_4$; the anolyte is $2\text{H}_2\text{O} : 1\text{H}_2\text{SO}_4$. The solution is preserved under H_2 . The strong reducing properties of (I) are illustrated by numerous reactions described. Fe^{III} is determined by direct titration using KCNS as internal indicator. Fe^{II} is first oxidised to Fe^{III} with KMnO_4 or H_2O_2 and aq. NH_3 . Cr^{III} is determined by oxidising with Na_2O_2 to CrO_4^{II} , neutralising with H_2SO_4 , adding excess of (I),

and back titrating with standard Fe^{III} alum using KCNS as indicator. Cu^{II} is determined, in the presence of excess of KCNS and a little FeSO_4 , by direct titration with (I); the Cu is pptd. as CuCNS . J. G. A. G.

Volumetric determinations in strongly alkaline solutions. I. Titration of cobalt with ferricyanide. O. TOMIČEK and F. FREIBERGER (J. Amer. Chem. Soc., 1935, 57, 801—804).—Co can be rapidly and simply titrated, potentiometrically, with $\text{K}_3\text{Fe}(\text{CN})_6$ in presence of alkalis, preferably aq. NH_3 . The solution must be kept below 10° and in an atm. of CO_2 . The method is not affected by large amounts of Ni^{II} , Cu^{II} , Zn^{II} , $\text{AsO}_4^{\text{III}}$, Fe^{II} , CrO_4^{II} , MoO_4^{II} , or VO_3^{I} , or by Fe^{III} if the concn. is not too great. Mn and $\text{AsO}_3^{\text{III}}$ must be absent. M. S. B.

Determination of cobalt in steel.—See B., 1935, 551.

Determination of chromium, aluminium, and iron, and the complete analysis of chromites. K. N. TODORVIĆ and V. M. MITROVIĆ (Bull. Soc. Chim. Yougoslav., 1934, 5, 219—227).—Chromite (0.2—0.3 g.) is fused with $\text{Na}_2\text{B}_4\text{O}_7 \cdot \text{Na}_2\text{CO}_3 \cdot \text{K}_2\text{CO}_3$, and the melt is extracted with H_2O ; Cr is determined iodometrically, and Fe by the Zimmermann—Reinhardt method. A second portion of ore is fused with Na_2O_2 , and $\text{Al}_2\text{O}_3 + \text{Cr}_2\text{O}_3 + \text{Fe}_2\text{O}_3$ determined; the Al_2O_3 content is calc. by difference. R. T.

Determination of chromium and nickel in ferrous alloys containing manganese and more than 1% of carbon.—See B., 1935, 499.

Detection of germanium in blende. G. PICCARDI (Annali Chim. Appl., 1935, 25, 179—194).—Chemical and X-ray analysis prove unsatisfactory for detecting small amounts of Ge in blende, but a spectroscopic method described gives good results.

T. H. P.

Microchemical detection of bismuth, antimony, and gold. A. SA (An. Farm. Bioquim., 1934, 5, 3—7; Chem. Zentr., 1934, ii, 3531).—To a drop of the acid solution is added (in testing for Au) a small crystal of NaBr or (for Bi or Sb) a small crystal of KI , followed by 2-aminopyridine. Bi gives a scarlet ppt. (lamellæ and H-formed crystals), and Sb an orange-yellow ppt., the crystals being larger than for Bi. The limits of detection for Sb and Bi are 1.2, 7.5×10^{-6} g., respectively. Au gives yellow-red rectangular lamellæ and H-formed crystals. In presence of Ag, Pb, Hg, Cu, Cd, Sn, or Au, Bi must first be separated by NaOH and KCN . H. J. E.

Analytical chemistry of tantalum, niobium, and their mineral associates. XXVIII. Separation of rare earths from earth acids. W. R. SCHOELLER and E. F. WATERHOUSE (Analyst, 1935, 60, 284—291; cf. A., 1934, 1192).—For the separation of large amounts of rare earths (I) from the earth acids (II) Schoeller and Powell's modification (J.C.S., 1921, 119, 1927) of Smith's HF method (A., 1884, 111) is recommended. For small quantities, the bulk of (II) is removed by hydrolysis with tartaric acid (III), (I) are pptd. with tannic acid in presence of NH_3 , the ppt. is fused with KHSO_4 , and the melt is either extracted with aq. $\text{H}_2\text{C}_2\text{O}_4$ (IV) or is dissolved in (III) and pptd. with (IV). E. C. S.

Industrial importance of m. p., and apparatus for their determination. J. A. SCARROW (Canad. Chem. Met., 1935, 19, 98).—The apparatus, intended for the determination of m. p. $< 300^\circ$, is trustworthy at temp. $> 50^\circ$. A brass block has a vertical thermometer socket and inclined tubes for the capillaries for the samples. It is inserted in a hole in a piece of asbestos board supported by a brass ring and shielded from draughts by a Pyrex glass sleeve.

C. I.

Leads and the formula in electric calorimeter calibration. W. P. WHITE (Rev. Sci. Instr., 1935, [ii], 6, 142—143).—A formula for calculation of the energy lost in the leads is deduced.

C. W. G.

Application of low-temperature calorimetry to radioactive measurements. F. SIMON (Nature, 1935, 135, 763).—The possibility of using the increased sensitivity of calorimetric measurement resulting from the use of very low temp. for radioactive measurements is illustrated.

L. S. T.

Thermal ratios and measurement of the tube apparatus for exothermic heterogeneous gas catalysis. W. LEITENBERGER (Chem. App., 1934, 21, 113—116, 121—123, 133—135; Chem. Zentr., 1934, ii, 3536).—Theoretical.

R. N. C.

Dispersion curves of some reflecting power standards of use in the microscopic study of metallic minerals. J. ORCEL and P. FASTERÉ (Compt. rend., 1935, 200, 1485—1488).—By a photo-electric method previously described (Bull. Soc. Franç. Min., 1930, 53, 301), the reflecting powers for different λ have been determined for the following standards: diamond, blende, galena, grey Cu, Si, and pyrites.

M. S. B.

Measurement of spectral distribution of intensity of fluorescence of Röntgen screens and intensifiers. H. FUNK and H. STEPS (Z. tech. Phys., 1934, 15, 301—306; Chem. Zentr., 1935, i, 113).—A photometer for weak fluorescent or phosphorescent sources is described. The spectrum of the fluorescent light is independent of the λ of the X-rays.

J. S. A.

Bollenrath optical dilatometer. W. KOCH (Metallwirts., 1934, 13, 671—672; Chem. Zentr., 1935, i, 149; cf. B., 1934, 765).—An improved form is described. The reported allotropic transition of Bi at 75° does not occur.

J. S. A.

Use of photographic plates with thick emulsion layers in studying the distribution of radioactive elements in natural objects. V. I. BARANOV and S. I. KRETSCHMER (Compt. rend. Acad. Sci. U.R.S.S., 1935, 1, 543—549).—A review of the technique and its applications.

H. J. E.

Selenium-sulphur rectifier photo-electric cell. G. P. BARNARD (Proc. Physical Soc., 1935, 47, 477—501).—The construction of a new type of cell, its theory, an investigation of its physical behaviour, and equations for its performance are given.

N. M. B.

Use of photo-electric apparatus in chemistry.—See B., 1935, 558.

X-Ray goniometer for the investigation of crystal structures of solidified gases. W. H. KEESOM and K. W. TACONIS (Proc. K. Akad. Wetensch. Amsterdam, 1935, 38, 375).—The method has been developed for those cases in which the Debye-Scherrer method yields insufficient data. Single crystals are grown by very slow crystallisation of liquid, and two exposures are made on the same film of the camera, in the second the film being continuously moved in the direction of the camera axis, as in Weisenberg's goniometer. For C_2H_4 the rhombic cell contains 2 mols., a 6.46, b 4.87, c 4.14 Å. at -175° ; d 0.717.

R. S. B.

Automatic high-pressure cloud chamber. W. M. BRUBAKER and T. W. BONNER (Rev. Sci. Instr., 1935, [ii], 6, 143—145).—A mixture of CH_4 and EtOH at 20 atm. is used.

C. W. G.

Electron diffraction camera. L. H. GERMER (Rev. Sci. Instr., 1935, [ii], 6, 138—142).

C. W. G.

Calculation of p_H values. W. R. ATKIN and F. C. THOMPSON (J. Soc. Leather Trades Chem., 1935, 19, 140—148).—Methods of calculation applicable to various acids, bases, and salts are given.

D. W.

Powder method of electronography. N. A. SCHISCHAKOV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 1, 461—463).—A process of fractional sedimentation of powders in a 1 m. long air tube is described. All particles above 0.1—1 μ in size settle in 20 min. The remaining suspended material is collected on a thin celluloid film as a holder, and exposed to the cathode beam, satisfactory powder photographs being obtained.

H. J. E.

Electrometric titration. Device for automatically stopping at a predetermined end-point. W. E. SHENK and F. FENWICK (Ind. Eng. Chem. [Anal.], 1935, 7, 194—197).—The sharp change in e.m.f. between two dissimilar electrodes at the end-point is utilised to operate a valve relay device controlling the burette.

J. S. A.

Direct reading p_H meter for glass, quinhydrone, and hydrogen electrodes. A. HEMINGWAY (Ind. Eng. Chem. [Anal.], 1935, 7, 203—205).

J. S. A.

Completely superconducting galvanometer. E. F. BURTON, H. G. SMITH, and F. G. A. TARR (Nature, 1935, 135, 906).

L. S. T.

Rapid practical method of demagnetisation involving high frequency. C. W. DAVIS (Nature, 1935, 135, 790—791).—The method can be used for determining the magnetic properties of powders, for testing Fe and steel bars, and in processes involving magnetic separation of ores.

L. S. T.

Apparatus for carbon dioxide determination according to Pettenkoffer. P. S. TUTUNDZIC (Bull. Soc. Chim. Yougoslav., 1934, 5, 151—154).

R. T.

Automatic pipette for rapid delivery. W. T. FORSEE, jun., P. J. THOMPSON, and C. B. POLLARD (Ind. Eng. Chem. [Anal.], 1935, 7, 156).

J. S. A.

Improved slow-combustion pipette for gas analysis. D. J. PORTER and D. S. CRYDER (Ind. Eng. Chem. [Anal.], 1935, 7, 191—192).—The gas is

led through a Pt capillary containing a concentric Pt wire, on to an electrically heated Pt spiral.

J. S. A.

Burette assembly for standard reducing solutions. C. J. SCHOLLENBERGER (Ind. Eng. Chem. [Anal.], 1935, 7, 199).

J. S. A.

Gas analysis apparatus.—See B., 1935, 530.

Construction of glass helices for fractionating column packing. E. E. ROPER, G. F. WRIGHT, J. R. RUHOFF, and W. R. SMITH (J. Amer. Chem. Soc., 1935, 57, 954—955).—Details are given for making helices for the column of Wilson *et al.* (cf. A., 1933, 926).

R. S. C.

High-speed oil-diffusion pump. H. W. EDWARDS (Rev. Sci. Instr., 1935, [ii], 6, 145—147).—Stream lines on the high-pressure side and baffles on the low-pressure side enable a speed of 50 litres per sec. to be reached at a pressure of 10^{-4} mm.

C. W. G.

Possible improvement of Walpole's comparator blocks. M. DÉRIBÉRE (Ann. Chim. Analyt., 1935, [iii], 17, 149—150).—Tubes of rectangular cross-section are suggested.

A. G.

Rotating sphere viscosimeter for liquids. A. GUILLET (Compt. rend., 1935, 200, 1522—1524; cf. this vol., 467).—Theoretical.

H. J. E.

Apparatus for measuring the viscosity of liquids at high pressures. C. C. MASON (Proc. Physical Soc., 1935, 47, 519—520).—An instrument covering a wide range of viscosities, suitable for determining the pressure coeff. of viscosity and investigating temp. effects, is described.

N. M. B.

Circulatory stirrer. W. PFLUGBEIL (Chem.-Ztg., 1935, 59, 389).—The liquid is caused to pass vertically up a glass cylinder surrounding the stirrer and to flow downwards in the outer portion of the beaker, or alternatively it may be made to circulate in the opposite direction. This vertical circulation ensures efficient mixing of liquids of different density.

D. R. D.

Manometer for measuring small pressure differences in gases and vapours at any initial pressure. H. SCHULTES and K. NEUMANN (Chem. Fabr., 1935, 8, 197—198).—Pressure changes are measured by the displacement of an air bubble in a horizontal capillary, using a modification of Henry's method (Compt. rend., 1912, 155, 1078). The method is suitable for measuring rates of adsorption.

H. J. E.

Emergency stopper for nitric acid bottles. D. HARRIS (Ind. Eng. Chem. [Anal.], 1935, 7, 162).—Al foil may be used; it undergoes no corrosion.

J. S. A.

Manometric manostat. G. B. BACHMAN (Ind. Eng. Chem. [Anal.], 1935, 7, 201).—An electrically operated device is described.

J. S. A.

Filtration of hot solutions. G. R. YOHE (Ind. Eng. Chem. [Anal.], 1935, 7, 206).—The liquid is maintained at const. level in the filter by an electrically heated siphon.

J. S. A.

Simple laboratory stirrer for use on vacuum line. G. T. AUSTIN (Ind. Eng. Chem. [Anal.], 1935, 7, 206).—A simple air turbine is described.

J. S. A.

Extraction test-tube. H. BARSCH (Z. anal. Chem., 1935, 101, 194—195).—A stoppered test-tube, with a side tap, is described.

J. S. A.

Apparatus for fractional solidification. R. PADMANABHAN (J. Indian Chem. Soc., 1935, 12, 197).—The apparatus operates at low temp., and H_2O is excluded. An immersion filter, *F*, is placed in the mixture, *M*, in a wide test-tube, *T*, surrounded by the freezing bath, and the stem of *F* passes through a cork *C* attached to the top of *T* by wide rubber tubing. A $CaCl_2$ tube and thermometer also pass through *C*. After part of *M* has solidified, the excess of pressure in *F* is changed to a deficiency and the fluid portion of *M* is thus removed.

J. G. A. G.

Pressures of 5000 kg. per sq. cm. I. Fundamental determination of the effective cross-section of the pressure balance. H. EBERT (Physikal. Z., 1935, 36, 385—388).—The construction of a differential pressure balance and the determination of the effective cross-section are described.

A. J. M.

Simple lecture apparatus for demonstration of the Peltier effect. H. ČECH (Physikal. Z., 1935, 36, 415—416).

A. J. M.

Equivalents. F. H. VAN LEENT (Chem. Weekblad, 1934, 31, 777—778).—The author advocates the extended use of equiv. wts. rather than at. and mol. wts., and of formulæ such as K_2O, Mn_2O_7 rather than $KMnO_4$, particularly in the teaching of chemistry.

H. F. G.

Chinese influence on Western alchemy. W. H. BARNES (Nature, 1935, 135, 824—825).

L. S. T.

Origin of chemistry: definition of flame. J. R. PARTINGTON (Nature, 1935, 135, 916).—Historical.

L. S. T.

Geochemistry.

Recent development of geochemistry. W. VAN TONGEREN (Chem. Weekblad, 1935, 32, 304—317).—A review.

D. R. D.

Sampling apparatus and composition of air in the stratosphere. A. LÉPAPE and G. COLANGE (Compt. rend., 1935, 200, 1340—1342).—An automatic sampling globe, with arrangements for recording time, pressure, and temp. of sampling, is described.

The O_2 is determined by absorption and circulation over heated Cu in a special apparatus.

N. M. B.

Jugoslavian iodine-containing mineral waters. S. MIHOLIĆ (Bull. Soc. Chim. Yougoslav., 1934, 5, 155—177).—Petroliferous strata in Jugoslavia are located along the former sea-coast. Analytical data are given for the mineral H_2O of these strata.

R. T.

Mineral water of Strumicka Banja. D. KENIG (Bull. Soc. Chim. Yougoslav., 1934, 5, 179—187).—Analytical data are recorded. R. T.

Deuterium content of naturally occurring water. A. J. EDWARDS, R. P. BELL, and J. H. WOLFENDEN (Nature, 1935, 135, 793).—The increase in d following the electrolysis of tap- H_2O gives a val. of 6220 ± 300 for H/D. L. S. T.

Physico-chemical variables in a Minnesota lake. H. J. COSTING (Ecol. Monog., 1933, 3, 493—533).—Local and daily variations in pH , total CO_2 and free CO_2 contents of lake- H_2O are recorded. Soil samples from areas filled in by decomp. of plant residues consisted largely of marl (I) with a low % of org. matter (II). High (II) in the substratum was usually accompanied by a still higher (I) content. CH. ABS. (p)

Slovenian mineral springs and travertine. S. PRÁT, J. HAMÁČKOVÁ, and J. VOLKO-STAROHORSKÝ (Sborn. Masaryk. Akad. Práce, 1934, 8, No. 5, 1—19; Chem. Zentr., 1935, i, 42).—The influence of physical and biological factors on the mineral content of spring waters, and on the rate and structure of sediment deposition, is discussed. J. S. A.

Iodine mineral waters in Jugoslavia. S. MIHOLIĆ (Bull. Soc. Chim. Yougoslav., 1934, 5, 155—177).—Analyses of I waters in petroleum-bearing strata are given. C. W. G.

Carbonated spring water from Burgenland. E. DITTLER and R. DWORZAK (Chem. Erde, 1935, 9, 269—285).—Analysis shows considerable Na, Mg, SO_4 , and free CO_2 . The Mg is probably derived from the underlying serpentine. L. J. S.

Heavy water content of French and other mineral waters. K. HANSEN, E. RUSTUNG, and J. HVEDING (J. Pharm. Chim., 1935, [viii], 21, 538—541).—The % of D_2O in various medicinal waters, determined by d (flotation method) after purification by repeated distillation (κ 1.1— 3.89×10^{-6} ohms $^{-1}$), is the same as that in ordinary H_2O . J. W. B.

Data in oceanographical chemistry. N. M. CARTER, E. G. MOBERG, T. SKOGSBERG, and T. G. THOMPSON (Proc. 5th Pacific Sci. Congr., 1934, 1933, 2123—2127).—A review and discussion of methods of reporting data. CH. ABS. (e)

Diffusion and reactions in solids. P. ESKOLA (Bull. Comm. géol. Finlande, 1934, No. 104, 144—156; Chem. Zentr., 1935, i, 192).—A discussion of solid reactions under pressure with reference to petrological problems. H. J. E.

Chemical structure of the earth. I. I. SASLAVSKI (Compt. rend. Acad. Sci. U.R.S.S., 1935, 1, 537—543).—A discussion of data. H. J. E.

Age of uraninite and monazite from the pegmatic seams in North Carelia. A. N. LABUNTZOV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 1, 646—648).—The Pb from uraninite (U 61.14, Pb 18.10%) has a mean at. wt. of 206.06 corresponding with the at. wt. of its isotope Ra-G. From this the age of uraninite is 2.125×10^6 years. From the at. wt. of Th contained in monazite the age of the monazite is 2.114×10^6 years. W. R. A.

Analysis and optical properties of thoreaulite. J. MELON (Bull. Acad. roy. Belg., 1935, [v], 21, 473—475).—Thoreaulite (Ta_2O_5, SnO_2) gave on analysis Ta_2O_5 72.83, SnO_2 21.88, SiO_2 1.85, Fe_2O_3 0.50, Al_2O_3 1.02, CaO 1.28%, and traces of Nb_2O_5 , Sb_2O_5 , MnO, and MgO. The mineral has high refractive index, is clinorhombic, and has hardness 6 and d 7.6—7.9. W. R. A.

Structures of vermiculites and their collapse by dehydration. J. W. GRUNER (Amer. Min., 1934, 19, 557—575).—The formula is $(OH)_2(Mg, Fe)_3(Si, Al, Fe)_4O_{10} \cdot 4H_2O$. The crystal is monoclinic holohedral (a_0 5.3, b_0 9.2, c_0 28.57—28.77 Å.; probable space-group C_{2v}^6 ; 4 mols. per unit cell). The structure consists of $(OH)_4Mg_6(Si, Al)_8O_{20}$ sheets with alternate layers of $8H_2O$ occupying a space 4.9 Å. thick. Half the H_2O can be driven off at 110° without essential change in the powder diagrams, but at 750° a collapse of the talc structure occurs. CH. ABS. (e)

Porphyry from the Gulf of Bothnia. P. ESKOLA (Bull. Comm. géol. Finlande, 1934, No. 104, 111—127; Chem. Zentr., 1934, ii, 3493).—The minerals are described. H. J. E.

Mineralogy and genesis of the Mayville iron ore of Wisconsin. J. E. HAWLEY and A. P. BEAVAN (Amer. Min., 1934, 19, 493—514).—The characteristics of the ore deposit are described and discussed. CH. ABS. (e)

Geological geophysical prospecting for bituminous shale deposits in the Lower Volga area, particularly in the Obshchi Suirt district. N. M. POPOV. **Prospecting for bituminous shale in the Ozinki-Tshair Lower Volga district.** I. I. KROMM (Bit. Shale and Tech. Utilisation, 1932, 45—71, 82—88).—Analyses are recorded and discussed. CH. ABS. (e)

Content of rare elements in igneous rocks. E. TRÖGER (Chem. Erde, 1935, 9, 286—310).—The average contents of Ti, Mn, Ba, Sr, Zr, Cr, Li, V, Ni, P, S, F, and Cl given by published analyses are tabulated for different types (acid to basic) of rocks. L. J. S.

Minor chemical constituents of some igneous rocks. G. A. HARCOURT (J. Geol., 1934, 42, 585—600).—Spectroscopic data for 14 granites are recorded. Ba, Sr, Mn, B, and Cr were found in nearly all; Sn, Pb, and Ag were present in half, and Co in one specimen. CH. ABS. (e)

X-Ray study of narsarsukite, $Na_2(Ti, Fe)Si_4O_{11}$. B. E. WARREN and C. R. AMBERG (Amer. Min., 1934, 19, 546—548).—The mineral is tetragonal (a 10.74, c 7.90 Å.; 4 mols. per unit cell; space-group S_6^2 , C_4^1 or C_4^2). CH. ABS. (e)

Unmixing of chalcopyrite from sphalerite. N. W. BUERGER (Amer. Min., 1934, 19, 525—530).—Polished sections 1 mm. thick were heated in vac. at 200 — 500° and cooled rapidly. At 350 — 400° small blebs of chalcopyrite (I) appeared in the sphalerite (II) in the region of the larger masses, indicating the unmixing of a solid solution of (I) in (II). CH. ABS. (e)

Synthesis of spinels. A. BAZILEVICH (Min. Suir., 1934, 9, No. 9, 25—30).—The powdered oxide mix-

ture was formed into cubes and heated for 2 hr. at the following optimum temp.: $\text{MgO, Al}_2\text{O}_3$, 1600—1750°; $\text{MgO, Cr}_2\text{O}_3$, 1600—1700°; $\text{MgO, Fe}_2\text{O}_3$, 1350°; forsterite, formed in presence of SiO_2 , 1400—1600°. At higher temp. vitrification occurs. Al spinel has abrasive properties equal to those of pumice stone. It is a promising refractory material. CH. ABS. (e)

Pyrites in quartz. F. BRECH (Nature, 1935, 135, 917).—Unusual features of Brazilian quartz containing pyrites inclusions are described. L. S. T.

Chemical composition of tschewkinite. I. P. ALIMARIN (Compt. rend. Acad., Sci. U.R.S.S., 1935, 1, 648—653).—The empirical formula, $\text{R}^{\text{I}}\text{R}^{\text{II}}\text{R}^{\text{III}}\text{R}^{\text{IV}}\text{O}_{10} \cdot x\text{H}_2\text{O}$, is derived from analysis. W. R. A.

Spectral analysis of tektites. E. PREUSS (Chem. Erde, 1935, 9, 365—418; cf. A., 1934, 988).—Tektites and SiO_2 -glass from various localities were examined by the method of Mannkopff and Peters (A., 1931, 991). No definite conclusion as to the origin of these bodies can be reached. L. J. S.

Petrogenesis of the Franconian Wellenkalk. P. SCHMITT (Chem. Erde, 1935, 9, 321—364).—Descriptions with chemical analyses of the limestones and dolomites of the Wellenkalk (Triassic) formation. L. J. S.

X-Ray examination of turquoise. K. F. MAYER (Chem. Erde, 1935, 9, 311—317).—X-Ray powder photographs of turquoise from several localities and of artificial material show similar patterns. A somewhat similar pattern is also shown by wavellite and chalcosiderite. L. J. S.

X-Ray examination of turquoise and other phosphates. H. JUNG (Chem. Erde, 1935, 9, 318—320).—A discussion of the preceding paper. L. J. S.

Copper minerals of Kinsenda (Belgian Congo). I. Bornite-chalcopyrite associations. M. GYSIN (Arch. Sci. phys. nat., 1935, [v], 17, Suppl., 24—27).—The deposits consist of lamellæ of chalcopyrite separated by grains of bornite. The genesis of the minerals is discussed. A. J. M.

Constitution of sepiolite from Ampandrandava. H. LONGCHAMBON (Compt. rend., 1935, 200, 1607—1610).—From the composition, cryst. structure, and physico-chemical properties, the formula $(\text{Mg, H}_2)_3\text{Si}_4\text{O}_{11} \cdot \text{H}_2\text{O} \cdot z\text{H}_2\text{O}$ is suggested for this compound, the term $z\text{H}_2\text{O}$ representing the zeolitic H_2O . J. W. S.

Properties of sepiolite from Ampandrandava. H. LONGCHAMBON (Compt. rend., 1935, 200, 1331—1333; cf. preceding abstract).—Curves for dehydration and transition of form are given and discussed. N. M. B.

Constitution of senonian phosphates from Syria. L. CAYEUX (Compt. rend., 1935, 200, 1553—1555).—The forms of phosphates from three localities have been examined and are discussed with reference to the origin of the deposits. J. W. S.

Orthitic granites of South-West Karamazar. A. L. LISOVSKI (Compt. rend. Acad. Sci. U.R.S.S., 1935, 1, 588—592).—A discussion of the geological structure of the region. H. J. E.

Orthites in mid-asiatic rocks. N. POROKOPENKO (Compt. rend. Acad. Sci. U.R.S.S., 1935, 1, 532—536).—The occurrence of the minerals is described. H. J. E.

[Description of various minerals.] R. KOEHLIN (Zentr. Min., 1934, A, 256—266; Chem. Zentr., 1934, ii, 3493).—Data are recorded for laurionite, zeophyllite, phosphosiderite, euclase, and other minerals. H. J. E.

Nickel deposits associated with diabase in Nassau. F. AHLFELD (Sitzungsber. Ges. Beförd. ges. Naturwiss. Marburg, 1933, 68, 93—122; Chem. Zentr., 1934, ii, 3494).—The deposits are described. Their origin and development are discussed. H. J. E.

Occurrence of vivianite in the District of Columbia. J. H. BENN (Amer. Min., 1935, 20, 311—312).—The vivianite occurs at Washington as small blue masses embedded in clay. It is associated with limonite and muscovite. L. S. T.

Amphibole from the Purcell sills, British Columbia. H. M. A. RICE (Amer. Min., 1935, 20, 307—309).—Partial analyses and optical properties of the two different types of amphibole which occur in the Purcell sills are recorded. L. S. T.

Mineragraphy and X-ray analysis of stainierite from the Swansea mine, Goodsprings, Nevada. S. R. B. COOKE and D. J. DOAN (Amer. Min., 1935, 20, 274—280).—X-Ray data show that the Co in the ore is present as stainierite (I), $\text{Co}_2\text{O}_3 \cdot \text{H}_2\text{O}$, the cryst. form of heterogenite, with which it has sometimes been confused. (I) occurs in the ore as two varieties, one cryst. and anisotropic and the other cryptocryst. and isotropic. X-Ray data show no essential differences between the two varieties. Both are slowly sol. in cold HCl. The crude ore contains 1.23% of Co. L. S. T.

Granite, pegmatite, and replacement veins in the Sheahan Quarry, Graniteville, Missouri. C. TOLMAN and S. S. GOLDICH (Amer. Min., 1935, 20, 229—239).—The granite (I), pegmatite (II), and replacement veins are genetically related. (I) consists of quartz, albite, orthoclase, microcline, and a small amount of accessory minerals. Secondary minerals include magnetite, muscovite, fluorite, sericite, chlorite, calcite, hæmatite, and pyrite. (II) is complex. Perthite and quartz represent the magmatic stage, whilst hydrothermal minerals are topaz, muscovite, albite, beryl, biotite, rutile, cassiterite, sericite, fluorite, pyrite, chalcopyrite, and galena. Chemical analyses for (I), perthite, beryl, and muscovite are given. L. S. T.

Alteration of the lavas surrounding the hot springs in Lassen Volcanic National Park, California. C. A. ANDERSON (Amer. Min., 1935, 20, 240—252).—The blue-black basalts, the grey pyroxene andesites, and the pale grey dacites are all bleached and decomposed to white, and rarely to yellow, brown, and red, products. Opal (I) accompanied by minor amounts of kaolin (II) and alunite is the chief product in the altered exteriors of lava fragments where active decomp. is taking place. The muds from the hot spring basins usually contain

more (II). Tridymite, residual in part, but largely secondary, is also formed. The various types of alteration products appear to be related to the concn. of the H_2SO_4 . A high concn. favours the formation of (I) and a low concn. that of (II).

L. S. T.

Johannite from Joachimsthal and Colorado. M. A. PEACOCK (Z. Krist., 1935, 90, 112—119).—A morphological study.

B. W. R.

Pectolite. M. A. PEACOCK (Z. Krist., 1935, 90, 97—111).—Triclinic symmetry, found by X-ray examination, is confirmed.

B. W. R.

Distribution of selenium in nature. L. W. STROCK (Amer. J. Pharm., 1935, 107, 144—157).—The Se contents of magmatic rocks, sulphides of hydrothermal origin, caliche, sea- H_2O , sedimentary Fe ores, and pyrites are given and the biological and geological significance of the Se absorption by plants and $Fe(OH)_3$ is discussed (cf. B., 1934, 418).

E. H. S.

Chemico-mineralogical characters of the tertiary eruptive rocks of Kabylie de Collo (Dept. of Constantine, Algeria). M. ROUBAULT (Compt. rend., 1935, 200, 1488—1490).—All the rocks are rich in quartz and consist of the types occurring generally in North Africa.

M. S. B.

Bowlingite. (MLLE.) S. CAILLÈRE (Compt. rend., 1935, 200, 1483—1485).—Two specimens of bowlingite (I), a hydrated silicate of Fe, Mg, and Al, have been examined chemically and the results compared with an analysis of saponite (II). The analogy is confirmed by thermal and X-ray analysis. On dehydration by calcination, recrystallisation begins at 810° and indications of the X-ray diagram of enstatite appear. The change is complete at 910° and the product becomes slightly magnetic. At higher temp. still the definite formation of magnetite is observed. The products of calcination of (II) are similar. (I) is apparently a fibrous variety of (II). A sample of diabantite behaved similarly in all respects to (I).

M. S. B.

Measurement of geological time. A. HOLMES (Nature, 1935, 135, 680—683).—Mainly a discussion of the application of radioactive methods to the determination of the age of igneous rocks.

L. S. T.

Isotope ratio in petroleum. N. S. FILIPPOVA (J. Chem. Physics, 1935, 3, 316; cf. Dole, A., 1934, 853, 1185).—The H_2O obtained by burning a motor-petroleum from Machach-Kala in a calorimetric bomb contained 1.5 parts of D per 5000 of H compared with 1 : 5000 in distilled H_2O . If the O_2 used for combustion had an increased concn. of heavy O_2 the val. given for the ratio would have to be reduced.

M. S. B.

Petrographic characters of the Permian coals of the Belgian Congo. A. DUPARQUE (Compt. rend., 1935, 200, 1490—1492).—The coals are very similar in character to bituminous Westphalian coals and stand between spore or cuticle coals and cannel coal.

M. S. B.

Microscopic structure of coals of the Kousnetzsk basin. M. D. ZALESKI and H. T. TSCHIRKOVA (Bull. Acad. Sci. U.R.S.S., 1934, 1319—1324).—The coal described is an old earthy peat composed mainly of a brownish-red jelly-like material with dispersed micrococci and fragments of modified wood (*Dadoxylon mungaticum*, Zal., and, probably, *Mesopitys Tchihatcheffi*, Goepfert).

T. H. P.

Classification of coals. W. A. BONE (Nature, 1935, 135, 910—911).—A criticism of the Stopes nomenclature.

L. S. T.

Classification of coals. R. LESSING (Nature, 1935, 135, 911).—A reply to criticism (cf. above).

L. S. T.

Evaluation of experimental data for slate and greywacke soils. R. GANSEN and K. UTESCHER (Mitt. Lab. preuss. geol. Landesanst., 1934, 20; Chem. Zentr., 1935, i, 42).—A method is given for calculating the transport of individual soil components.

J. S. A.

Organic Chemistry.

Electronic theory and organic chemistry. II. Structure of open-chain unsaturated organic compounds. V. RASUMOVSKI (Bull. Soc. chim., 1935, [v], 2, 762—788).—The electronic theory of valency previously developed (this vol., 431) is applied in detail to various unsaturated open-chain hydrocarbons and cyclic systems, especially in relation to the reactivity of the various possible electromerides. The following phenomena are discussed on this basis, predictions in all cases being in harmony with experimental data: the greater reactivity of C_2H_4 than of C_2H_2 in additive reactions; *cis-trans* isomerism of C_2H_4 derivatives; the isomerisation of $CHPr^{\delta}:CH_2$ and $CPr^{\delta}:CH$ contrasted with the stability of $CMe_2:CH_2$; the greater reactivity of C_2H_4 and of cyclohexane than of C_6H_6 , and the smaller stability of cyclooctatetraene; the greater reactivity of C_8H_6 than of $(CPh_2)_2$ or of C_5H_5N ;

the order of free radical stability $Me < CHPh_2 < CPh_3$, and the orientation of substitution in C_6H_6 and $C_{10}H_8$.

J. W. B.

Isomerisation of *n*-heptane. G. CALINGAERT and D. T. FLOOD (J. Amer. Chem. Soc., 1935, 57, 956).—Pyrolysis of *n*- C_7H_{16} by $AlCl_3$ at 100° gives a mixture containing 1% of *n*- C_6H_{14} and 4% of β -methylhexane, but no other isomeric heptane.

R. S. C.

Index of unsaturation of ethylenic compounds. VOLMAR and WAGNER (Bull. Soc. chim., 1935, [v], 2, 826—844).—Using Farnsteiner's gravimetric method (Br in Et_2O at -10° and weighing the additive Br compound) as a standard, the various lit. methods for determination of the index of unsaturation have been tested with ethylenic hydrocarbons ($C_{16}H_{32}$), alcohols ($CH_2:CH:CH_2:OH$), bromides ($CH_2:CH:CH_2Br$), and acids (oleic, linoleic,

and $\text{CHPh:CH}\cdot\text{CO}_2\text{H}$) and diallylbarbituric acid. The following are the main conclusions. I must be added at 15–25°, and Br at < 0°. Addition of I without a catalyst (Margosches *et al.*, A., 1924, ii, 575) is often incomplete, and is useless when negative groups are present, since these greatly reduce the activity of the double linking. Hübl's method (I-HgCl₂) is applicable for small indices, but fails in presence of acids containing >1 double linking, and cannot, therefore, be used for drying oils. SCN is more reactive than I and is satisfactory for ethylenic hydrocarbons, but gives low vals. in other cases. Wijs' method (ICI) is satisfactory for open-chain derivatives, but not for bromides. Of methods using IBr that of Hanus (A., 1902, ii, 112) is best, but is not applicable to aromatic unsaturated acids. Winkler's method (A., 1925, ii, 446) is satisfactory for the usual oils, soaps, and resins, but the presence of two non-miscible phases is an objection and it gives low results with aromatic compounds. The method of Volmar *et al.* (B., 1928, 236) is trustworthy in all cases, requires no blank determination, and is capable of use in micro-determinations.

J. W. B.

Action of bromine on butadiene.—See this vol., 827.

$\alpha\epsilon$ -Dibromo-*n*-pentane. A. MÜLLER (Ber., 1935, 68, [B], 1013).—The contamination of $\alpha\epsilon$ -dibromo-*n*-pentane with PhCN described by Johnson (A., 1934, 55) is due to removal of H₃PO₄ previous to heating the product of the action of 1-benzoylpiperidine and PBr₅ with HBr. If the directions of von Braun *et al.* (A., 1905, i, 341) are followed, the product reacts readily with Mg.

H. W.

Bromo-derivatives of olefines C₈ to C₁₁. M. TUOR (Compt. rend., 1935, 200, 1418–1420).—Reaction does not occur between the olefines and HCl at 20°, whilst with HI the change is not sufficiently rapid to avoid dissociation leading to polyhalogenated compounds. Saturation of olefines with dry HBr at 0°, followed by treatment of the product with ice-H₂O-Et₂O, washing with aq. K₂CO₃ at 0°, and desiccation with CaCl₂, leads to the following compounds: β -bromo- γ -methylheptane, b.p. 69°/12 mm.; δ -bromo- $\beta\delta$ -dimethylhexane, b.p. 67°/15 mm.; β -bromo- $\beta\epsilon$ -dimethylhexane, b.p. 64°/15 mm.; δ -bromo- $\beta\delta$ -dimethylheptane, b.p. 80°/15 mm.; ϵ -bromo- $\beta\epsilon$ -dimethylheptane, b.p. 83°/16 mm.; β -bromo- $\beta\gamma\epsilon$ -trimethylhexane, b.p. 79°/15 mm.; δ -bromo- $\beta\delta$ -dimethyloctane, b.p. 93°/15 mm.; δ -bromo- $\beta\delta\zeta$ -trimethylheptane, b.p. 83°/15 mm.; δ -bromo- $\beta\delta\eta$ -trimethyloctane, b.p. 98°/11 mm. The monobromides are readily hydrolysed to the corresponding alcohols, the b.p. of which are about 40–50° > those of the olefines. Separation of mixtures of olefines with saturated and benzenoid hydrocarbons of similar b.p. is effected by the action of HBr followed by hydrolysis and distillation, whereby the corresponding alcohol is readily isolated; benzenoid and saturated hydrocarbons are not attacked and are separated by use of HNO₃. Olefines suspended in very dil. H₂SO₄ are converted by KBr-KBrO₃ into non-distillable dibromides which are sufficiently pure to be useful in separations.

H. W.

Natural and synthetic $\Delta^{\beta\gamma}$ -hexenol. S. TAKEI, T. IMAKI, and Y. TADA (Ber., 1935, 68, [B], 953–956).—Sorbic acid is reduced by Na-Hg in H₂O to hydrosorbic acid (*p*-iodophenacyl ester, m.p. 92°), the Et ester, b.p. 165–168°, of which is converted by Na and EtOH into Δ^{β} (or Δ^{γ})-hexenol, b.p. 153–156° (4'-iododiphenylurethane, m.p. 155–156°). Et sorbate similarly affords a Δ^{γ} -hexenol (4'-iododiphenylurethane, m.p. 148°; 3:5-dinitrobenzoate, m.p. 28°). The identity of these hexenols with that obtained from the leaves of fresh green tea (probably *trans*- Δ^{γ} -hexenol) is excluded by the differences in odour and the physical consts. of their derivatives.

H. W.

Symmetrical pentanetriol. L. BLANCHARD and R. PAUL (Compt. rend., 1935, 200, 1414–1415).—4-Pyrone is hydrogenated incompletely and with difficulty in presence of Pt-black or of Ni as customarily obtained. In presence of Ni prepared by Raney's technique it is rapidly transformed into tetra- and thence into hexa-hydropyrone (I), b.p. 90°/19 mm., which affords $\alpha\gamma\epsilon$ -tribromopentane, b.p. 143°/25 mm., with HBr at 100°. (I) is unattacked by Ac₂O at 200°. Treatment of (I) with an insufficiency of HBr and subsequently with KOAc at 130–140° gives a mixture of acetates hydrolysed by Ba(OH)₂ to *n*-pentane- $\alpha\gamma\epsilon$ -triol, b.p. 188–189°/11 mm. (phenylurethane, m.p. 154°).

H. W.

Polarimetric determination of mannitol. M. FRÈREJACQUE (Compt. rend., 1935, 200, 1410–1412).—Use of As₂O₃ in the polarimetric determination of mannitol (I) is convenient but not highly accurate, since the increments in rotation are small. In presence of >2MoO₃ per mol. (I) has [α]_{D,20}²⁰ +169°. For the determination of (I) in wines etc. the liquid is treated with C and Pb subacetate and centrifuged. After removal of excess of Pb by H₂S and of H₂S by air, the solution is centrifuged and polarised. An aliquot portion is then treated with *N*-H₂SO₄ and 0.1*N*-molybdate and again polarised. The operation in acid solution avoids errors due to mannose or fructose.

H. W.

Polymerisation and ring-formation. XXIV. **Cyclic and polymeric formals.** J. W. HILL and W. H. CAROTHERS. XXV. **Macrocyclic esters.** XXVI. **meta- and para-Rings.** E. W. SPANAGEL and W. H. CAROTHERS (J. Amer. Chem. Soc., 1935, 57, 925–928, 929–934, 935–936; cf. A., 1934, 392).—XXIV. CH₂(OBu)₂ and polymethylene glycols afford α -polyformals, which at 230–250°/low pressure give β - (I) and ω -forms (II). The monomeric (I) are indistinguishable in odour from the corresponding carbonates; e.g., the 17-membered rings have a musk-like odour, but the dimerides are odourless. CH₂(OBu)₂ with OH·[CH₂]₃·OH (III) and OH·[CH₂]₄·OH affords relatively volatile cyclic monomerides. That from (III) is 6-membered (cf. the sugars) and does not polymerise, but the higher membered cyclic monomerides polymerise. The ω -polymerides can be drawn into tough, elastic, oriented (*X*-ray diagrams) fibres. The following *poly-methylene formals* are described: (a) monomerides, tetra-, b.p. 112–117°, and penta-methylene, b.p. 40–44°/11 mm., and triethylene glycol, m.p. 18–

20°; (b) dimerides, deca-, m.p. 93—94°, penta-, m.p. 55—56°, hexa-, m.p. 71—72°, nona-, m.p. 68—69°, and tetradeca-methylene, m.p. 103.5—104°; (c) ω -polymerides, penta-, m.p. 38—39°, hexa-, m.p. 38°, nona-, m.p. 54—55°, deca-, m.p. 56—57°, tetradeca-, m.p. 68—69°, and octadeca-methylene, m.p. 71—72°, and triethylene, a syrup, of which the last is most readily depolymerised (70%).

XXV. Depolymerisation of linear polyesters is rapidly effected by heating to a carefully controlled temp. at 1 mm. with various inorg. catalysts. Mono- and/or di-meric cyclic esters are formed in yields often of 60—75% in 1—2 hr. The following monomerides are described, data in parentheses referring to the corresponding dimerides: (a) *succinates*: *tri*-, b.p. 94—100°/2 mm., m.p. 81° (138°), *tetra*-, b.p. 95—96°/2 mm., m.p. 42° (121°), *penta*-, b.p. 88—89°/1 mm., m.p. 19° (87°), *hexa*-, b.p. 108—110°/2 mm., m.p. —15° (110°), *hepta*-, b.p. 116—118°/1—2 mm., m.p. 49° (86°), *octa*-, m.p. 71° (101°), *nona*-, m.p. 71°, *deca*-, b.p. 135—140°/2 mm., m.p. 58° (109°), *dodeca*-, b.p. 156—159°/2 mm., m.p. 12°, *trideca*-, b.p. 154°/1—2 mm., m.p. 13°, *tetradeca*-, b.p. 167°/2 mm., m.p. 11°, and *octadeca-methylene*, b.p. 199—201°/2 mm., m.p. 13°; *ethylene* (m.p. 131°); (b) *adipates*: *hexa*-, b.p. 117°/2 mm., m.p. 70°, and *nona-methylene*, b.p. 144—146°/2 mm., m.p. 26°; *triethylene glycol*, b.p. 162°/2 mm., m.p. 59°; (c) *azelates*: *ethylene*, m.p. 52° (145°), *tetra*-, b.p. 123—124°/2 mm., m.p. 9°, and *hexa-methylene*, m.p. 59°; (d) *sebacates*: *ethylene*, b.p. 119—123°/2 mm., m.p. 42° (81°), *tri*-, b.p. 130—133°/2 mm., m.p. 7° (110°), *tetra*-, b.p. 136—138°/2 mm., m.p. 6°, *penta*-, b.p. 159—160°/2 mm., m.p. 37°, and *hexa-methylene*, m.p. 47°, and *diethylene glycol*, b.p. 156—157°/2 mm., m.p. 15°; (d) *heptamethylene suberate*, b.p. 158—160°/1—2 mm., m.p. 47°; *ethylene decamethylenedicarboxylate*, b.p. 139—141°/2 mm., m.p. 18° (96°), and *brassyrate*, b.p. 139—142°/1 mm., m.p. —8° (146°); *decamethylene octadecanedicarboxylate*, m.p. 60°. 9—13-membered rings are formed in poorest yields; with higher members there are indications of alternations, with lower yields for rings with an even no. of atoms. Depressions in $[M_n]$ are greatest for 9—14-membered rings, but are occasionally 0 for large rings. Other physical data, including odour, are discussed.

XXVI. $m\text{-C}_6\text{H}_4(\text{O}\cdot\text{CH}_2\cdot\text{CO}_2\text{H})_2$ and polymethylene glycols at 190—210° give resinous, polymeric *esters* (I), $m\text{-C}_6\text{H}_4(\text{O}\cdot\text{CH}_2\cdot\text{CO}_2)_2(\text{CH}_2)_n$; the *nonamethylene* polymeride is cryst., m.p. 35—40°. $p\text{-C}_6\text{H}_4(\text{O}\cdot\text{CH}_2\cdot\text{CO}_2\text{Et})_2$ with glycols and a trace of SnCl_2 at 190—210° gives polymeric *p*-ring *esters* (II) [as (I)]; the *tetra*-, *hexa*-, and *deca-methylene* esters have m.p. 45—50°, 50—55°, and 60—65°, respectively. Depolymerisation by 1—2% of SnCl_2 at 270°/1 mm. affords the following monomeric, cryst. esters [the m.p. given first is that of the *m*-ring ester (I), that given second of the *p*-ring ester (II), and the figures in parentheses the corresponding pure yields %]: *ethylene*, m.p. 100°, — (21, 0); *tri*-, m.p. 134°, — (24, 0), *tetra*-, m.p. 112°, 140° (16, 12), *hexa*-, m.p. 115°, 124° (35, 12), *nona*-, 86°, — (35, —), and *deca-methylene*, m.p. 86°, 58° (35, 18). The smallest *m*- and *p*-rings obtainable have 13 and 16 members, respectively. R. S. C.

Fission of ethyl thiosulphite $\text{S}_2(\text{OEt})_2$. A. MEUWSEN and H. GEBHARDT (Ber., 1935, 68, [B], 1011—1013).—Treatment of $\text{S}_2(\text{OEt})_2$ with NaOEt in warm EtOH causes separation of S and formation of *Et*₂ *sulphoxylate* (I), $\text{S}(\text{OEt})_2$, b.p. 23—24°/17 mm., the action appearing catalytic. (I) is immediately decomposed by $\text{KOH}\text{-MeOH}$ with separation of S. It immediately decolorises Br in CCl_4 and is converted by prolonged treatment with O_2 into Et_2SO_3 .

H. W.

*allo*Telluric acid [esters].—See this vol., 834.

Reaction between esters of organic acids and magnesium isopropyl chloride. II. Ethyl acetate and propionate. D. IVANOV and A. SPASSOV (Bull. Soc. chim., 1935, [v], 2, 816—824).— EtOAc reacts with $\text{MgPr}^\beta\text{Cl}$ (3 mols.) in Et_2O to give a 93% yield of C_3H_8 , the other products depending partly on the method of isolation. Decomp. with NH_4Cl or dil. H_2SO_4 and distillation under reduced pressure gives $\text{OH}\cdot\text{CMePr}^\beta\cdot\text{CH}_2\cdot\text{COPr}^\beta$ (I) (65%) (semicarbazone, m.p. 116—117°; lit. 109°) [dehydrated by I to $\text{CMePr}^\beta\cdot\text{CH}\cdot\text{COPr}^\beta$ (II); hydrolysed by aq. KOH to COMePr^β (III)], and small amounts of (II), (III), EtOAc , and EtOH . Decomp. with NH_4Cl and distillation at atm. pressure affords (III) (60%) and (II); when decomp. is effected with dil. H_2SO_4 (II) is the main product, small amounts of (III) and of $\text{CH}_2\text{Ac}\cdot\text{COPr}^\beta$ (IV) also being obtained. (IV) is obtained in 12% yield under prescribed conditions. With MgEtBr (II) gives β -*dimethyl- ϵ -isopropyl- Δ^2 -n-hepten- ϵ -ol*, b.p. 60—64°/1 mm. (III) with $\text{MgPr}^\beta\text{Cl}$ gives a 70% yield of (I), in agreement with the suggested mechanism of these reactions. EtCO_2Et and $\text{MgPr}^\beta\text{Cl}$ and decomp. with NH_4Cl and distillation under atm. pressure give 73% of C_3H_8 and 48% of COEtPr . In accordance with the suggested mechanism approx. the same % of gas is evolved by the action of MgRX on the ketone, the corresponding ester, or the ketol. J. W. B.

Synthesis of β -chloropropionic acid by condensation of carbonyl chloride with ethylene. A. L. KLEBANSKI and K. K. TSCHEVITSCHALOVA (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 42—47).—Interaction of C_2H_4 and COCl_2 is investigated under many different conditions of temp., pressure, solvents, and catalysts. With AlCl_3 in CS_2 at $< 0^\circ$, $\text{CH}_2\text{Cl}\cdot\text{CH}_2\cdot\text{CO}_2\text{H}$ and acrylic acid are formed.

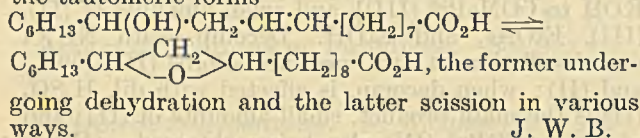
J. L. D.

Catalytic hydrogenation of unsaturated organic compounds by means of selenium.—See this vol., 829.

Reduction [debromination] of fatty acid bromides. W. KIMURA (Fettechem. Umschau, 1935, 42, 78—80).—5*N*- $\text{H}_2\text{SO}_4\text{-MeOH}$ solution in conjunction with Zn is convenient for the debromination of fatty acid bromides to form the corresponding unsaturated Me esters. E. L.

Simultaneous reactions in the pyrolysis of ricinoleic esters and especially of castor oil. I. Mechanism of and optimum conditions for ricinoleic scission. A. BARBOT (Bull. Soc. chim., 1935, [v], 2, 895—910).—In the pyrolysis of castor oil two reactions are superimposed: (a) dehydration to $\Delta^6\alpha$ -

and Δ^{α} -linoleic acids, which then undergo spontaneous polymerisation to a spongy residue and (b) fission into ricinoleic acid (I) and *n*-heptaldehyde (II), and the further scission products, undecenoic acid (III), $\text{CH}_2\text{:CH}\cdot\text{CHO}$, C_8H_{16} , and, probably, $\text{CO}_2\text{H}\cdot[\text{CH}_2]_8\cdot\text{CHO}$, and myristic, palmitic, stearic, and oleic acid. The effect of varying conditions on the relative importance of the two decomp. is studied in detail by analysis of the products at various stages. At 185—190° a little H_2O is evolved, but decomp. into (II) and (III) begins sharply at 285—290°. This temp. and the yields obtained are almost independent of pressure, but (b) increases much more rapidly than (a) with rise of temp. Hence rapid distillation at $> 500^\circ/15\text{--}35$ mm. (conditions prescribed) affords much increased yields of (II) (23—24% of the wt. of the oil, *i.e.*, 82—83% of the theoretical) and (III) (10—14%), although the higher temp. slightly reduces the yield of (III) by favouring its polymerisation. Evolution of H_2O increases 9-fold at the moment of formation of the spongy polymeride. To explain the results it is suggested that (I) exists in the tautomeric forms



Ether-like compounds. XVI. Influence of oxygen in the atomic chain on esterification and hydrolysis. M. H. PALOMAA and K. R. TUUKIMÄKI (Ber., 1935, 68, [B], 887—892).—Examination of the esterification, $\text{OR}\cdot[\text{CH}_2]_n\cdot\text{CO}_2\text{H} + \text{MeOH} \xrightleftharpoons[k_e]{k_s}$ $\text{OR}\cdot[\text{CH}_2]_n\cdot\text{CO}_2\text{Me} + \text{OH}$, catalysed by HCl when $\text{R} = \text{Me}$, Et, Pr^α, Pr^β, Bu^α, or Bu^β and $n = 1, 2, 3$, or 4, shows that k_e is at a pronounced min. when $n = 2$. The nature of R has little influence on k_e or k_s or on the temp. coeffs. Within the limits $n = 1\text{--}4$ the latter are nearly equal and about the same as that of Pr^αCO₂H. The effect of the ratio $\text{H}_2\text{O}\text{--}\text{MeOH}$ in the solvent has been examined. Two extreme cases are recognised, in the first of which the rate of reaction is parallel to that of the mol. concn. of the solvent participating in the change or of its components, whereas in the second the influence of the solvent remains approx. the same over a wide variation of concn. The difference is ascribed to constitutive factors, notably α -substitution. Substances which in a definite reactive solvent fall into the second category are probably solvatised in a high degree. H. W.

Preparation of acetylenedicarboxylic acid from fumaric acid. C. MUSANTE (Gazzetta, 1935, 65, 199—200).—From $(\cdot\text{CHBr}\cdot\text{CO}_2\text{H})_2$ (I) prepared from fumaric acid, the latter is removed by treating an Et₂O extract with aq. KOH, and acidifying the aq. solution. The pure (I) is then treated with KOH—EtOH in the usual way. E. W. W.

Alkaline ceritartarates. M. FOUCHE (Bull. Soc. chim., 1935, [v], 2, 701—707).—Oxidation (O_2) of a solution of cerous *d*-tartrate in 2*N*-KOH (free from K_2CO_3) and evaporation of the solution at $< 50^\circ/\text{vac}$. affords *K d-ceritartarate* (I) $+ 6\text{H}_2\text{O}$, $[\alpha]^{16} + 137.5^\circ$

(crystallographic data), from which ceritartaric acid is liberated by AcOH. The corresponding *K l-ceritartarate*, $[\alpha]^{16} - 137.3^\circ$, is similarly prepared. On the basis of its cryst. form and $[\alpha]$ the structure $[\text{CO}_2\text{K}\cdot\text{CH}(\text{OH})\cdot\text{CH}(\text{CO}_2\text{K})\cdot\text{O}\cdot\text{Ce}\cdot\text{O}]_2$ is suggested for (I). J. W. B.

Synthesis of ascorbic acid and its identity with vitamin-C. S. MARUYAMA (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1935, 27, 59—63).—Synthetic ascorbic acid, prepared according to Reichstein *et al.* (A., 1934, 511), is identical with the natural product in properties and therapeutic activity. F. R. S.

E. Fischer's allomucic acid. T. POSTERNAK (Naturwiss., 1935, 23, 287).—An equimol. mixture of *d*- and *l*-talomucic acids (A., 1892, 299; 1894, i, 218) is identical with the acid which Fischer (A., 1891, 1193, 1444) regarded as allomucic acid and as having the annexed structure. The acid of this structure is as yet unknown; the author expects to obtain it by the oxidation of *d*-allonic acid (A., 1911, i, 14). H. G. M.

Mechanism of aldehyde, ketone, and ester condensations. K. BODENDORF (Ber., 1935, 68, [B], 831—832; cf. A., 1934, 991).—Mainly a reply to Tschelincev (this vol., 472). An electronic explanation of the mechanism is given. H. W.

Determination of formaldehyde. J. H. NORRIS and G. AMPT (J. Soc. Chem. Ind. Victoria, 1933, 33, 801—810).—10 ml. of aq. CH_2O (approx. 4%) is treated with excess of $\text{NH}_4\text{Cl} + 25$ ml. of 0.5*N*-NaOH in a stoppered flask. The excess of alkali is titrated back to $p_H 7.5$ [p_H of aq. $(\text{CH}_2)_6\text{N}_4$] using cresol-red or bromothymol-blue. J. S. A.

Reduction of carbonic acid by means of nascent hydrogen.—See this vol., 833.

Thermal oxidation of formaldehyde. R. SPENCE (Nature, 1935, 135, 961—962).—Packing with powdered Pyrex glass changes the course of the polymerisation and decomp. of CH_2O . The gaseous product is almost exclusively CO_2 instead of CO and H_2O . L. S. T.

Thermal decomposition of acetaldehyde.—See this vol., 827.

Attempts to apply the Tischtschenko reaction to unsaturated aldehydes. E. V. ZAPPI and R. A. LABRIOLA (Anal. Asoc. Quím. Argentina, 1934, 22, 133—142).— $\text{CH}_2\text{:CH}\cdot\text{CHO}$ with $\text{Al}(\text{OEt})_3$ under varying conditions yields polymerides. $\text{CH}_2\text{:CH}\cdot\text{CO}_2\text{CH}_2\cdot\text{CH}\cdot\text{CH}_2$ was not produced. F. R. G.

Ethers of hydroxyaldehydes and their acetals. P. SCHORIGIN and V. KORSCHAR (Ber., 1935, 68, [B], 838—844).—Addition of geraniol to NaOEt in EtOH followed by removal of EtOH and treatment of the product with boiling $\text{CH}_2\text{Cl}\cdot\text{CH}(\text{OEt})_2$ in presence of Cu powder gives $\beta\beta$ -diethoxyethyl geranyl ether (glycollaldehyde geranyl ether Et₂ acetal), b.p. $144^\circ/8$ mm. Similarly, $\text{CH}_2\text{Cl}\cdot\text{CH}_2\cdot\text{CH}(\text{OEt})_2$, NaOH, and the requisite phenol at 100° and subsequently at $160\text{--}170^\circ$ yield the following aryl $\gamma\gamma$ -diethoxy-*n*-propyl ethers, $\text{R}\cdot\text{O}\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{CH}(\text{OEt})_2$, in which $\text{R} =$

Ph (I), b.p. 126°/6 mm., *o*-C₆H₄Me, b.p. 165°/18 mm., *m*-C₆H₄Me, b.p. 150°/5 mm., *p*-C₆H₄Me, b.p. 137°/5 mm., α -C₁₀H₇, b.p. 145°/2 mm., β -C₁₀H₇ (II), b.p. 166°/2 mm., m.p. 24—25°, CH₂Ph (III), b.p. 114°/2 mm., *isoamyl*, b.p. 111°/6 mm. Dil. acids decompose the acetals, R·O·CH₂·CH₂·CH(OEt)₂ + H₂O = R·OH + CH₂·CH₂·CHO + 2EtOH, and Ac₂O causes acetolysis. H₂SO₄, ZnCl₂ in boiling AcOH, or heating at 250° effects condensations of the type, R·O·CH₂·CH₂·CH(OEt)₂ → R·O·CH₂·CH₂·CHO → OR·CH₂·CH₂·CH(OH)·CH(CH₂·OR)·CHO → OR·CH₂·CH₂·CH·C(CH₂·OR)·CHO → OR·CH₂·CH₂·[CH·C(CH₂·OR)]₂·CHO etc. Thus (I) yields the compound (IV) C₆₃H₅₈O₈, in which the presence of 1 CHO is quantitatively established. Titration with Br indicates the presence of about 5 double linkings, the deficiency being due to incomplete elimination of H₂O from OH·CH·CH as established according to Zerevitinov. When treated with red P and conc. HI (IV) gives PhOH and a hydrocarbon CH₂Me·CH[·CMe·CH]₃·CMe₂, b.p. 185—195°/2 mm. The substances C₆₀H₆₂O₇ and C₃₉H₃₂O₄ are obtained from (III) and (II), respectively.

H. W.

Thermal decomposition of acetone vapour.—See this vol., 827.

Action of mixed organomagnesium compounds on aliphatic α -ethylenic ketones. J. COLONGE (Bull. Soc. chim., 1935, [v], 2, 754—761).— $\alpha\delta$. Addition of a Grignard reagent to the conjugated system in aliphatic α -ethylenic ketones ·C''·C'·C·O is favoured by an alkyl substituent on the C' of the olefinic radical, but when C'' is so substituted (with or without α -substitution) only the normal formation of a *tert.*-alcohol is observed. These conclusions are based on the following results: Me α -methyl- Δ^{α} -propenyl ketone with MgMeI affords only $\beta\gamma$ -dimethyl- Δ^{γ} -*n*-penten- β -ol (I), b.p. 53—54°/13 mm. (dehydrated by distillation at 760 mm. to the diene, b.p. 106—108°), but with MgMeBr (I) and a 20% yield of Me $\alpha\beta$ -dimethyl-*n*-butyl ketone are obtained; MgBuBr similarly gives (I) and Me $\alpha\beta$ -dimethyl-*n*-hexyl ketone, b.p. 195—196° (corr.)/755 mm. (*semicarbazone*, m.p. 99—100°). CMeEt·CMe·COMe with the appropriate MgRX gives only the *tert.*-alcohol and thus are obtained $\beta\gamma\delta$ -trimethyl- Δ^{γ} -*n*-hexen- β -ol, b.p. 60—61°/5 mm. (reduced catalytically to $\beta\gamma\delta$ -trimethyl-*n*-hexan- β -ol, b.p. 57—58°/5 mm.), $\gamma\delta\epsilon$ -trimethyl- Δ^{δ} -*n*-hepten- γ -ol, b.p. 70—72°/5 mm., $\delta\epsilon\zeta$ -trimethyl- Δ^{ϵ} -*n*-octen- δ -ol, b.p. 79—80°/4 mm., and $\epsilon\zeta\eta$ -trimethyl- Δ^{ζ} -*n*-nonen- ϵ -ol, b.p. 93—94°/5 mm. CHPr·CMe·COMe with MgMeBr affords mainly $\gamma\delta$ -dimethyl- Δ^{δ} -*n*-octen- γ -ol, b.p. 81—82°/11 mm., and a little Me α -methyl- β -ethyl-*n*-amyl ketone isolated as its *semicarbazone*, m.p. 120°. CMeBu·CH·COBu with MgEtBr gives only $\beta\beta\epsilon\zeta$ -pentamethyl- γ -ethyl- Δ^{δ} -*n*-hepten- γ -ol, b.p. 106—108°/12 mm.

J. W. B.

Influence of hydrogen sulphite solutions on xylose. G. MENZINSKY (Ber., 1935, [B], 822—824).—Xylose is converted by aq. Ca(HSO₃)₂ or aq. NaHSO₃ at 130° under pressure into xylonic acid (brucine salt, m.p. 170—172°, [α]_D²⁰ -37·37° in H₂O; double compound of Cd salt with CdBr₂). H. W.

3 L

Reducing powers of physiologically-important carbohydrates. A. P. WEINBACH and D. B. CALVIN (Science, 1935, 81, 407—408).—The relative and actual reducing vals. of various carbohydrates have been compared using 5 of the newer methods for the determination of glucose (I). The order of reducing power for all methods per unit wt. of carbohydrate is fructose (II) or glucose (I) > arabinose (III) > galactose (IV) > lactose (V) > maltose (VI); the order per mol. is (II) or (I) > (V) > (VI) or (IV) > (III). L. S. T.

Carbohydrates and furfuraldehyde. I. H. BREDERECK (Ber., 1935, 68, [B], 777—783).—The methods employed in the prep. of CPh₃ derivatives are not applicable to furfurylidene compounds. Condensations of carbohydrates with furfuraldehyde (I) at high temp. in presence of CaCl₂, ZnCl₂, etc. are unsatisfactory on account of ready resinification. Small yields are obtained when the components are heated in CO₂ under slightly diminished pressure and these increase to 80% when the liberated H₂O is removed in a small Soxhlet apparatus filled with CaCl₂. (I), as employed, is faintly acid to litmus, doubtless due to HCl which is essential for condensation. α -Methylglucoside and (I) at 160—165°/100—200 mm. yield 4 : 6-furfurylidene- α -methylglucoside (II), m.p. 153—154°, [α]_D²⁵ +84·4° in H₂O, and a substance, m.p. 215—217°. Treatment of (II) with Ac₂O·C₅H₅N affords 4 : 6-furfurylidene- α -methylglucoside 2 : 3-diacetate, m.p. 112—113°, hydrolysed by HCl-EtOH and then converted by CPh₃Cl in C₅H₅N into 6-triphenylmethyl- α -methylglucoside 2 : 3-diacetate, m.p. 163—164°, [α]_D²⁵ +78·0° in CHCl₃, whence 6-triphenylmethyl- α -methylglucoside 2 : 3 : 4-triacetate, m.p. 138°. (II), MeI, and Ag₂O in COMe₂ give 4 : 6-furfurylidene-2 : 3-dimethyl- α -methylglucoside, m.p. 119—120°, [α]_D²⁵ +98·4° in CHCl₃, hydrolysed to 2 : 3-dimethyl- α -methylglucoside, m.p. 82—85°, [α]_D²⁵ +150·2° in H₂O. α -Methylmannoside and (II) similarly afford 2 : 3 : 4 : 6-difurfurylidene- α -methylmannoside, m.p. 182—184°, [α]_D²⁵ +42·45° in CHCl₃, and 4 : 6-furfurylidene- α -methylmannoside (III), m.p. 153—154°, [α]_D²⁵ +64·5° in CHCl₃. Treatment of (III) with Ac₂O·C₅H₅N followed by hydrolysis with 0·5% HCl-EtOH leads to α -methylmannoside 2 : 3-diacetate, m.p. 142—143°, [α]_D²⁵ +32·9° in H₂O. Repeated treatment of (III) with MeI and Ag₂O in COMe₂ followed by hydrolysis and action of CPh₃Cl in C₅H₅N affords triphenylmethyl-dimethyl- α -methylmannoside, m.p. 176°, [α]_D²⁵ +8·1° in CHCl₃, whereas less drastic methylation leads similarly to triphenylmethylmethyl- α -methylmannoside, m.p. 182—183°.

H. W.

Differentiating behaviour of α - and β -methylglucoside towards *p*-toluenesulphonyl chloride and pyridine. K. HESS and H. STENZEL (Ber., 1935, 68, [B], 981—989; cf. this vol., 68).—Treatment of α -methylglucoside (I) with *p*-C₆H₄Me·SO₂Cl (II) in C₅H₅N at 20° (16 days) gives non-cryst. α -methylglucoside 2 : 3 : 4 : 6-tetra-*p*-toluenesulphonate (III), [α]_D²⁰ +44·7° in CHCl₃, +42·0° in COMe₂. With the same ratio of (I) and (II) but at 75° (2 days), the products are 4-chloro- α -methylglucoside 2 : 3 : 6-tri-*p*-toluenesulphonate (IV), m.p. 134—135° [α]_D¹⁹ +39·1° in CHCl₃, [α]_D²⁵ +32·1° in COMe₂, [α]_D²⁵ +42·7° in C₆H₆,

and at 80° (4 days) 4 : 6-dichloro- α -methylglucoside 2 : 3-di-*p*-toluenesulphonate (V), m.p. 119—120°, $[\alpha]_D^{19} + 97.2^\circ$ in C_5H_5N , $[\alpha]_D^{18} + 102.5^\circ$ in $CHCl_3$, $[\alpha]_D^{22} + 100.5^\circ$ in $COMe_2$. β -Methylglucoside (VI) and (II) quantitatively afford β -methylglucoside 2 : 3 : 4 : 6-tetra-*p*-toluenesulphonate, m.p. 183—184°, $[\alpha]_D^{18} - 6.9^\circ$ in $CHCl_3$, $[\alpha]_D^{19} - 9.8^\circ$ in $COMe$, or under modified conditions, 4-chloro- β -methylglucoside 2 : 3 : 6-tri-*p*-toluenesulphonate, m.p. 186—187°, $[\alpha]_D^{18} - 17.7^\circ$ in $CHCl_3$, $[\alpha]_D^{20} - 18.9^\circ$ in $COMe_2$, $[\alpha]_D^{19} - 31.8^\circ$ in C_6H_6 (max. yield 43.7%) or 4 : 6-dichloro- β -methylglucoside 2 : 3-di-*p*-toluenesulphonate, m.p. 147.5—148°, $[\alpha]_D^{19} + 23.3^\circ$ in $CHCl_3$, $[\alpha]_D^{18} + 35.9^\circ$ in $COMe_2$, $[\alpha]_D^{18} + 19.2^\circ$ in C_5H_5N (max. yield, 15.6%). Chlorination is effected by replacement of $O \cdot SO_2 \cdot C_6H_4Me$ by Cl , $R \cdot O \cdot SO_2 \cdot C_6H_4Me + C_5H_5N \cdot HCl \rightarrow RCl + C_5H_5N \cdot p \cdot C_6H_4Me \cdot SO_3H$. (III) and (IV) are smoothly transformed into (V) by $C_5H_5N \cdot HCl$ in C_5H_5N , whereas (I) is unaffected. The constitution of (V) follows from its identity with the product of Helferich *et al.* (A., 1925, i, 792). (IV) and NaI in $COMe_2$ give 4-chloro-6-iodo- α -methylglucoside 2 : 3-di-*p*-toluenesulphonate, m.p. 127—128°, $[\alpha]_D^{19} + 107.6^\circ$ in $CHCl_3$, $+ 96.5^\circ$ in $COMe_2$, $[\alpha]_D^{20} + 120.5^\circ$ in C_6H_6 , in which both halogen atoms are stable towards $AgOAc$ in $AcOH$ at 100°. Since (V) does not react with NaI under these conditions, Cl in (IV) is probably in position 4. Unexpectedly, cellulose resembles (I) in its behaviour towards (II), whereas starch is similar to (VI). H. W.

Detection of small amounts of invert sugar in the presence of sucrose. VON MORGENSTERN (Zentr. Zuckerind., 1934, 42, 824—825).—Hydrolysis of sucrose (I) during the determination of invert sugar (II) by Cu_2O pptn. is prevented by the presence of buffers and NH_2 -acids. Although the pptn. of Cu_2O is delayed, Barfoed's reagent serves for the qual. detection of (II) in presence of (I) if buffered with $NaOAc$ and glycine. A. G. P.

Synthesis of α -maltosides and their behaviour towards diastase. B. HELFERICH and S. R. PETERSEN (Ber., 1935, 68, [B], 790—795).—Maltose octa-acetate, $PhOH$, and $ZnCl_2$ at 100° give *phenyl- α -maltoside hepta-acetate* (I), m.p. 184—184.5°, $[\alpha]_D^{20} + 170.2^\circ$ in $CHCl_3$. *o-Tolyl- α -maltoside hepta-acetate* (II), m.p. 188.5—190°, $[\alpha]_D^{22} + 161.4^\circ$ in $CHCl_3$, prepared similarly, passes when irradiated and treated with Br in $CHCl_3$ containing $NaHCO_3$ into ω -bromo-*o-tolyl- α -maltoside hepta-acetate* (III), m.p. 198.5—199.5° (corr.), $[\alpha]_D^{22} + 160.2^\circ$ in $CHCl_3$, which is converted by $AgOAc$ in boiling $COMe_2-H_2O$ into *saligenin- α -maltoside hepta-acetate* (IV), m.p. 191—192° (corr.), $[\alpha]_D^{25} + 154^\circ$ in $CHCl_3$. *p-Tolyl- α -maltoside hepta-acetate* (V), m.p. 159.5—161.5°, $[\alpha]_D^{22} + 166^\circ$ in $CHCl_3$, and *p-tolyl- β -maltoside hepta-acetate*, m.p. 160.5—162° (corr.), $[\alpha]_D^{20} + 46^\circ$ in $CHCl_3$, are produced simultaneously. (V) is transformed by successive treatments with Br and $Ag_2O-COMe_2-H_2O$ into *p-hydroxymethylphenyl- α -maltoside hepta-acetate* (VI), m.p. 175.5—177.5° (corr.), $[\alpha]_D^{18} + 173^\circ$ in $CHCl_3$. The *maltosides* obtained by the action of $NaOMe$ in anhyd. $MeOH$ on (I), (II), (IV), and (VI) are amorphous; they have $[\alpha]_D^{20} + 198^\circ$, $[\alpha]_D^{17} + 186^\circ$, $[\alpha]_D^{19} + 168.5^\circ$, and $[\alpha]_D^{19} + 208^\circ$ in H_2O , respectively. *p-Hydroxydiphenyl- β -maltoside*

hepta-acetate has m.p. 131—134° (corr., decomp.) after softening, $[\alpha]_D^{20} + 45.5^\circ$ in $CHCl_3$. Treatment of (III) with NH_3 in $MeOH-H_2O$ and of the product with stearyl chloride in $C_5H_5N-CHCl_3$ affords *o-aminomethylphenyl- α -maltoside octastearate*, m.p. 85—87°, $[\alpha]_D^{19} + 48.0^\circ$ in $CHCl_3$, transformed by NH_3-MeOH at 170° into *o-stearamidomethylphenyl- α -maltoside* (VII), $[\alpha]_D^{20} + 55.4^\circ$ in abs. $EtOH$. The *maltosides* are resistant towards diastase of malt, the slight fission observed being due to the presence of α -glucosidase; the formation of maltose could not be detected. (VII) behaves similarly although only colloidal sol. in H_2O ; enlargement of the aglucone of the α -maltosides is too external to render the substrate "starch-like" towards diastase.

β -Melibiose octa-acetate is converted by $HBr-AcOH$ at 0° into non-cryst. acetobromomelibiose (VIII), transformed by $MeOH-H_2O$ into β -melibiose hepta-acetate, m.p. 193° (corr.), $[\alpha]_D^{24} + 119^\circ$ to $+125.8^\circ$ in $CHCl_3$. (VIII) and Ag_2O in anhyd. $MeOH$ give *methyl- β -melibioside hepta-acetate*, m.p. 158—160° after softening, $[\alpha]_D^{18} + 92.7^\circ$ in $CHCl_3$. H. W.

Cymarose. R. C. ELDERFIELD (Science, 1935, 81, 440—441).—Oxidation of cymarose (I) with 50% HNO_3 yields a hydroxymethoxyglutaric acid (II) characterised by its *di-N-methylamide*, m.p. 138°, $[\alpha]_D^{24} - 55.3^\circ$. The lactone of (II) has m.p. 150—152°, $[\alpha]_D^{24} - 1.2^\circ$. The OMe of (I) is on the third C of the deoxyhexose chain. L. S. T.

Schardinger's dextrins from starch. K. FREUDENBERG and R. JACOBI (Annalen, 1935, 518, 102—108).—Schardinger's α - (I) and β - (II) -dextrin are individual products, but his sparingly-sol. "schlamm" is an additive compound of (I) and (II) which crystallises under certain conditions. To these are added γ - (III), δ - (IV), and ϵ - (V) -dextrin which occur in small amount and, in part, have possibly not been obtained homogeneous. The confusion in the lit. is caused by the difficulty of separating these mixtures, their power of forming additive compounds with acids, H_2O , $EtOH$, and other solvents, and the false vals. for mol. wt. when determined in the customary manner. The following consts. are recorded: (I) $[\alpha]_D + 148^\circ$ in H_2O ; $[\alpha]_{578} + 153^\circ$ to $+167^\circ$ and then $+70^\circ$ in 50% H_2SO_4 (acetate, $[\alpha]_D + 107.5^\circ$ in $CHCl_3$); (II), $[\alpha]_D + 158^\circ$ in H_2O , $[\alpha]_{578} + 165^\circ \rightarrow 171^\circ \rightarrow +70^\circ$ in 50% H_2SO_4 (acetate, $[\alpha]_D + 121^\circ$ in $CHCl_3$); (III), $[\alpha]_D + 160^\circ$ in H_2O , $[\alpha]_{578} + 165^\circ \rightarrow +170^\circ \rightarrow +69^\circ$ in 50% H_2SO_4 (acetate, $[\alpha]_D + 137^\circ$ in $CHCl_3$); (IV), $[\alpha]_D + 166^\circ$ in H_2O (acetate, $[\alpha]_D + 126^\circ$ in $CHCl_3$); (V) $[\alpha]_D + 171^\circ$ in H_2O (acetate, $[\alpha]_D + 158^\circ$ in $CHCl_3$). (I) appears to be a penta- and (II) a hexa-saccharide. (I) and (II) appear to contain about 0.6% OMe . Variation of $[\alpha]_{578}$ during hydrolysis of (I), (II), and (III) shows the presence of a readily-hydrolysed β union belonging to the anhydride termination of the chain-formed oligosaccharide. The assumption that this is of the same type as in β -glucosan is qualitatively but not quantitatively satisfactory. A β union within the chain is excluded. (I) is best separated as acetate by $EtOAc$ from the other acetates and (II) in the free state from H_2O . H. W.

Determination of relative mol. wts. of the members of polymeric-homologous series of cellulose derivatives. L. I. MIRLAS (Iskus. Volokno, 1934, 5, No. 6, 5—10).—A discussion of the relation between mol. wt. and η . CH. ABS. (e)

Colloid chemistry of compounds of sugars and fatty acids, particularly glucose stearate.—See this vol., 821.

Solubility rules for cellulose derivatives. Cellulose acetate and benzylcellulose.—See this vol., 822.

Dependence of the viscosity of cellulose esters on the concentration.—See this vol., 822.

Addition of ammonia to ethylene. C. E. SUN (J. Chinese Chem. Soc., 1935, 3, 1—5).—From calculations of the energies of activation it is concluded that NH_3 will not add easily to C_2H_4 , that a primary amine will decompose more easily into a *sec.*-amine than into a hydrazine, and that this decomp. will occur long before its decomp. into C_2H_4 .

J. W. S.

Chlorinated ethylamines. New type of vesicant. K. WARD, jun. (J. Amer. Chem. Soc., 1935, 57, 914—916).— $\text{N}(\text{CH}_2\text{CH}_2\text{OH})_3$ with SOCl_2 in CHCl_3 or its hydrochloride with SOCl_2 in C_6H_6 or PCl_5 in CHCl_3 gives $\beta\beta'$ -trichlorotriethylamine, an oil (hydrochloride, m.p. 130—131°; picrate, m.p. 136.5—137°). The following revised data are given: $\text{CH}_2\text{Cl}\cdot\text{CH}_2\cdot\text{NH}_2$ (best obtained from $\text{OH}\cdot\text{C}_2\text{H}_4\cdot\text{NH}_2\cdot\text{HCl}$ and SOCl_2) hydrochloride, m.p. 144°, and picrate, $+0.5\text{H}_2\text{O}$, m.p. 107—110°; $\beta\beta'$ -dichlorodiethylamine picrate, m.p. 112—113°. The Cl_3 - but not the Cl - or Cl_2 -base is strongly vesicant. The Cl in these bases is reactive. $\beta\beta'$ -Diamylthiol-diethylamine, b.p. 214°/25 mm., is described.

R. S. C.

Relation between the behaviour of ethylolamine, propylolamine, and butylolamine and their p_{H} . A. TETTAMANZI (Atti R. Accad. Sci. Torino, 1934, 69, I, 369—377; Chem. Zentr., 1935, i, 190; cf. A., 1934, 993).—Triethylolamine (I) forms with aq. solutions of bivalent metals partly products of alcoholysis (II) and partly additive products. In abs. EtOH with Co^{II} halides only (II) are formed. Mono- and di-ethylolamine behave similarly in EtOH, but do not form compounds in H_2O . Compound formation is correlated with the p_{H} of the H_2O solutions. (I) reacts with NaOH forming cryst. compounds with (I) : Na ratios of 1 : 1.5 and 1 : 2.

H. J. E.

Preparation of β -diethylaminomethylbutanol. S. I. SERGIEVSKAJA, A. A. KROPACHEVA, and I. LIPOVICH (Khim. Farm. Prom., 1934, No. 5, 13—15).—Et α -ethylhydracrylate is converted successively into $\text{CH}_2\text{Cl}\cdot\text{CHEt}\cdot\text{CO}_2\text{Et}$ and $\text{NEt}_2\cdot\text{CH}_2\cdot\text{CHEt}\cdot\text{CO}_2\text{Et}$, which is then reduced to $\text{NEt}_2\cdot\text{CH}_2\cdot\text{CHEt}\cdot\text{CH}_2\cdot\text{OH}$.

CH. ABS. (r)

True methylcholines. A. SIMONART (J. Pharm. Exp. Ther., 1935, 54, 105—130).—A criticism of Hunt's work (cf. A., 1934, 875) with choline derivatives.

M. T.

β -Methylcholine and its acetyl ester. R. T. MAJOR and J. K. KLINE (J. Pharm. Exp. Ther., 1935,

54, 131—135).—Methylcholine chloride and acetyl- β -methylcholine, previously described and used by different investigators, were almost certainly, with a few exceptions, not as pure as the compounds prepared by the authors. M. T.

Deamination of chitin and glucosamine. P. SCHORIGIN and N. N. MAKAROVA-SEMLJANSKAJA (Ber., 1935, 68, [B], 965—969).—Chitosan (I) reacts vigorously with liquid N_2O_4 at -10° and even in presence of CCl_4 as diluent extensive destruction of (I) occurs; unless action is very carefully conducted (I) is completely dissolved with production of oligosaccharides. NH_2 of chitin (II) appears so protected against chemical reagents by Ac that the latter cannot be removed without degradation of (II). Deamination of glucosamine under the conditions of Zechmeister *et al.* and treatment of the product (III) with $\text{NHPh}\cdot\text{NH}_2$ gives small amounts of a product which does not depress the m.p. of phenylglucosazone (IV); if the syrup is evaporated in vac. only traces of (IV) are produced. Oxidation of (III) with HNO_3 affords $\text{H}_2\text{C}_2\text{O}_4$, which is not produced from glucose (V) or mannose (VI) under similar conditions. The absence of fructose in (III) is established by its non-reaction with $\text{NPhMe}\cdot\text{NH}_2$. (III) yields a hexosediethylhydrazone, m.p. 144—145°, $[\alpha]_{\text{D}} + 23.8^\circ$ in MeOH, whereas d-mannose- and d-glucose-diphenylhydrazone have m.p. 150°, $[\alpha]_{\text{D}} + 11.6^\circ$ in MeOH and m.p. 156°, $[\alpha]_{\text{D}} + 13.6^\circ$ in MeOH, respectively. The carbohydrate is therefore not (V) or (VI) but another monosaccharide, probably Fischer's chitose. H. W.

Methyl ethers of chitin. P. SCHORIGIN and N. N. MAKAROVA-SEMLJANSKAJA [with V. ANURJEVA] (Ber., 1935, 68, [B], 969—971).—Chitin (I) is methylated with much greater difficulty than cellulose and 45 treatments with $\text{Me}_2\text{SO}_4\text{--NaOH}$ give a product with 9.34% OMe (1 OMe = 14.28%). The material retains the structure of (I) and combined AcOH is almost unchanged. The difficulty is attributed to the failure of (I) to swell in alkali and is partly overcome by use of more conc. NaOH and mechanical stirring. After pre-swelling in conc. HCl, products with 16.07% OMe are obtained after 15 treatments in which (I) is probably very appreciably degraded. H. W.

Acetylation of chitin. P. SCHORIGIN and E. HAIT (Ber., 1935, 68, [B], 971—973).—Acetylation of chitin (I) with Ac_2O in presence of AcOH and H_2SO_4 proceeds only to a small extent since (I) does not swell in the mixture. Addition of HClO_4 is useless. Better results are obtained by use of HClO_4 and ZnCl_2 or of conc. $\text{HCl}\text{--Ac}_2\text{O}$. Complete acetylation is secured by passing dry HCl through (I) suspended in Ac_2O , but the I val. of the product indicates considerable degradation of (I). The products are sol. in HCO_2H and 50% *m*- $\text{C}_6\text{H}_4(\text{OH})_2$ solution in a degree which increases with the degree of acetylation. They dissolve immediately in HNO_3 (d 1.5) and the solutions give ppts. of chitin acetate nitrate when diluted with H_2O . H. W.

Steric series. XXII. Configuration of alanine. K. FREUDENBERG and M. MEISTER (Annalen, 1935, 518, 86—96; cf. A., 1934, 767).—Re-examination of the configurative relationship of *l*(+)-lactic acid (I) to (+)-alanine in the light of more recent

rules (*loc. cit.*) confirms the previous conclusion (A., 1924, i, 1173). (I) is converted into (—)-*carbethoxy-l(+)-lactic acid*, b.p. 98°/0.45 mm., $[\alpha]_{578}^{20} -43.6^\circ$, $[\alpha]_{546}^{20} -49.2^\circ$, transformed into (—)-*carbethoxy-l(+)-lactyl chloride* (II), b.p. 79°/11 mm., $[\alpha]_{578}^{19} -14.0^\circ$, $[\alpha]_{546}^{19} -14.9^\circ$, whence (EtOH + C₅H₅N) *Et* (—)-*carbethoxy-l(+)-lactate* (III), b.p. 93°/11 mm., $[\alpha]_{578}^{19} -40.9^\circ$, $[\alpha]_{546}^{19} -46.0^\circ$, and *Ph* (—)-*carbethoxy-l(+)-lactate*, b.p. 123°/0.6 mm., $[\alpha]_{578}^{19} -35.1^\circ$, $[\alpha]_{546}^{19} -39.8^\circ$. (—)-*Carbethoxy-l(+)-lactodimethylamide*, b.p. 91°/0.45 mm., $[\alpha]_{578}^{19} -5.6^\circ$, from (II) and NHMe₂ in Et₂O, from (III) and NHMe₂ at 80°, or from OH·CHMe·CO·NMe₂ and ClCO₂Et in C₅H₅N (corresponding *dl-form*, m.p. 20°), and (—)-*carbethoxy-l(+)-lactanilide*, m.p. 101—102°, $[\alpha]_{578}^{19} -49.5^\circ$ in EtOH (corresponding *dl-form*, m.p. 79°), are described. EtBr is transformed by (NH₄)₂SO₃, NH₃, and H₂O at 110° followed by treatment with PCl₅ into *ethanesulphonyl chloride*, b.p. 61—65°/11 mm., which with *Et* l(+)-*lactate* in Et₂O-C₅H₅N affords *Et* (—)-*ethanesulphonyl-l(+)-lactate*, b.p. 93°/12 mm., $[\alpha]_{578}^{20} -44.3^\circ$, $[\alpha]_{546}^{20} -50.0^\circ$. (—)-*Ethanesulphonyl-l(+)-lactic acid*, $[\alpha]_{578}^{20} -28.5^\circ$, $[\alpha]_{546}^{20} -32.3^\circ$, is converted by SOCl₂ into (—)-*ethanesulphonyl-l-chloride*, b.p. 84°/0.03 mm., $[\alpha]_{578}^{20} -43.4^\circ$, $[\alpha]_{546}^{20} -47.7^\circ$, whence *Ph* (—)-*ethanesulphonyl-l(+)-lactate*, b.p. 145°/0.16 mm., $[\alpha]_{578}^{19} -46.3^\circ$, $[\alpha]_{546}^{19} -52.4^\circ$, (—)-*ethanesulphonyl-l(+)-lactodimethylamide*, b.p. 128°/0.1 mm., $[\alpha]_{578}^{19} -2.5^\circ$ in Et₂O (corresponding *dl-compound*, m.p. 40°), and (—)-*ethanesulphonyl-l(+)-lactanilide*, m.p. 75°, $[\alpha]_{578}^{17} -70.4^\circ$, $[\alpha]_{546}^{17} -79.4^\circ$ in EtOH (corresponding *dl-substance*, m.p. 98°). *Et* azidopropionate, $[\alpha]_{578}^{19} -20.1^\circ$, is converted by successive treatments with H₂-Pt sponge and ClCO₂Et-K₂CO₃ into *Et* (—)-*carbethoxy-l(+)-aminopropionate*, b.p. 123°/11 mm., m.p. 38°, $[\alpha]_{578}^{19} -4.4^\circ$ in hexane. Similarly, *Ph* l(—)-*azidopropionate*, b.p. 105.0°/0.6 mm., $[\alpha]_{578}^{19} -81^\circ$, $[\alpha]_{546}^{19} -8.9^\circ$, yields *Ph* (—)-*carbethoxy-l(+)-aminopropionate*, m.p. about 40°, $[\alpha]_{578}^{19} -24.0^\circ$, $[\alpha]_{546}^{19} -27.2^\circ$ in EtOH (*dl-compound*, m.p. 70°). (—)-*Carbethoxy-l(+)-aminopropiondimethylamide*, b.p. 97°/2 mm., $[\alpha]_{578}^{19} -13.7^\circ$, $[\alpha]_{546}^{19} -15.5^\circ$ (corresponding *dl-compound*), l(—)-*azidopropionanilide*, $[\alpha]_{578}^{19} +105^\circ$, (—)-*carbethoxy-l(+)-aminopropionanilide*, m.p. 131°, $[\alpha]_{578}^{19} -56.1^\circ$, $[\alpha]_{546}^{19} -64.9^\circ$ in EtOH (corresponding *dl-compound*, m.p. 151°), and *carbethoxy-l(+)-alanine*, $[\alpha]_{578}^{19} -1.9^\circ$, $[\alpha]_{578}^{19} +4.5^\circ$ in Et₂O-hexane (9:11) (corresponding *dl-compound*, m.p. 84°), are described. *Et* (—)-*ethanesulphonyl-l(+)-amidopropionate*, b.p. 119°/0.2 mm., $[\alpha]_{578}^{22} -25.5^\circ$ (corresponding *dl-substance*), is hydrolysed to (—)-*ethanesulphonyl-l(+)-alanine*, m.p. 82—83°, $[\alpha]_{578}^{20} -7.1^\circ$ in Et₂O-hexane (7:3) (*r-acid*, m.p. 82—83°). *dl-α-Ethanesulphonamidopropionyl chloride* has m.p. 61°. *Ph*l(+)-*α-ethanesulphonamidopropionate*, m.p. 93°, $[\alpha]_{578}^{19} +47.6^\circ$, $[\alpha]_{546}^{19} -54.3^\circ$ in EtOH (*dl-compound*, m.p. 97°), l(+)-*α-ethanesulphonamidopropiondimethylamide*, m.p. 82—83°, $[\alpha]_{578}^{19} -29.3^\circ$, $[\alpha]_{546}^{19} -33.0^\circ$ in EtOH (*dl-substance*, m.p. 81°), and l(+)-*α-ethanesulphonamidopropionanilide*, m.p. 112°, $[\alpha]_{578}^{19} -61.9^\circ$, $[\alpha]_{546}^{19} -70.7^\circ$ in EtOH (*dl-compound*, m.p. 131°), are described. H. W.

Amino-acids. VIII. Condensation of creatinine with aromatic aldehydes and syntheses of *N*-methylamino-acids. U. DEULOFEU and G. MENDIVELZUA (*Ber.*, 1935, 68, [B], 783—789; cf. A.,

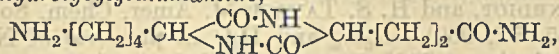
1934, 1216).—Creatinine (I) is readily condensed with aromatic aldehydes by Ac₂O and NaOAc, acetylated products (II) being obtained in varying yield. These, which are insol. in alkali, are reduced by Na-Hg to the corresponding H₂-derivatives. Ac attached to N is very resistant to alkaline hydrolysis and is not removed during reduction. The products are readily hydrolysed by acid to the corresponding substituted creatinines. (II) are hydrolysed by conc. Ba(OH)₂ to the corresponding NHMe-acids. Thus are obtained: 2-acetyl-5-benzylidenecreatinine, m.p. 208°, 2-acetyl-5-benzylcreatiniene, m.p. 135°, 5-benzylcreatiniene, m.p. 282°, and phenyl-*N*-methylalanine, sublimes 253—255°: 2-acetyl-5-*p*-acetoxymethylidenecreatiniene, m.p. 225—226°, 2-acetyl-5-*p*-hydroxybenzylcreatiniene, m.p. 162°, *N*-methyltyrosine, m.p. 265° when slowly heated or m.p. 318° when rapidly heated, and 5-*p*-hydroxybenzylcreatiniene, m.p. 230°; 2-acetyl-5-*p*-methoxybenzylidenecreatiniene, m.p. 201°, 2-acetyl-5-*p*-methoxybenzylcreatiniene, m.p. 137°, and 5-*p*-methoxybenzylcreatiniene, m.p. 270°; 2-acetyl-5-*m*-acetoxymethylidenecreatiniene, m.p. 182°, 2-acetyl-5-*m*-hydroxybenzylcreatiniene, m.p. 164°, 5-*m*-hydroxybenzylcreatiniene, m.p. 229°, and *m*-hydroxyphenyl-*N*-methylalanine, m.p. 268° or m.p. 292° when slowly or rapidly heated, respectively: 2-acetyl-5-*m*-methoxybenzylidenecreatiniene, m.p. 181°; 2-acetyl-5-*o*-acetoxymethylidenecreatiniene, m.p. 209°, 2-acetyl-5-*o*-hydroxybenzylcreatiniene, m.p. 153°, and *o*-hydroxyphenyl-*N*-methylalanine, m.p. 207° or m.p. 226°, when slowly or rapidly heated, respectively: 2-acetyl-5-*o*-methoxybenzylidenecreatiniene, m.p. 195°, and 2-acetyl-5-*o*-methoxybenzylcreatiniene, m.p. 159°: 2-acetyl-5-3'-acetoxymethyl-4'-methoxybenzylidenecreatiniene, m.p. 223°, and 2-acetyl-5-3'-hydroxy-4'-methoxybenzylcreatiniene, m.p. 185°: 2-acetyl-5-*veratrylidenecreatiniene*, m.p. 215°, and 2-acetyl-5-*veratrylcreatiniene*, m.p. 127°; 2-acetyl-5-*piperonylidenecreatiniene*, m.p. 240° after softening at 235°, and 2-acetyl-5-*piperonylcreatiniene*, m.p. 164°. When heated with *p*-OH·C₆H₄·CHO at 150—155°, (I) affords *di-p*-hydroxybenzylidenecreatiniene, m.p. 265°. H. W.

Preparation of glutamine. H. B. VICKERY, G. W. PUCHER, and H. E. CLARK (*J. Biol. Chem.*, 1935, 109, 39—42).—The method of Schulze and Bosshard (A., 1883, 658) of prep. from beetroot is modified in detail, and 80% of the glutamine content isolated. E. W. W.

Multivalent amino-acids and peptides. I. Synthesis of quadrivalent amino-acids and their derivatives. II. Synthesis of derivatives of lysylglutamic acid. J. P. GREENSTEIN (*J. Biol. Chem.*, 1935, 109, 529—540, 541—544).—I. Three tetrapolar NH₂-acids are synthesised. Et₃ aconitate and NH₃-EtOH (saturated at 0°) at 100° give *anhydrominotricarballyltetra-amide*, CO<CHR·NH>CO (R = NH₂·CO·CH·CH₂·CO·NH₂), m.p. 232° (decomp.), hydrolysed by 5*N*-NaOH at 100° to *α-aminotricarballylic acid*, m.p. 196° (decomp.) [*Cu* salt; *carbobenzyloxyglycyl*, m.p. 72° (decomp.), and *glycyl* derivatives, m.p. 195° (decomp.)]. *αγδ-Triamino-Δ^γ-pentenoic acid hydrochloride*, m.p. 171—173° (decomp.), is obtained by boiling the Bz₃ derivative with conc. HCl. *α*-Bromo-*ε*-benzamidohectic acid and *K* ethylxanthate

give the substance $\text{NH}_2\text{Bz}\cdot[\text{CH}_2]_4\cdot\text{CH}(\text{CO}_2\text{H})\cdot\text{S}_2\cdot\text{COEt}$, m.p. 112—114°, which, when heated first with NH_3 -EtOH and then with Zn-HCl , gives ϵ -benzamido- α -thiol-*n*-hexoic acid hydrochloride, m.p. 123° after softening at 117° (corresponding acid, m.p. 158°), which is oxidised by $\text{FeCl}_3\text{-NH}_3$ to α -disulphido-di- ϵ -amino-hexoic acid, m.p. 207° (decomp.) [corresponding $\epsilon\epsilon$ -di-guanidino-, m.p. 178—180° (decomp.), and -di(phenyl-carbamido)-acid, m.p. 81°, resolidifies, decomp. 140°].

II. Me lysylglutaminate with $\text{NH}_3\text{-MeOH}$ at 0° gives anhydrolysylglutamamide,



(hydrochloride, m.p. 242°), and with $\text{NH}_2\cdot\text{C}(\text{NH})\cdot\text{OME}$ affords α -amino- ϵ -guanidinohexoyleglutamic acid, m.p. 95° (decomp.), hydrolysed by hot conc. HCl to the mono-peptide.

R. S. C.

Rotatory power of ricinoleamide. E. ANDRÉ and C. VERNIER (Bull. Soc. chim., 1935, [v], 2, 809—816).—Repeated saturation of an EtOH solution of castor oil with NH_3 at 0° and prolonged keeping affords successive crops of the ricinoleamide which have been fractionally crystallised. The fraction from the later NH_3 treatment of the mother-liquor has a higher $[\alpha]_D^{20}$, +3° 6', than that of the first crop, m.p. 65.5—67°, $[\alpha]_D^{20}$ +2° 35', thus indicating the presence of two ricinoleic acids (possibly *dl*- and *d*-) of different rotatory power.

J. W. B.

Thiocarbamide. G. A. KIRKHOFF and E. A. AKONIANZ (Khim. Farm. Prom., 1934, No. 3, 17—18).—An improved prep. is described.

CH. ABS. (r)

ψ -Halogenes. XXIX. Preparation, reactions, and tautomerism of cyanates and of cyanic acid. L. BIRCKENBACH and H. KOLB. XXX. Raman effect and the constitution of the cyanate residue. J. GOUBEAU (Ber., 1935, 68, [B], 895—912, 912—919; cf. A., 1933, 1281; 1934, 1332).—XXIX. The following compounds are described: $\text{Hg}(\text{NCO})_2$ (I); $2\text{Hg}(\text{NCO})_2\cdot\text{KOCN}\cdot\text{KOAc}$ (II); $3\text{Hg}(\text{NCO})_2\cdot 2\text{KOCN}$ (III); $\text{Hg}(\text{NCO})_2\cdot\text{KCl}$ (IV); $\text{Hg}(\text{OCN})_2\cdot\text{KCl}$ (V) (also + H_2O); $2\text{Hg}(\text{OCN})_2\cdot\text{KOCN}\cdot\text{KOAc}$ (VI); $3\text{Hg}(\text{OCN})_2\cdot 2\text{KOCN}$ (VII); $2\text{AgNCO}\cdot\text{KOCN}$ (VIII); NMe_4 cyanate (IX). These are colourless cryst. compounds freely sol. in H_2O [with exception of (VIII)] which become grey or brown in sunlight. The *O*-cyanates, unless decomposed by hot H_2O , are transformed thereby into *N*-cyanates. Investigation of the constitution of the cyanates is based on Raman spectrum (see below) and chemical evidence. The production of Me 2-iodocyclohexylallophanate (X) from *O*-cyanates and of Me 2-iodocyclohexylcarbamate (XI) from *N*-cyanates, I, cyclohexene, and MeOH has been further examined. Pure AgNCO or (I) afford exclusively (XI). (II), (III), (IV), (V), (VI), (VII), and (VIII) yield with equiv. amounts of I (X) and (XI) in proportion about 20:1 to 5:1. Mixtures of AgNCO or (I) with K salts sol. in MeOH give (X). Formation of (X) requires brine and, in all cases, hasty termination of the reaction hinders its formation. Production of (X) does not take place from (III) if I is in 10% excess or from other complexes in presence of a greater excess. During the production of (X) and (XI)

2-iodocyclohexyl Me ether and MeOCN are also formed. $\text{Pb}(\text{OCN})_2$ scarcely reacts with I and does not form (X). (IX) reacts smoothly with formation of (X). The following schemes are proposed: $\text{R}\cdot\text{NCO} + \text{I} \rightarrow \text{INCO} (+ \text{C}_6\text{H}_{10}) \rightarrow \text{C}_6\text{H}_{10}\text{I}\cdot\text{NCO} (+ \text{MeOH}) \rightarrow \text{C}_6\text{H}_{10}\text{I}\cdot\text{NH}\cdot\text{CO}_2\text{Me}$ and $\text{INCO} (+ \text{MeOH}) \rightarrow \text{HNCO}$. $\text{R}\cdot\text{OCN} + \text{I} \rightarrow \text{I}\cdot\text{OCN} (+ \text{C}_6\text{H}_{10}) \rightarrow \text{C}_6\text{H}_{10}(\text{I}\cdot\text{NCO}) + \text{HOCN} \rightarrow \text{C}_6\text{H}_{10}\text{I}\cdot\text{NH}\cdot\text{CO}\cdot\text{O}\cdot\text{C}\cdot\text{N} \rightarrow \text{C}_6\text{H}_{10}\text{I}\cdot\text{NH}\cdot\text{CO}\cdot\text{N}\cdot\text{C}\cdot\text{O} (+ \text{MeOH}) \rightarrow \text{C}_6\text{H}_{10}\text{I}\cdot\text{NH}\cdot\text{CO}\cdot\text{NH}\cdot\text{CO}_2\text{Me}$ and $\text{I}\cdot\text{OCN}(\text{MeOH}) \rightarrow \text{HOCN} \rightarrow \text{HNCO}$. Investigation of the reaction between cyanic acid (XII) and MeOH gives the following results. (XII) obtained from AgNCO or (I) and H_2S or HCl in MeOH yields (XI) exclusively. If isolated and distilled and then treated with MeOH it gives (X) and (XI), dilution with Et_2O favouring the formation of (X). (XII) from cyanuric acid behaves analogously. (XII) from KOCN , (II), (III), (IV), (V), (VI), (VII), and (IX), Pb cyanate, and mixtures of AgNCO and K salts invariably affords predominately (X) sometimes mixed with small amounts of (XI). (X) is not formed by subsequent addition of (XII) to (XI).

XXX. The Raman spectrum of the cyanate residue definitely establishes its existence in 2 differing forms according to its partner. In the undoubtedly heteropolar alkali salts and the Pb salt the oxynitrile form occurs. In purely homopolar form in the acid and esters and in metallic salts in which for other reasons a transition to homopolar union must be assumed the ketimide form is present. Both forms are detected only in the Hg salts, particularly in those of complex nature, thus conforming the views of Hantzsch according to which formation of isomeric salts is possible only with certain heavy metals such as Hg. In all other cases the Raman spectrum indicates the presence of only one of the two possible forms.

H. W.

Determination of cacodylates. S. BABICH (Khim. Farm. Prom., 1934, No. 5, 27—29).—The material is decomposed with H_2SO_4 and MnO_2 , and diluted to 100 c.c. Tile's reagent ($\text{NaH}_2\text{PO}_2 + \text{HCl}$) is added to ppt. As, and the ppt. is dissolved in a measured vol. of I solution and NaHCO_3 . Excess of I is titrated with $\text{Na}_2\text{S}_2\text{O}_3$.

CH. ABS. (e)

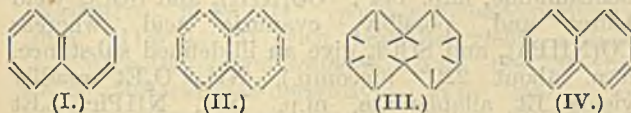
Interchange of heavy atoms in organo-metallic methyls. A. LEIGH-SMITH and H. O. W. RICHARDSON (Nature, 1935, 135, 828—829).—Using radioactive isotopes as indicators evidence has been obtained indicating that Pb and Bi deposited on a metal surface can exchange with the Pb in PbMe_4 and the Bi in BiMe_3 in Et_2O at room temp. The exchange process occurs mainly between atoms of the same at. no. and without disruption of the mol.

L. S. T.

1-Methyl- Δ^2 - and - Δ^3 -cyclopentenes and their derivatives. M. GODCHOT, M. MOUSSERON, and R. RICHAUD (Compt. rend., 1935, 200, 1599—1601).—The mixture, b.p. 65—76°, obtained by action of *o*- $\text{C}_6\text{H}_4(\text{CO})_2\text{O}$ on *dl*-1-methylcyclopentan-3-ol, yields on fractionation *dl*-1-methyl- Δ^2 -cyclopentene (I), b.p. 66.5—67°/766 mm., oxidised to α -methylglutaric acid, and 1-methyl- Δ^3 -cyclopentene, b.p. 74.5—75.5°/766 mm., oxidised to β -methylglutaric acid. If optically active 1-methylcyclopentan-3-ol is dehydrated

energy of dissociation is approx. afforded by the heat of solution of the radicals produced; in the CPh₃ series these radicals are stable under the experimental conditions whereas in the sugar series further changes immediately ensue. H. W.

Raman effect and problems of constitution. VIII. Symmetry of the naphthalene molecule. K. W. F. KOHLRAUSCH (Ber., 1935, 68, [B], 893—895).—The infra-red and Raman spectra of C₁₀H₈ are in harmony with the symmetrical structures (I),



(II), or (III) but not with the unsymmetrical constitution (IV). H. W.

Synthesis of methylcholanthrene. L. F. FIESER and A. M. SELIGMAN (J. Amer. Chem. Soc., 1935, 57, 942—946; cf. this vol., 480).—*p*-C₆H₄BrMe, (CH₂O)₃, and HCl in presence of AlCl₃-ZnCl₂ (specified conditions of prep. only) at 40—50° give 8% of 4-bromo-2:5-di(chloromethyl)toluene, m.p. 125° (reduced by Zn dust and alkali to 5-bromo-*ψ*-cumene), and 74% of a mixture, b.p. 106—108.5°/4 mm., of 4-bromo-2- and -3-chloromethyltoluene (in the proportion 1:1.8), which with CH₂(CO₂Et)₂ and NaOEt affords a mixture (88% yield), b.p. 166—170°/2 mm., of esters, hydrolysed by Ba(OH)₂ to a mixture (I), m.p. 147—150°, of 2-bromo-5-methyl-, m.p. 159—161° (decomp.) (oxidised by KMnO₄ to 4-bromoisophthalic acid), and 5-bromo-2-methyl-benzylmalonic acid, m.p. (impure) 160—162°. (I) in hot H₂O gives 92% of a mixture (II), b.p. 168—172°, of β-4-bromo-*m*- and β-4-bromo-*o*-tolylpropionic acid; incompletely hydrolysed (I) at 190° gave 70% of (II) and the *Et* esters, b.p. 129°/1.5 mm., of (II), which by hydrolysis and ring-closure gave the same products as did (II). The acid chlorides from (II) with AlCl₃ in CS₂ afford a 94% yield of 7-bromo-4-methyl-, m.p. 154°, and 4-bromo-7-methyl-1-hydrindone (III), m.p. 95°, each obtained also from the corresponding pure component of (II) and each reduced (Clemmensen) to 4-bromo-7-methyl-hydrindene, b.p. 100°/2 mm., 265°/757 mm. The Grignard reagent of (III), prepared by MgEtBr in N₂ with α-C₁₀H₇·COCl, affords a good yield of 4-*α*-naphthoyl-7-methylhydrindene, an oil, which at 405—410° (bath) in 25 min. gives methylcholanthrene (IV), m.p. 178.5—179° (corr.) [*picrate*, m.p. 182—182.5° (corr.)]. (III) and β-C₁₀H₇·COCl give 4-β-naphthoyl-7-methylhydrindene (45% yield), m.p. 114°, and 7-methyl-8:9-dimethylene-1:2-benzanthracene (V), m.p. 187.5° (corr.) [*picrate*, m.p. 164.5—165.5° (corr.)]. (IV) (over-all yield from C₆H₄BrMe 11%) is identical (absorption; carcinogenic) with the substance from dehydronorcholene. (V) is not carcinogenic.

R. S. C.

Azulene. K. S. BIRRELL (J. Amer. Chem. Soc., 1935, 57, 893—895).—Azulene (I) [from guaiene (II)], when hydrogenated (2.7 mols.) and ozonised, gives HCO₂H (formed by oxidation of a terminal Me group), Pr^αCO₂H, an acid (III), C₁₄H₂₁·CO₂H, and an acid (C₆H₄Ph·CO·CH₂ ester, m.p. 132°), probably α-methyl-

glutaric acid. (I) thus probably has the formula of Ruzicka *et al.* (A., 1931, 1302). After absorption of 4 mols. of H₂, ozonolysis gives HCO₂H and (III). (II) (probably a mixture) and KMnO₄ give COMe₂ and H₂C₂O₄. A reaction mechanism for this oxidation and azulene formation is discussed. The Na (IV) and K (V) derivatives of (I) are probably as annexed. (IV) and aq. Et₂O give a hydrocarbon, m.p. 141°, probably C₃₀H₃₈. Carboxylation and oxidation of (V) gives COMe₂, AcOH, and probably H₂C₂O₄. The C₆H₄Ph·CO·CH₂ esters of adipic acid and (CHMe·CO₂H)₂ have m.p. 148° and 146°, respectively. R. S. C.

Constitution and reactivity. VIII. Substitution in aromatic compounds as a polar phenomenon or as a homopolar coupling effect. K. LAUER (J. pr. Chem., 1935, [iii], 142, 243—251; cf. A., 1933, 60, 277, 395, 829).—Schmidt's theory of aromatic substitution (this vol., 73) may have a better theoretical foundation than Robinson's theory of polarity, but, unlike the latter, does not satisfactorily explain experimental results, *e.g.*, the nitration and sulphonation of PhNO₂ etc. The reaction of NH₂OH with *m*-C₆H₄(NO₂)₂ to form 2:4-dinitroaniline and dinitro-*m*-phenylenediamine, the formation of *o*-NO₂·C₆H₄·OH from PhNO₂ and alkali, the action of NaNH₂ on C₅H₅N, the formation of *p*-nitrophenylcarbazole, and the oxidising action of SO₃ (see this vol., 863), all involve substitution in positions which on Schmidt's theory should be unreactive, but are explicable on Robinson's. Schmidt's theory does not explain substitution in CH₂PhCl, CHPhCl₂, and CPhCl₃ and fails in practice because it assumes that the aromatic mol. reacts in the (stationary) state deduced theoretically; variation of results with substituent and with solvent shows that this is not the case. Schmidt's classification of substituents is invalid. E. W. W.

Influence of poles and polar linkings on the course pursued by elimination reactions. XXII. Wagner rearrangement in the Hofmann degradation. C. K. INGOLD and M. A. T. ROGERS (J.C.S., 1935, 722—725).—*γ*-Elimination with accompanying Wagner rearrangement, involving the migration of the β-H (I) is demonstrated in the thermal decomp. of onium salts by substitution of CO₂Et for *γ*-H in order to distinguish (I) from β-elimination followed by prototropic change with migration of the *γ*-H (II):

$$\text{CH}_2\text{R}\cdot\overset{\beta}{\text{C}}\text{H}_2\cdot\overset{\alpha}{\text{C}}\text{H}_2\cdot\overset{\gamma}{\text{N}}\text{R}_3\text{OH} \longrightarrow \text{CHR}\cdot\overset{\beta}{\text{C}}\text{H}\cdot\overset{\alpha}{\text{C}}\text{H}_2\text{H} \text{ (I) or}$$

$$\longrightarrow \text{CH}_2\text{R}\cdot\overset{\beta}{\text{C}}\text{H}\cdot\overset{\alpha}{\text{C}}\text{H}_2 \longrightarrow \text{CHR}\cdot\overset{\beta}{\text{C}}\text{H}\cdot\overset{\alpha}{\text{C}}\text{H}_2\text{H} \text{ (II).}$$

NMe₂·CH₂·CH₂·OH (prep., A., 1927, 650, modified) is converted by SOCl₂ into NMe₂·CH₂·CH₂Cl, which condenses with CH₂(CO₂R)₂-NaOEt-EtOH to give only NMe₂·CH₂·CH₂·OEt, isolated as β-ethoxyethyl-trimethylammonium iodide, m.p. 156—158°, but with CH₂Ph·CNa(CO₂Et)₂ is obtained *Et benzyl-β-dimethyl-aminoethylmalonate* (III) (hydrochloride, m.p. 131—132°), converted by MeI-MeNO₂ into its *methiodide* (IV), m.p. 103—130°, whence the Cl', OH' (V), CO₃'' (VI), and OEt' (VII) derivatives were obtained in

solution. Thermal decomp. of (V) at 140—170° (N₂) gives NMe₃, (III), α -benzyl- γ -butyrolactone (VIII), b.p. 182°/15 mm. (oxidised by 3% KMnO₄ to benzylsuccinic acid), and α -benzyl- γ -butyrolactone- α -carboxylic acid (IX), m.p. 87—88° (best obtained by thermal decomp. in presence of excess of NaOH). Decomp. of (VI) (CO₂) gives (VIII), and (IV) gives a little (III), NMe₃I, NMe₃EtI, the Et ester of (IX), and Et iso- α -benzylcrotonate (X), b.p. 144—148°/19 mm., hydrolysed to iso- α -benzylcrotonic acid (XI), m.p. 107° (Ag salt; amide, m.p. 82—83°) (gives MeCHO on ozonolysis). Thermal decomp. of (VII) at 150—210° gives (X) by mechanism (I):

$$\text{CH}_2\text{Ph}\cdot\text{C}(\text{CO}_2\text{Et})_2\cdot\text{CH}_2\cdot\text{CH}_2\text{NMe}_3\text{OEt (VII)} \longrightarrow \text{CH}_2\text{Ph}\cdot\text{C}(\text{CO}_2\text{Et})\cdot\text{CHMe (X)},$$

and the production of the iso-acid (X) in the elimination

$$\text{CH}_2\text{Ph}\cdot\text{CH}(\text{CO}_2\text{Et})\cdot\text{CH}_2\cdot\text{CH}_2\text{Br} + \text{OH}' \longrightarrow \text{(X)}$$

suggests that this also involves γ -H elimination and Wagner rearrangement. Saturation of (VIII) in EtOH with HBr and hydrolysis of the Br-ester (20% aq. EtOH-NaOH) affords (XI).

J. W. B.

Production of aromatic amines by hydrogenation. I. Catalysts and conditions of hydrogenation. K. YOSHIKAWA, T. YAMANAKA, and B. KUBOTA (Bull. Inst. Phys. Chem. Res. Japan, 1935, 14, 23).—Reduction of PhNO₂ with H₂ is facilitated by Ni catalysts poisoned with thiophen or sulphates. Cu increases the rate and lowers the temp. of reduction. The life of the Ni-Cu catalyst is shorter the higher is the temp., and is lengthened by Al₂O₃.

J. L. D.

Constitution and reactions of thiocarbonyl tetrachloride. II. Reaction with primary arylamines, phenols, and reducing agents. J. M. CONNOLLY and G. M. DYSON (J.C.S., 1935, 679—681).—The compounds obtained by interaction of NH₂Ar and CCl₄, previously described as NHAr·CCl₂·S·Cl (A., 1934, 883), are actually NHAr·S·CCl₃ (I), since they react with 4 mols. of NH₂Ar' in inert solvents: (I) + 4NH₂Ar' \longrightarrow NH₂Ar',HCl + 2HCl + NHAr·S·C(NHAr')₃ \longrightarrow NH₂Ar',HCl + S + NAr·C(NHAr')₂·HCl. Thus S-anilinothiomethylthiol [(I), R=Ph; previously designated anilinothiomethylchlorothiol] with NH₂Ph in ligroin affords, after basification, NPh·C(NHPh)₂; S-*p*-toluidinothiomethylthiol. (I), R=*p*-C₆H₄Me, similarly affords tri-*p*-tolylguanidine. PhNCS with Cl₂·CHCl₃ affords NPh·CCl₂, b.p. 209°, converted by *p*-C₆H₄Me·NH₂ in boiling C₆H₆ into NPh·C(NH·C₆H₄Me)₂. (*p*-C₆H₄Me·NH)₂CS with HgO in C₆H₆ at 40° affords di-*p*-tolylcarbodi-imide, converted by NH₂Ph in boiling C₆H₆ into *as*-phenyldi-*p*-tolylguanidine. CCl₄ reacts similarly with phenols, and thus, from the appropriate phenol, are prepared S-*phenoxy*-, b.p. 196°/760 mm. (decomp.), -*p*-tolyl-*oxy*-, b.p. 183°/755 mm. (decomp.), -2-*chlorophenoxy*-, b.p. 180°/756 mm. (decomp.), -3-*xylyloxy*- (unstable), and -*diphenyl-2-oxo*-, m.p. 58°, -*trichloromethylthiol*, all of type OR·S·CCl₃. These are reduced (Zn dust-AcOH) to give MeSH, and react with an excess of NH₂Ar in inert solvents to give the corresponding triarylguanidine hydrochloride in 40—50% yield. Good yields of ArNCS are obtained by addition of CCl₄ to NH₂Ar dissolved in HCl-SnCl₂. Examples

are given, and an improved prep. (64% yield) of CCl₄ is described. J. W. B.

Action of thionyl chloride on anilides, carbamides, and urethanes. W. H. WARREN and F. E. WILSON (Ber., 1935, 68, [B], 957—960; cf. A., 1931, 339).—*NN'*-Diphenylformamidine, m.p. 135°, is obtained from HCO·NHPh and SOCl₂ if the solution is preserved previously to distillation of the excess of the latter. NHPhAc and SOCl₂ give ill-defined results whereas NHPhBz and SOCl₂ afford *NN'*-diphenylbenzamidine, m.p. 144°. CO(NH₂)₂ and SOCl₂ yield biuret and, possibly, cyanuric acid, whereas CO(NHPh)₂ and SOCl₂ give an ill-defined substance, m.p. about 220° (decomp.). NH₂·CO₂Et readily yields Et allophanate, m.p. 188°. NHPh·CO₂Et with cold SOCl₂ affords (PhNCO)₂, whereas tars are produced if the mixture is heated. H. W.

N-Methylation of acetanilides. E. THIELEPAPE [with A. FULDE] (Ber., 1935, 68, [B], 751—753).—NHPhAc is treated with Na in C₆H₆ and subsequently with Me₂SO₄ or MeI, thereby giving *N*-methylacetanilide, m.p. 100° (corr.). Similar treatment of *p*-OMe·C₆H₄·NHAc affords *p*-methoxy-*N*-methylacetanilide, b.p. 183°/18 mm., m.p. 57° (corr.). H. W.

Action of nitrous acid on dimethylaniline. III. J. C. EARL and A. W. MACKNEY (J. Proc. Roy. Soc. New South Wales, 1935, 68, 58—60; cf. A., 1934, 998).—*p*-NO·C₆H₄·NMe₂, HNO₃ with glacial AcOH at 33° during 90 min. gives principally 2 : 4-(NO₂)₂C₆H₃·NMe₂, also *p*-NO₂·C₆H₄·NMe₂ and *p*-NO₂·C₆H₄·NMe·NO. F. N. W.

Benzoates of N- β -hydroxyethylaniline. P. SCHORIGIN and V. BELOV (Ber., 1935, 68, [B], 833—837).—NHPh·CH₂·CH₂·OH and BzCl in NPhMe₂ give the corresponding *ON*-Bz₂ derivative (I), m.p. 92—93° (yield about 79%), converted into β -anilinoethyl benzoate (II), m.p. 77—78°, identical with the product of von Auwers (A., 1904, i, 736). The constitution of (II) follows from the identity of its Me derivative (picrate, m.p. 164°) with that prepared from NHPhMe and CH₂Cl·CH₂·OBz or from NaOBz and CH₂Cl·CH₂·NPhMe (von Braun *et al.*, A., 1920, i, 29). Under very mild conditions (I) is hydrolysed to a substance, C₁₅H₁₅O₂N, m.p. 74—75°, regarded either as 2-hydroxy-2 : 3-diphenyloxazolidine or the unstable *N*-benzoate of β -hydroxyethylaniline. The *N*-benzoate of Clemo *et al.* is (II). H. W.

Peracetic acid oxidation of acetyl derivatives of aromatic amines. D. BIGLAVI and C. ALBANESE (Gazzetta, 1934, 65, 249—252).—Treatment of NHRAc, where R = Ph, *p*-C₆H₄·NO₂, *p*-C₆H₄·Br, *p*-C₆H₄·Me, and 1 : 2 : 5-C₆H₂Me₃, with AcOH-H₂O₂ yields RNO₂, no azoxy-compound being formed. The mechanism ·NHAc \rightarrow ·N(OH)Ac \rightarrow ·N(OH)₂ + AcOH, is suggested. E. W. W.

Metal ammine salts from benzidine sulphate. A. TETTAMANZI (Atti R. Accad. Sci. Torino, 1934, 69, I, 225, 230; Chem. Zentr., 1935, i, 190).—Cryst. additive compounds of sulphates of Co, Ni, Cd, Mn, Zn, and Fe^{II} with benzidine are described. They are insol. in H₂O but more sol. in EtOH. H. J. E.

Alkylated ethylenediamine derivatives. II. Reaction between Grignard compounds and $\alpha\beta$ -bisbenzylideneaminoethane. J. VAN ALPHEN and (MISS) J. L. ROBERT (Rec. trav. chim., 1935, 54, 361—365; cf. this vol., 337).—Bisbenzylidene-ethylenediamine (I) with MgPhBr in Et₂O gives $\alpha\beta$ -bisbenzylideneaminoethane, m.p. 105.5° (dihydrochloride, cryst.; bisphenylcarbamido-derivative, m.p. 218°), and α -amino- β -benzylideneaminoethane, b.p. 201.5°/20 mm., m.p. 25.5° [bisphenylcarbamido-derivative, m.p. 203°; benzylidene derivative, m.p. 66°; 2:4-dinitrophenyl derivative, m.p. 111° (phenylcarbamido-derivative, m.p. 211.5°)]. (I) with MgEtBr yields α -amino- β -(α -phenylpropyl)aminoethane, b.p. 139°/20 mm. (bisphenylcarbamido-derivative, m.p. 200°), and $\alpha\beta$ -bis-(α -phenylpropylamino)ethane, b.p. 210°/25 mm. (dihydrochloride, cryst.; bisphenylcarbamido-derivative, m.p. 186.5°). F. R. G.

Preparation of 2:4:6-triaminotoluene and related amines by catalytic hydrogenation. F. HEIN and F. WAGNER (Ber., 1935, 68, [B], 856—864).—Chemical reduction of 1:2:4:6-C₆H₂Me(NO₂)₃ is satisfactory for the production of salts of 1:2:4:6-C₆H₂Me(NH₂)₃, but the isolation of the free base (I) therefrom is difficult owing to its unusual susceptibility to air. Catalytic reduction (Pd—BaSO₄ or Pd—MgO; less advantageously, Pd—SiO₂ gel or Pd—C) in EtOH (apparatus described) yields (I), m.p. 121° in bath preheated to 115°, which is resistant to air when dry. Diazotisation of (I) does not occur homogeneously and depends on the concn. Coupling of (I) with SO₃H·C₆H₄·N₂Cl occurs quantitatively with production of the compound, (NH₂)₃C₆Me(N₂·C₆H₄·SO₃H)₂, solutions of which are intensely yellow and obey Beer's law. The salt C₆H₂Me(NH₂)₃·H[(SCN)₄Cr(NH₃)₂] is too sol. to permit analytical application. Under similar conditions only 1 NO₂ of 2:4:6-trinitro-3-*tert*-butyltoluene is reduced, probably that *para* to Bu^v. Two NO₂ of 2:4:6-trinitro-*m*-xylene are affected whilst 3-nitro-*o*-toluidine is reduced. H. W.

Carbonitrosohydrazines. III. Hydrazo- and azo-hydroxamic acids. A. QUILICO and R. JUSTONI (Gazzetta, 1935, 65, 201—214).—In the prep. of arylhydrazinoformhydroxamic acids (I) (A., 1934, 401) from carbonitrosohydrazines (II) and NH₂OH (III), improved yields are obtained by using large excess of (III) at 14—15°. The Ph compound (IV) so prepared has new m.p. 179°. From (IV) an azo-compound was not isolated, but *p*-tolylhydrazinoformhydroxamic acid (V) treated with H₂O₂—AcOH yields *p*-tolueneazoformhydroxamic acid (VI), m.p. 125° (decomp.) [NH₄ salt (VII), decomp. 144°]. When (V) is treated with NH₃ in EtOH and the solution exposed to the air, (VII) is readily obtained; and similarly the NH₄ salt, m.p. 156° (decomp.), of *p*-chlorobenzeneazoformhydroxamic acid (VIII) (*loc. cit.*). (V) with boiling 20% HCl gives *p*-C₆H₄Me·NH₂ and (III). HNO₂ reconverts (I) into (II). (I) with Ac₂O yields benzene- (IX), *p*-toluene- (X), and *p*-chlorobenzene- (XI) azocarbonamides. Conc. HCl converts (X) and (XI), respectively, into substances, C₈H₁₀ON₃Cl, m.p. 171°, and C₇H₇ON₃Cl₂, m.p. 191°; (IX) is, however, decomposed. (VI) and (VIII)

similarly treated give substances, C₈H₁₀O₂N₃Cl, m.p. 169° (decomp.), and C₇H₇O₂N₃Cl₂, m.p. 180° (decomp.). E. W. W.

1-Chloro-3:4-dinitrobenzene series. II. A. MANGINI and C. DELIDDO (Gazzetta, 1935, 65, 214—228).—Impure 5-chloro-2-nitrophenylhydrazine (I) (A., 1934, 177) as obtained from 1:3:4-C₆H₃Cl(NO₂)₂ (II) prepared from *m*-C₆H₄Cl·NO₂ contains chloro-nitrophenylhydrazines of m.p. 200—204° and 140°, which it is suggested are derived from 1-chloro-2:3- and -3:6-dinitrobenzene. (I) with ClCO₂Et in C₅H₅N yields *Et* α -5-chloro-2-nitrophenylhydrazine- β -carboxylate, m.p. 134—135°. With PhNCS, (I) in C₅H₅N gives γ -phenyl- α -5-chloro-2-nitrophenylisothiosemicarbazide, C₆H₃Cl(NO₂)·NH·N·C(SH)·NHPH, m.p. 190—192° (decomp.); this forms *Ag*, *Hg*, *Cd*, *Cu*, and *Pb* salts, and has the *syn* configuration; with COCl₂ in PhMe it yields 5-anilino-3-(5'-chloro-2'-nitrophenyl)-1:3:4-thiodiazol-2-one, m.p. 187—188°. α -Phenyl- β -5-chloro-2-nitrophenylhydrazine (*loc. cit.*) with Ac₂O gives 5-chloro-2-phenylbenzo-1:2:3-triazole 1-oxide (III), m.p. 138—139.5°. (II) with semicarbazide gives 5-chloro-2-nitrophenylsemicarbazide, NO₂·C₆H₃Cl·NH·CO·NH₂, m.p. 214—216° (decomp.), identified by prep. from (I) and carbamide. (II) with benzidine gives NN'-bis-(5'-chloro-2'-nitrophenyl)benzidine, m.p. 252—253° (decomp.), whilst *p*-C₆H₄(NH₂)₂ gives N-5'-chloro-2'-nitrophenyl-*p*-phenylenediamine [hydrochloride, m.p. 250—258°; *Ac* derivative, m.p. 220—221° (decomp.); N'-benzylidene and -*o*-, -*m*-, and -*p*-nitrobenzylidene derivatives, m.p. 148—149°, 219—220.5° (decomp.), 220—221°, and 198.5—200°, respectively.] E. W. W.

Transformation of dialkylidene-cyclohexanones into the corresponding dialkylphenols. I. Dibenzylidene-cyclohexanone to 2:6-dibenzylphenol. R. WEISS and J. EBERT (Monatsh., 1935, 65, 399—404).—Dibenzylidene-cyclohexanone (I) with HBr and Ac₂O in AcOH at > 40° is converted into 2:6-dibromo-2:6-dibenzylcyclohexanone, m.p. 139—141°; at 52—55° the product is 2:6-dibenzylphenyl acetate (II), m.p. 74—77°, hydrolysed (KOH—EtOH) to 2:6-dibenzylphenol (A., 1929, 552), m.p. < 30°. (II) with Br in AcOH gives 4-bromo-2:6-dibenzylphenol, m.p. 74—77°, and with diazotised *p*-nitroaniline, 4'-nitro-4-hydroxy-3:5-dibenzylazobenzene, m.p. 169—171°. (I) is prepared from cyclohexanone and PhCHO in abs. EtOH (HCl); in KOH—EtOH a substance, C₃₃H₃₀O, m.p. 172—175°, is formed. E. W. W.

Interaction of thionyl chloride with phenol. C. COURTOT and T. Y. TUNG (Compt. rend., 1935, 200, 1541—1543; cf. A., 1932, 506; 1934, 177).—The interaction of SOCl₂ with PhOH is represented by 3PhOH + 2SOCl₂ = (C₆H₄·OH)₃S·Cl + SO₂ + 3HCl, but in the presence of AlCl₃ as dehydrating agent, only a trace of SO₂ is evolved, the H₂O produced by the reaction reacting with the AlCl₃ instead of the SOCl₂. P₂O₅ may also be used as a dehydrating agent, in which case the main product is the compound (C₆H₄·OH)₃S·O·PO(OH)·OPh, m.p. 217—218°, also obtained by the action of OPh·PO(OH)₂ on (C₆H₄·OH)₃S·Cl, m.p. 265—268° (corr.) [lit. 261—262°

(decomp.). The compound $(C_6H_4 \cdot OH)_3S \cdot NO_3$, m.p. 169—170°, with $H_2SO_4-HNO_3$ (60:40) affords a $(NO_2)_2$ -derivative, m.p. 213° (decomp.). The compound $(C_6H_4 \cdot OBz)_3S \cdot Cl$ has m.p. 53—54° (cf. A., 1933, 389; 1934, 69). H. G. M.

Aromatic fluoro-compounds. XX. Fluorophenols. G. SCHIEMANN, with W. WINKELMÜLLER, E. BAESLER, and E. LEY [and, in part, M. SEYHAN] (J. pr. Chem., 1935, [ii], 143, 18—28).—4-Fluoro- α -naphthylamine diazotised yields 4-fluoro- α -naphthol, m.p. 115°. *o*-, *m*-, and *p*-Fluoroanisole with $AlCl_3$ in C_6H_6 give *o*-, *m*-, and *p*-fluorophenol; the last is also obtained from *p*-fluorophenetole. 2-Fluoro- and 2:3'-difluoro-4'-methoxydiphenyl ether similarly give 2-fluoro-, m.p. 69—72°, b.p. 193—200°/22 mm., and 2:3'-difluoro-, b.p. 156—157°/9 mm., 4'-hydroxydiphenyl ether. (I) and Br in $CHCl_3$ yield 4-bromo-2-fluoroanisole, m.p. 16°, b.p. 96°/14 mm., also made by converting 4-bromo-*o*-anisidine (HNO_2 , HBf_4) into 5-bromo-*o*-anisole diazonium fluoride, which decomposes at 152°. *o*-Fluorophenol and *p*-bromoanisole condense (K_2CO_3 , Cu, C_5H_5N) to 2-fluoro-4'-methoxydiphenyl ether, b.p. 160.5—161.5°/12 mm. 2:3'-Difluoro-4'-methoxydiphenyl ether has m.p. 28.5°, b.p. 161.0°/10 mm. E. W. W.

Bromination of substances containing two aromatic nuclei. II. Bromination of phenyl and tolyl esters of *m*- and *p*-nitrobenzoic acids. G. V. JADHAV and Y. I. RANGWALA (Proc. Indian Acad. Sci., 1935, 1, A, 616—619; cf. this vol., 339, 746).—The appropriate nitrobenzoates (I) heated with 1 or 2 mols. of Br yield 4-bromophenyl *p*-, m.p. 181°, 4-bromo-*o*-tolyl *p*-, m.p. 183—184°, 4-bromo-*m*-tolyl *p*-, m.p. 145—146°, 4-bromophenyl *m*-, m.p. 122° (the above were also prepared from the respective bromophenols and nitro-acid chlorides), and (probably) 4:5-dibromo-*o*-tolyl *p*-, m.p. 139—140° (depresses m.p. of 4:6-isomeride), -nitrobenzoate. (I) heated with Br and fuming HNO_3 (8 hr.) give (probably) 4:5-dibromo-*o*-, m.p. 170°, and 3:5:6-tribromo-*p*-, m.p. 193—194°, -tolyl *m*-nitrobenzoate. *p*-Tolyl *p*-nitrobenzoate with Br and conc. HNO_3 at 110—120° (2 hr.) yields 3:5- or 2:5-dibromo-*p*-tolyl *p*-nitrobenzoate, m.p. 165°, converted by Br and conc. HNO_3 at 150—160° (2 hr.) into 3:5:6-tribromo-*p*-tolyl *p*-nitrobenzoate, m.p. 194—195°. F. R. G.

Mononitration of α -naphthol and α -naphthyl methyl ether, and mono-reduction of 2:4-dinitro- α -naphthol. H. H. HODGSON and E. W. SMITH (J.C.S., 1935, 671—674).—In agreement with Pictet *et al.* (Chem. Zentr., 1903, ii, 1109) and contrary to Bell (A., 1933, 499) (OH) $_2N(OAc)_2$ (I) with α - $C_{10}H_7 \cdot OH$ in AcOH < 7° affords a 34% yield of its 2- NO_2 -derivative (II); α - $C_{10}H_7 \cdot OAc$ similarly gives a 45% yield of (II) and some 2:4-(NO_2) $_2$ -derivative (III), but α - $C_{10}H_7 \cdot OMe$ affords mainly its 4- NO_2 -derivative (IV), also obtained by the action of $Me_2SO_4 \cdot K_2CO_3$ on 4-nitro- α -naphthol. Reduction (Fe-50% AcOH) of (IV) and acetylation of the product gives 4-acetamido- α -naphthyl Me ether, converted by (I)-AcOH at 18—20° into its 3- NO_2 -derivative, m.p. 246°. Further nitration (at 70°) of either (IV) or the 2- NO_2 -compound gives the 2:4-(NO_2) $_2$ -derivative. Reduction of (III) with $SnCl_2$ -

HCl-EtOH at < 30° gives the hydrochloride, m.p. 175° (decomp.), of 2-nitro-4-amino- α -naphthol (V), m.p. 160° (decomp.) [N-Ac, m.p. 250° (decomp.) (lit. m.p. 238°) (Me ether, m.p. 214°), and N-Bz derivative, m.p. 230° (decomp.)]. Diazotisation of (V) gives 2-nitro-4-diazonaphthalene 1-oxide (VI), m.p. 163° (decomp.), converted (Sandmeyer) into 4-chloro-2-nitro- α -naphthol, m.p. 155°. (VI) with β - $C_{10}H_7 \cdot OH$ in acid solution gives 2-nitro-1-naphthol-4-azo- β -naphthol, m.p. 233° (decomp.), and with $OK \cdot CS_2Et$, hydrolysis to the mercaptan, and oxidation with $K_2Fe(CN)_6$, it gives 3:3'-dinitro-4:4'-dihydroxydiphenyl disulphide, m.p. 197° (decomp.). (V) with aq. HNO_3 at room temp. gives 2:3-dinitro-4-amino- α -naphthol, m.p. 130°, and with Cl_2 -, Br-, or I- $CHCl_3$, it affords, respectively, its 3-*Cl*-, m.p. 120° (hydrochloride), 3-*Br*- (VII), m.p. 123°, and 3-*I*-derivative, m.p. 138°. 2-Bromo-4-nitro- α -naphthylamine is reduced (Fe-50% AcOH) and acetylated to the corresponding 4-acetamido-compound, m.p. 230°, nitrated to 2-bromo-3-nitro-4-acetamido- α -naphthylamine, m.p. 300°, which gives (VII) when boiled with 10% NaOH. J. W. B.

Alkaline-earth compounds of guaiacol and *p*-cresol. V. P. SUMAROKOV (Lesokhim. Prom., 1933, 2, No. 3, 34—36).—The prep. and properties of the Ba and Ca salts are described. CH. ABS. (r)

Chemical activity of the naphtholic hydrogens of 1:7-dihydroxynaphthalene. L. PALFRAY and A. LEMAN (Compt. rend., 1935, 200, 1328—1331).—No difference in activity was observed between the two OH groups. The Bz_2 derivative, m.p. 101—105°, and diphenylurethane, m.p. 203—204°, of 1:7- $C_{10}H_6(OH)_2$ are described. F. R. G.

Optically active naphthalenesulphoxyacetic acids. F. GAJOWCZYK and J. SUSZKO (Ber., 1935, 68, [B], 1005—1011; cf. A., 1932, 1288).—1- $C_{10}H_7 \cdot SH$ and $CH_2Cl \cdot CO_2H$ in alkaline solution afford 1-naphthylthiolacetic acid, m.p. 111° (corresponding amide, m.p. 147°), oxidised by 30% H_2O_2 in AcOH at room temp. to *r*-naphthalene-1-sulphoxyacetic acid (I), $C_{10}H_7 \cdot SO \cdot CH_2 \cdot CO_2H$, m.p. 151° (decomp.). Repeated crystallisation of (I) and cinchonidine from $COMe_2$ containing 3% of H_2O affords cinchonidine 1-naphthalene-1-sulphoxyacetate, m.p. 190—191° (decomp.), $[\alpha]_D^{20} -296.7^\circ$ in $CHCl_3$, whence 1-naphthalene-1-sulphoxyacetic acid, m.p. 151° (decomp.), $[\alpha]_D^{20} -459^\circ$ in EtOH, which is not racemised by prolonged contact with 5% NaOH at 20°. Treatment of the residual acid from the above resolution with strychnine in EtOH leads to strychnine *d*-naphthalene-1-sulphoxyacetate, m.p. 148—150° (decomp.), $[\alpha]_D^{20} +174^\circ$ in $CHCl_3$, whence *d*-naphthalene-1-sulphoxyacetic acid, m.p. 150—151° (decomp.), $[\alpha]_D^{20} +456^\circ$ in EtOH. 2-Naphthylthiolacetic acid (amide, m.p. 134°) is similarly oxidised to *r*-naphthalene-2-sulphoxyacetic acid, m.p. 144° (decomp.), resolved by cinchonine in C_6H_6 into 1-naphthalene-2-sulphoxyacetic acid, m.p. 144—146° (decomp.), $[\alpha]_D^{20} -171^\circ$ in 99.5% EtOH [cinchonine salt, m.p. 141° (decomp.), $[\alpha]_D^{20} +43^\circ$ in 99.5% EtOH], and *d*-naphthalene-2-sulphoxyacetic acid, m.p. 143—145° (decomp.), $[\alpha]_D^{20} +168^\circ$ in 99.5% EtOH (cinchonine salt, m.p. 156—158° (decomp.), $[\alpha]_D^{20} +175^\circ$ in 99.5% EtOH). H. W.

Salt-like properties of halogens. Products of the action of bromine on silver salts. M. I. USCHAKOV and V. O. TCHISTOV (Ber., 1935, 68, [B], 824—830; cf. A., 1934, 1187).—Immediate decolorisation is observed when equiv. solutions of Br and AgNO_3 in MeOH are mixed and the amount of pptd. AgBr increases with time owing to the reducing action of MeOH. Determination of the oxidising power of the solution shows that reaction is $\text{Br}_2 + \text{AgNO}_3 \rightarrow \text{AgBr} + \text{BrNO}_3$; $2\text{BrNO}_3 + \text{AgNO}_3 \rightleftharpoons \text{AgBr} + \text{Br}(\text{NO}_3)_2$. The isolation of BrNO_3 from MeOH solution appears impossible, but the compound, $\text{BrNO}_3 \cdot 2\text{C}_5\text{H}_5\text{N}$, m.p. 78—78.5° in a sealed capillary, is obtained when Br in CHCl_3 is gradually added to AgNO_3 in $\text{C}_5\text{H}_5\text{N} \cdot \text{CHCl}_3$ at 0°. With cyclohexene it yields 2-bromocyclohexyl nitrate, b.p. 125—126°/15 mm., and bromocyclohexyl Me ether mixed with dibromocyclohexane. Ag salts of carboxylic acids and Br yield compounds (I) of positive Br^\dagger , reaction proceeding to completion in presence of a large excess of Ag salt, when (I) are periodically removed, for example, by addition of cyclohexene or when the $\text{C}_5\text{H}_5\text{N}$ complexes of the Ag salts are used. The following 2-bromocyclohexyl esters are described: benzoate, m.p. 64—64.5°; m-nitrobenzoate, m.p. 81.5°; acetate, b.p. 108—111°/12 mm.; propionate, b.p. 126—128°/11 mm.; n-butyrate, b.p. 140°/10 mm., 145°/14 mm. Addition of Cl_2 and cyclohexene to a suspension of AgOBr in CCl_4 at -10° leads to 2-chlorocyclohexyl benzoate, m.p. 50.5—51.5°. H. W.

Relationship between absorption and valency in the chemistry of organic colouring matters. Halochromic dyes. P. RUMPF (Bull. Soc. chim., 1935, [v], 2, 882—894).—It is suggested that the coloured forms of all halochromic colouring matters are due to the presence of a central carbonium (ter-covalent C) or immonium (dicovalent N) cation rather than to quinonoid forms. Various dyes of the di- and tri-phenylmethane, phthalein, and diphenylamine groups are discussed on this basis. The colour of the anthocyanin group may also be due to the carbonium condition of C in position 2 rather than to an oxonium salt, and the oxidation-reduction systems of indo-phenol, safranin, and related types are consistently explained. The polar effects of substituents are also discussed. J. W. B.

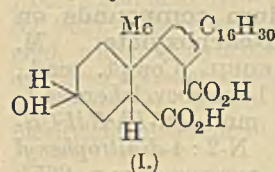
Triphenylmethane series. II. Photochemical behaviour and optical activity of triphenylmethyl derivatives. I. LIFSCHITZ (Rec. trav. chim., 1935, 54, 397—408; cf. A., 1934, 403).—3-Methoxy-9-phenylfluorene (I) (modified prep.), m.p. 125° (lit. 84°), $+\text{C}_6\text{H}_6$, m.p. about 116° (decomp.), and $+\text{CCl}_4$, photosensitive, gives the chloride, m.p. 119—120°, not photosensitive, which with $\text{SH} \cdot \text{CH}_2 \cdot \text{CO}_2\text{H}$ in CS_2 readily gives 3-methoxy-9-phenylfluorene-9-thioglycollic acid, m.p. 156°, resolved by brucine into the l-acid, m.p. 98—100° [brucine salt, m.p. 131° (decomp.)]. When illuminated, this is largely racemised, but gives also traces of (I) and a substance, m.p. 184—185°. Illumination probably produces $[\text{C}_{19}\text{H}_{12} \cdot \text{OMe}]^+$ and $[\text{SH} \cdot \text{CH}_2 \cdot \text{CO}_2\text{H}]^-$. 9-Phenylfluorene-9-thioglycollic acid, m.p. 149.5°, gives, when illuminated, a small amount of a substance, m.p. 187°, possibly 9-fluorene peroxide. Attempts to prepare a perchlorate of (I) failed. R. S. C.

Saligenin. G. A. KIRKHOFF and A. D. STEPANOV (Khim. Farm. Prom., 1934, No. 3, 14—15).—The reduction of salicylamide, both with Na—Hg in 96% EtOH, and electrolytically, using a Hg cathode, is described. CH. ABS. (r)

Irradiation of ergosterol. I. L. FRANCESCONI and F. OPISSE (Annali Chim. Appl., 1935, 25, 124—135).—From the physical properties and colour reactions of the products obtained by exposing dry ergosterol, in the cold and in presence of CO_2 , to the light from a Hg-vapour lamp for 1—32 hr., the proportions of lumisterol, vitamin- D_2 , and suprasterol are deduced. The best conditions for obtaining vitamin- D_2 are given. T. H. P.

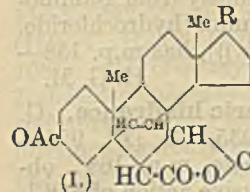
Photographic activity of irradiated ergosterol and its nature. II. L. FRANCESCONI and L. BALDISSERA (Annali Chim. Appl., 1935, 25, 136—148).—Pure ergosterol does not affect a photographic plate, but after irradiation either in the dry state and in presence of CO_2 or in EtOH, it acts on the plate more vigorously than autunite. The activity persists for a long time. The phenomenon is chemical, O taken up by the irradiated material being partly released in active form. Irradiation of santonin with ultra-violet light produces similar results. T. H. P.

Stereochemistry of sterols and bile acids. H. LETTRÉ (Ber., 1935, 68, [B], 766—767).—Cholesterol is transformed through cholestanol-6-one into β -chlorocholestan-6-one, oxidised by HNO_3 to a chlorodicarboxylic acid which is hydrolysed to the OH-acid (I). Treatment of (I) with boiling Ac_2O gives the lactonic acid, $\text{C}_{27}\text{H}_{44}\text{O}_4$, m.p. 211—213°; OH at C 3 and CO_2H at C 5 are therefore in the cis-position to one another. Chenodeoxycholic acid (II)



is oxidised by NaOBr to a OH-tricarboxylic acid (III), which readily gives a lactonic dicarboxylic acid (IV). (II) is a derivative of cholic acid, and is hence derived from cis-decahydronaphthalene. Me at C 10 and H at C 5 are cis to one another and CO_2H at C 5 in (III) is trans to these substituents. Lactone formation shows that OH at C 7 is cis to CO_2H at C 5. (IV) is also derived from biliobanic acid, the product of the action of NaOBr on cholic acid (V). OH at C 7 in (V) and in (II) are sterically similar and trans to Me at C 10 and H at C 5. H. W.

Transformation products of ergosteryl acetate-maleic anhydride. H. H. INHOFFEN (Ber., 1935, 68, [B], 973—981; cf. A., 1934, 186, 769).—The action of MgMeI under defined conditions on ergosteryl acetate-maleic anhydride [(I); $\text{R} = \text{C}_9\text{H}_{17}$] gives an enol-lactone (II), $\text{X} \left\{ \begin{array}{l} \text{CH} \cdot \text{C}(\text{CH}_2) \\ \text{CH} \text{---} \text{CO} \end{array} \right\} \text{O}$ ($\text{X} = \text{C}_{30}\text{H}_{46}\text{O}_2$), m.p. 195° (corr.), which reduces $\text{NH}_3 \cdot \text{Ag}$ solution but does not give the Legal reaction. A small amount of a product (III), $\text{X} \left\{ \begin{array}{l} \text{C} \cdot \text{CMe} \\ \text{C} \cdot \text{CMe} \end{array} \right\} \text{O}$, m.p. 246° (corr.), is also obtained the yield of which can be greatly increased by modified conditions. If elimin-



ation of H_2O is avoided the primary product (IV), $X \begin{matrix} (\text{CH}\cdot\text{CMe}(\text{OH}) \\ (\text{CH}\cdot\text{CMe}(\text{OH})) \end{matrix} > \text{O}$, m.p. 275—277°, is obtained, converted by hot Ac_2O into (III). Alkaline hydrolysis of (II) yields a complex mixture from which are isolated a sparingly sol. acidic substance, m.p. 290—295° (decomp.), transformed by CH_2N_2 into a Me ester or ether, $\text{C}_{34}\text{H}_{50}\text{O}_5$, m.p. 195—196° (corr.) [acetate, $\text{C}_{36}\text{H}_{52}\text{O}_4$, m.p. 205—206° (corr.)], and a freely sol., neutral product, $\text{C}_{33}\text{H}_{50}\text{O}_4$, m.p. 121—123° (corr.), which does not react with CH_2N_2 but is converted by boiling Ac_2O into the acetate, $\text{C}_{35}\text{H}_{52}\text{O}_5$, m.p. 129—131° (corr.). Exhaustive hydrogenation (Pt sponge in AcOH) of (II) yields the H_6 -derivative (V), $\text{C}_{35}\text{H}_{56}\text{O}_4$, m.p. 215—217° (corr.), hydrolysed to a OH-acid, transformed by boiling Ac_2O into (V) and a neutral product, m.p. 201—202° (corr.), which also yields (V) when acetylated. Reduction of (II) in presence of Pd and COMe_2 yields the dihydroenol-lactone (VI), m.p. 182° (decomp.) (cf. I; R = C_9H_{19}), also obtained by treating 2,2-dihydroergosteryl acetate-maleic anhydride (VII) with MgMeI in Et_2O . Ozonisation of (VI) followed by oxidative fission of the ozonide with CrO_3 -AcOH gives a neutral product (VIII), $\text{C}_{35}\text{H}_{50}\text{O}_9$, m.p. 304—305° (corr., decomp.), and an acid substance of which the Me ester (IX), m.p. 307—308° (corr.), is identical with that obtained by the ozonisation of (VII). (VIII) is converted into (IX) by the successive action of boiling 80% AcOH and CH_2N_2 . H. W.

Sterol from *Pinus sabiniana*.—See this vol., 797.

Action of organomagnesium compounds on ethyl 1-aminocyclohexane-1-carboxylate. M. GODCHOT and (MLLE.) G. CAUQUIL (Compt. rend., 1935, 200, 1479—1481).—*Et* 1-aminocyclohexane-1-carboxylate (I), b.p. 110°/15 mm. (N-Ph-NH-CS-derivative, m.p. 258—259°; N-2:4-dinitrophenyl derivative, m.p. 168°; forms a compound, m.p. 265°, with CS_2), obtained from the acid (A., 1906, i, 425), reacts with MgMeI (5 mols.) forming 1-aminocyclohexyldimethylcarbinol, b.p. 145°/11 mm. (hydrochloride, m.p. 138°), 1-hydroxycyclohexylisopropyl alcohol, m.p. 82°, b.p. 125°/15 mm. (cf. A., 1909, i, 796), and 3:6-bis-pentamethylene-2:5-dimethyl-3:6-dihydropyrazine (II), m.p. 212°. The formation of (II) is explained by the self-condensation of the intermediate compound 1-aminocyclohexyl Me ketone (III), b.p. 105°/10 mm. (hydrochloride, m.p. 195°), obtained from (I) with 3 mols. of MgMeI . (III) with KOEt-EtOH affords (II). Similarly (I) and 3 mols. of MgEtBr afford 1-aminocyclohexyl Et ketone, b.p. 132—133°/12 mm. (hydrochloride, m.p. 230°), and (I) and MgPhBr give mainly 1-aminocyclohexyl Ph ketone, m.p. 126—127° (hydrochloride, m.p. 258—260°), and some 1- α -hydroxybenzhydrylcyclohexanol (A., 1913, i, 485). Di-1-cyanocyclohexylamine (A., 1914, i, 671) formed spontaneously from α -amino- α -cyanocyclohexane, b.p. 105°/12 mm. [hydrochloride, m.p. 199° {lit. 187—189° (decomp.)}], has m.p. 138—139°. H. G. M.

Overcoming two cases of steric hindrance. G. WITTIG and H. PETRI (Ber., 1935, 68 [B], 924—927).—*Me* 1-benzhydryl-8-naphthoate, m.p. 168°, obtained from the acid by the successive action of SOCl_2 and MeOH or by means of CH_2N_2 in Et_2O , is unaffected

by MgPhBr but is converted by LiPh in Et_2O into 1-benzhydryl-8-hydroxydiphenylmethyl-naphthalene (I), m.p. 200—201° (K derivative). (I) is easily transformed by MeOH-HCl into 1-benzhydryl-8-methoxydiphenylmethyl-naphthalene (II), m.p. 247—248° (slight decomp.), and by HCl in CHCl_3 followed by AcCl into 1-benzhydryl-8-chlorodiphenylmethyl-naphthalene, decomp. 140—142°. Reduction of (I) by ZnCl_2 in AcOH-HCl containing a trace of HI affords 1:8-dibenzhydrylnaphthalene, m.p. 243°, also obtained by successive treatments of (II) with Na-K and MeOH. Similarly, 9:9-diphenylacenaphthen-10-one is indifferent towards MgPhBr but is readily transformed by LiPh into 10-hydroxy-9:9:10-triphenylacenaphthene, m.p. 169—170°, whence 10-methoxy-, m.p. 174—175°, and 10-chloro-, decomp. 165°, -9:9:10-triphenylacenaphthene. H. W.

Complex formation between polynitro-compounds and aromatic hydrocarbons.—See this vol., 828.

Relations between constitution and substantivity of cotton-substantive "naphthols." H. KRZIKALLA and B. EISTERT (J. pr. Chem., 1935, [ii], 143, 50—58).—The substantivity of "Naphthol AS" (2-hydroxy-3-naphthanilide) (I) is usually ascribed to the $\cdot\text{CO}\cdot\text{NH}_2$. "Homonaphthol AS" (2-hydroxy-3-naphthylacetanilide) (II) (see below), which gives yellower dyes than (I), is little more substantive than β - $\text{C}_{10}\text{H}_7\cdot\text{OH}$ and the *N*-Me derivative of (I) has also low substantivity; that of (I) is therefore ascribed to an enol structure, $\text{C}_{10}\text{H}_6(\text{OH})\cdot\text{C}(\text{OH})\cdot\text{NPh}$. This is supported by the low substantivity of β -naphthol-3-sulphonanilide (A., 1931, 479). The action of CH_2N_2 on (I) yields, however, only 2-methoxy-3-naphthanilide, m.p. 154°. (II) is prepared as follows. 2-Hydroxy-3-naphthoyl chloride (new m.p. 100—101°) with CH_2N_2 gives 2-hydroxy-3-naphthoyldiazomethane (III), m.p. 128—129° (decomp.); attempts to combine this with NH_2Ph yielded only 5:6-benzo-3-coumaranone (IV) [obtained in quant. yield from (III) heated in EtOH with HCl]. 2-Acetoxy-3-naphthoyl chloride (new m.p. 98°) yields 2-acetoxy-3-naphthoyldiazomethane (V), m.p. 122—123° (decomp.), converted by HCl in AcOH into 3-chloroacetyl- β -naphthol, m.p. 151° [which in $\text{C}_6\text{H}_5\text{N}$ gives (IV)]. With NH_2Ph , (V) yields 2-hydroxy-3-naphthylacetanilide (II), m.p. 215—216°. This is hydrolysed (KOH) to 2-hydroxy-3-naphthylacetic acid (+ H_2O ; sinters at 150°, chars at 240°) (*p*-nitrobenzeneazo-derivative), which with P_2O_5 in xylene forms 2-hydroxy-3-naphthylacetolactone (5:6-benzo-2-coumaranone), m.p. 128—129°. 2-Hydroxy-3-naphthmethyl-anilide with CH_2N_2 gives the 2-*OMe*-compound, m.p. 96—97°. E. W. W.

Nitration of lactones Ia and IIb. [Lactones of the isomeric 2-phenyl-3- α -hydroxybenzylcyclopropane-1-carboxylic acids.] F. SCHENCK (Ber., 1935, 68, [B], 920—924; cf. A., 1932, 1029).—Under defined conditions lactone Ia is transformed by AcNO_3 in Ac_2O into the lactone (I) of 2-*p*-nitrophenyl-3- α -hydroxybenzylcyclopropane-1-carboxylic acid Ia, m.p. 134—135°, whilst a larger proportion of AcNO_3 affords a dinitrolactone Ia, m.p. 199—200°, which is hydrolysed to the corresponding acid, decomp.

185° (*Me* ester, m.p. 191—192°). (I) is similarly converted into 2-*p*-nitrophenyl-3- α -hydroxybenzylcyclopropane-1-carboxylic acid Ia (II), decomp. 168° [*Me* ester (III), m.p. 167—167.5°], transformed by H_2SO_4 -AcOH at 15—20° into (I). Lactone Iib similarly yields the lactone (IV) of 2-*p*-nitrophenyl-3- α -hydroxybenzylcyclopropane-1-carboxylic acid, m.p. 154—155°, whence 2-*p*-nitrophenyl-3- α -hydroxybenzylcyclopropane-1-carboxylic acid Iib (V), m.p. 174° (*Me* ester, m.p. 130—131°), reconverted by Ac_2O or H_2SO_4 -AcOH into (III). Since (II) is converted into (IV) by Ac_2O , NO_2 is attached to the same Ph and in the same position in (I), (II), (IV), and (V) and the *para* position follows from the production of *p*- $NO_2 \cdot C_6H_4 \cdot CO_2H$ by the oxidation of (I) with $KMnO_4$. Since (III) is transformed by H_2SO_4 -AcOH followed by KOH -EtOH into α -*p*-nitrobenzylidene- γ -phenyl- Δ^2 -butenoic acid, m.p. 212—213.5°, NO_2 is substituted in the 2-Ph group. H. W.

Preparation of substituted *o*-aroylbenzoic acids in the identification of aromatic hydrocarbons.

H. W. UNDERWOOD, jun., and W. L. WALSH (J. Amer. Chem. Soc., 1935, 57, 940—942).—Aromatic hydrocarbons (I) may be identified by conversion [Friedel-Crafts; technique for 0.4 g. of (I) described] into *o*-aroylbenzoic or -tetrachlorobenzoic acids, followed, if necessary, by ring-closure to anthraquinone derivatives. The following have been prepared: *o*-4-*n*-butyl-, m.p. 97—98°, *o*-2:4-diethyl-, m.p. 114—116°, and *o*-2:4:6-triethylbenzoylbenzoic acid, m.p. 129.5—130.5°; 3:4:5:6-tetrachloro-2-2':3'-, m.p. 177.5—178.5°, -2':4'-, m.p. 222—224°, -2':5'-dimethyl-, m.p. 244—246°, and -4'-ethylbenzoylbenzoic acid, m.p. 172—173°; 5:6:7:8-tetrachloro-2:3-dimethylanthraquinone. R. S. C.

(A) 1:9-Benzanthrone-8-carboxylic acid and dibenzanthronedicarboxylic acid from 8-bromo-1-naphthoic acid. H. G. RULE, W. PURSELL, and (in part) A. J. G. BARNETT. (B) Cyclisation of 1:9-benzanthrone-8-carboxylic acid to 8:11-ketobenzanthrone, and of dibenzanthronedicarboxylic acid to diketodibenzanthrone. L. A. BIGELOW and H. G. RULE (J.C.S., 1935, 571—572, 573—575).—(A) *Me* 8-bromo-1-naphthoate and *o*- $C_6H_4I \cdot CO_2Me$ heated together with Cu-bronze at 215—220° afford (with other products) the *Me_2* ester (I), m.p. 132—133°, of 8-*o*-carboxyphenyl-1-naphthoic acid, m.p. 231—232°, which is obtained, together with some *Me* 8-*o*-carboxyphenyl-1-naphthoate (II), m.p. 150—151°, by hydrolysis with KOH -EtOH. (I) with conc. H_2SO_4 at 100° gives 1:9-benzanthrone-8-carb-

proved], decarboxylated by Cu-bronze in boiling quinoline to benzanthrone (IV). Fusion of (III) with 10 parts of KOH at 225—230° affords dibenzanthronedicarboxylic acid (V), which is a blue vat dye. (V) is decarboxylated by Cu-bronze in quinoline to dibenzanthrone, which gives the same absorption spectrum as violanthrone-A separated from crude violanthrone (Maki, B., 1933, 261).

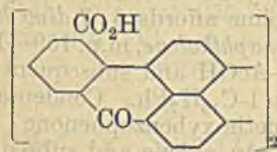
(B) The products obtained by treatment of (I) with H_2SO_4 (d_4^{20} 1.823) vary with the temp. of reaction. At 15—40° *Me* 1:9-benzanthrone-8-carboxylate, m.p. 159—160°, is obtained in almost quant. yield, with slight hydrolysis to (III), which is obtained in 90% yield at 100°. At 120—170° (IV) is obtained in small yield with partial dehydration to 8:11-ketobenzanthrone (VI), m.p. 327—328°, which at >135° is formed together with (?) the lactone (VII), m.p. 355—356°, of 11-hydroxybenzanthrone-8-carboxylic acid (separation difficult). Much loss by sulphonation occurs at >160°. (VII) is prepared free from (VI) by oxidation of (III) with CrO_3 - H_2SO_4 , and (VI) is best prepared by addition of P_2O_5 to (III) dissolved in *o*- $C_6H_4(CO)_2O$ at 200°. Similar dehydration of (V) gives diketodibenzanthrone (purple-blue vat dye). Neither decarboxylation nor methylation of (VII) could be effected. All m.p. in (b) are corr. J. W. B.

Occurrence of norstictic acid in *Parmelia acetabulum*.—See this vol., 905.

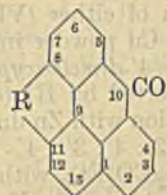
Methylcholanthrene from cholic acid. L. F. FIESER and M. S. NEWMAN (J. Amer. Chem. Soc., 1935, 57, 961).—Cholic acid (I) is oxidised to dehydrocholic acid, which is hydrogenated (PtO_2) to impure 3:7-dihydroxy-12-ketocholanic acid, pyrolysed (260—330°) to a mixture, which with Se at 320—330° affords methylcholanthrene in 5.4% over-all yield. R. S. C.

Isolation of 3-hydroxy-6-ketoallocholanolic acid from pig's bile.—See this vol., 773.

Syntheses with cyclic ketonic esters. I. Synthesis of 1-methylcyclohexane-2-acetic-1-carboxylic acid and related compounds. C. K. CHUANG, Y. L. TIEN, and Y. T. HUANG. II. Synthesis of cyclohexane-1:2-diacetic acid and related compounds. C. K. CHUANG and C. M. MA (Ber., 1935, 68, [B], 864—870, 871—876).—I. *Et* 1-methylcyclohexan-2-one-1-carboxylate (improved prep.) does not condense with $CN \cdot CH_2 \cdot CO_2Et$ in presence of piperidine or KOEt, but is transformed by Zn and $CH_2Br \cdot CO_2Et$ into *Et_2* 2-hydroxy-1-methylcyclohexane-1-carboxylate-2-acetate (I), b.p. 169—170°/10 mm. (corresponding non-cryst. acid). (I) is dehydrated by $SOCl_2$ in $C_6H_5N \cdot Et_2O$ to the unsaturated ester, $C_{14}H_{22}O_4$, b.p. 144—156°/10 mm., hydrolysed by KOH - $MeOH$ to the *Me H* ester (II), $C_{11}H_{16}O_4$, m.p. 133—134° (*Ag* salt; corresponding anilide, m.p. 146.5—147.5°), and by KOH -EtOH to the *Et H* ester (III), $C_{12}H_{18}O_4$, m.p. 92.5—93° (anilide, m.p. 107—108°). (II) is catalytically reduced to 1-carbomethoxy-1-methylcyclohexane-2-acetic acid (IV), m.p. 59—60°, the corresponding *Et H* ester (V), m.p. 79—81°, being obtained similarly from (III). Hydrolysis of (IV) or (V) affords 1-methylcyclohexane-1-carboxylic-2-acetic acid (VI), m.p. 163—164° (anilide, m.p. 164—165°; dianilide, m.p. 186—187°), also obtained by treating (I)



(V.)

(VI.) R = CO
(VII.) R = CO-O-

oxylic acid (III), m.p. 273° [also by the action of cold conc. H_2SO_4 on (II), the constitution of which is thus

successively with HBr and Zn dust in AcOH and hydrolysing the product. Attempts to isomerise (VI) by boiling with Ac₂O or distillation in high vac. were unsuccessful.

II. Et cyclohexan-2-one-1-carboxylate is transformed by Na and CH₂Br·CO₂Et in C₆H₆ into Et₂ cyclohexan-2-one-1-carboxylate-1-acetate, b.p. 168—170°/8.8 mm., which does not yield ketonic derivatives. It is converted by boiling conc. HCl followed by esterification into Et cyclohexan-2-one-1-acetate (VII), b.p. 131—133°/9.8 mm. (semicarbazone, m.p. 191—193°; phenylhydrazone, m.p. 134—135°); cyclohexan-2-one-1-acetic acid has m.p. 39—41°. (VII) with Zn and CH₂Br·CO₂Et in C₆H₆ affords Et₂ 1-hydroxycyclohexane-1:2-diacetate (VIII), b.p. 132—134°/0.5 mm.; (VII) does not condense with CN·CH₂·CO₂Et in presence of piperidine. Dehydration of (VIII) by SOCl₂ in C₅H₅N-EtOH yields the unsaturated ester, b.p. 129—135°/0.5 mm., hydrolysed to a cyclohexene-1:2-diacetic acid, m.p. 164—166° after softening at 155°, reduced (Pt-sponge-EtOH) to a mixture (IX) of *cis*- and *trans*-cyclohexane-1:2-diacetic acids from which a homogeneous material could not be obtained by crystallisation or isomerisation. (IX) with NH₂Ph at 180—190° yields a product from which *trans*-cyclohexanediacetmonoanilide, m.p. 179°, is derived, whence *trans*-cyclohexane-1:2-diacetic acid, m.p. 167°.

H. W.

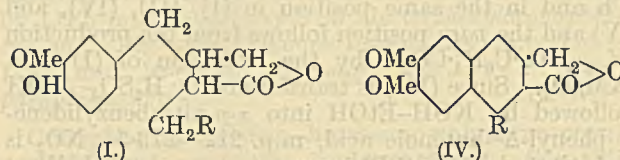
Derivatives of *o*-piperonal. T. S. STEVENS (J.C.S., 1935, 725—726).—3:4-Dibromopyrocatechol methylene ether in CHCl₃ is converted by 38% CH₂O-AcOH-H₂SO₄ at 40° (2 weeks) and hydrolysis of the Ac derivative formed into 2:3-dibromo-5:6-methylenedioxybenzyl alcohol, m.p. 115°, reduced (3% Na-Hg in boiling 70% MeOH) to 2:3-methylenedioxybenzyl alcohol, b.p. 165°/30 mm., m.p. 34—35°, oxidised (KMnO₄) to *o*-piperonylic acid. J. W. B.

α -Aminoketones. II. Experiments based on Gabriel's synthesis. J. PASCUAL and R. R. REBOLLO (Anal. Fís. Quím., 1934, 32, 374—381).—The chloride (I) (improved prep.) of phthalimidoacetic acid (*Me* ester, m.p. 115—116°) with CHNa(CO₂Et)₂ in C₆H₆ yields a compound, C₁₇H₁₇O₇N, and an acid, C₁₅H₁₂O₇N₂, as well as Et phthalimidoacetylmalonate. Et γ -phthalimidoacetoacetate (cf. Pfähler, A., 1913, i, 750) with NaOEt and MeI in C₆H₆ yields Et γ -phthalimido- α -methylacetoacetate (?), m.p. 79—80°. (I) with CH₂Ph·CN(CO₂Et)₂ gives Et phthalimidoacetylbenzylmalonate (cf. *loc. cit.*), hydrolysed by conc. HCl at 120° to an unidentified compound (decomp. 170°) containing 31.6% Cl. F. R. G.

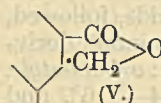
5-Chloro-3:4-dimethoxycinnamic acid and some of its esters. R. M. HANN (J. Washington Acad. Sci., 1935, 25, 220—222).—5-Chloroveratraldehyde when heated with malonic acid, C₅H₅N, and C₅H₁₁N (steam-bath) affords 5-chloro-3:4-dimethoxycinnamic acid, m.p. 126—127° [*Me*, m.p. 63°, *Et*, m.p. 165°, *phenacyl*, m.p. 132°, *p*-fluoro-, m.p. 135° (I), *p*-chloro-, m.p. 137°, and *p*-bromo-phenacyl ester, m.p. 132°]. All m.p. except (I) are corr. H. G. M.

Constituents of natural phenolic resins. I. Matairesinol. R. D. HAWORTH and T. RICHARDSON. II. "Sulphite-liquors lactone." R. D. HAWORTH, G. SHELDRIK, and (in part) C. R. MAVIN

(J.C.S., 1935, 633—636, 636—644).—I. Analytical data for matairesinol (I) + EtOH, m.p. 74—76°, and anhyd., m.p. 117—118°, [α]_D¹⁸ -48.6° in COMe₂ (lit. -4.89°), and its Me₂ (II), m.p. 127—128°, [α]_D¹⁹ -35.6° in CHCl₃ {Br₂-derivative, m.p. 126—127°, [α]_D¹⁸ -38.4° in CHCl₃; (NO₂)₂, m.p. 179—180°, [α]_D¹⁸ -126.6° in CHCl₃, by cold conc. HNO₃-AcOH, and (NO₂)₄-derivative, m.p. 202—203°, [α]_D¹⁹ -161.6° in COMe₂, by cold fuming HNO₃, or boiling conc. HNO₃}, and Et₂ ether (III), m.p. 97—98°, agree best with the composition C₂₀H₂₂O₆ (Easterfield *et al.*, J.C.S., 1910, 95, 1028, give C₁₉H₂₀O₆). Oxidation of (II) and (III)



with 3% KMnO₄-EtOH-NaOH (CO₂ stream) affords, respectively, veratric acid and 3-methoxy-4-ethoxybenzoic acid (yield > 50%). Oxidation of (II) with Pb(OAc)₄-AcOH effects ring-closure to give a 10—15% yield of a mixture (separated by fractional crystallisation from MeOH-CHCl₃) of the lactone (IV), m.p. 254—255°, of 6:7-dimethoxy-1-(3':4'-dimethoxyphenyl)-3-hydroxymethylnaphthalene-2-carboxylic acid (less sol.) and the isomeric lactone (V), m.p. 215—216°, of 6:7-dimethoxy-1-(3':4'-



dimethoxyphenyl)-2-hydroxymethylnaphthalene-3-carboxylic acid. Hence (I) has the structure assigned [R=3:4-C₆H₃(OMe)₂].

II. Dimerisation of 3:4-dimethoxyphenylpropionic acid in Ac₂O at 100° affords the anhydride (VI), m.p. 305—306°, of 6:7-dimethoxy-1-(3':4'-dimethoxyphenyl)naphthalene-2:3-dicarboxylic acid, m.p. 232—234° (*Me*₂, m.p. 166°, and *Et*₂, m.p. 127—128°, esters), which is obtained together with veratroylveratric acid by oxidation of the Me₂ ether (VII) of "sulphite-liquors lactone" (VIII) (Erdtmann, A., 1934, 1352). Condensation of Na β -3:4-dimethoxybenzoylpropionate with veratraldehyde in Ac₂O at 100° gives the lactone (IX), m.p. 140—147°, resolidifying and remelting 153°, of β -3:4-dimethoxybenzoyl- α -3':4'-dimethoxybenzylidenepropionic acid, m.p. 175°, converted by boiling MeOH-HCl into the *Me* ester, m.p. 177—178°, of 6:7-dimethoxy-1-(3':4'-dimethoxyphenyl)naphthalene-3-carboxylic acid (X), m.p. 222—223° (*Br*₁-m.p. 295—296°, shrinks at 280—285°, and *Br*₂-, m.p. 260°, -derivatives), which is obtained by hydrolysis, or by the action of I-CHCl₃ on (IX). Decarboxylation of either (VI) (2% yield) or (X) (50% yield) with Cu powder in quinoline affords 6:7-dimethoxy-1-(3':4'-dimethoxyphenyl)naphthalene, m.p. 159—160°, converted by HI (*d* 1.7)-AcOH and subsequent distillation with Zn dust into 1-C₁₀H₇Ph. Condensation of 3:4:3':4'-tetramethoxybenzophenone and (-CH₂·CO₂Et)₂ with KOEt in xylene and subsequent hydrolysis (5% NaOH) affords γ -di-(3:4-dimethoxyphenyl)itaconic acid (XI), m.p. 128—130°, the anhydride, m.p. 147—148°, of which with AlCl₃-PhNO₂ gives 1-keto-5:6-dimethoxy-3-(3':4'-dimethoxyphenyl)indene-2-acetic acid, m.p. 216—217° [semicarbazone (not analysed), m.p. 254° (decomp.)], reduced (H₂-

Pd-C-AcOH) to 5:6-dimethoxy-3-(3':4'-dimethoxyphenyl)hydrindene-2-acetic acid, m.p. 169—170°. Condensation of OH·CH₂C(CO₂Et)·CH₂·CO₂Et with veratrole (2 mols.) in AcOH-H₂SO₄ at < 15° and subsequent hydrolysis (10% KOH-MeOH) affords γ -di-3:4-dimethoxyphenyl-n-propane- α β -dicarboxylic acid, m.p. 177—178° [also obtained in small yield by catalytic reduction of (XI)], the anhydride (AcCl) of which is converted by AlCl₃-PhNO₂ at 0° into 4-keto-6:7-dimethoxy-1-(3':4'-dimethoxyphenyl)-1:2:3:4-tetrahydronaphthalene-2-carboxylic acid (XII), m.p. 200—201° (90% yield) [semicarbazone, m.p. 244—245° (decomp.)], the Et ester (XIII), m.p. 130—131°, of which is reduced (Zn-Hg-HCl) to 6:7-dimethoxy-1-(3':4'-dimethoxyphenyl)-1:2:3:4-tetrahydronaphthalene-2-carboxylic acid, m.p. 184—185° (Br₂-derivative, m.p. 190—191°), dehydrogenated (Se at 280°) to the corresponding naphthalene. With Br-CHCl₃ (XIII) gives a 3:6'-Br₂-derivative, m.p. 146—147°, converted by NPhEt₂ at 180—190° into Et 4-hydroxy-6:7-dimethoxy-1-(6'-bromo-3':4'-dimethoxyphenyl)-naphthalene-2-carboxylate (XIV), m.p. 193—195°, converted (repetition unsuccessful) by H₂-Pd-C in boiling EtOH into (?) the debrominated ester, m.p. 228°. (XIV) with 40% CH₂O in conc. HCl-AcOH at 100° gives the lactone, m.p. 319—320°, of 4-hydroxy-6:7-dimethoxy-1-(6'-bromo-3':4'-dimethoxyphenyl)-3-hydroxymethylnaphthalene-2-carboxylic acid. (XIII) with HCO₂Et-Na in C₆H₆ affords Et 3-aldehydo-4-keto-6:7-dimethoxy-1-(3':4'-dimethoxyphenyl)-1:2:3:4-tetrahydronaphthalene-2-carboxylate, m.p. 165°, reduced by 4% Na-Hg in 0.2% NaOH at 100° (CO₂ stream) to the corresponding 4-hydroxy-3-hydroxymethyl-acid, m.p. 200°, converted by heating at 200°, or by boiling 10% H₂SO₄, into the α -form, m.p. 186—187°, of the lactone (XV) (B, R=Me) of 6:7-dimethoxy-1-(3':4'-dimethoxyphenyl)-3-hydroxymethyl-1:2:3:4-tetrahydronaphthalene-2-carboxylic acid. Similar condensation of (XIII) with Et₂C₂O₄ (KOEt-C₆H₆) affords the lactone (XVI) +H₂O, m.p. 212—213°, of 4-hydroxy-6:7-dimethoxy-2-carboxy-1-(3':4'-dimethoxyphenyl)-1:2:3:4-tetrahydronaphthalene-3-glycollic acid [Et₂ ester, m.p. 145—146°, hydrolysed to a carboxylic acid, m.p. 212—213°, which depresses the m.p. of the hydrated form (XVI)], converted at 215°/12 mm. into an acidic compound, m.p. 285°. When heated at 215° (10 min.) (XVI) gives the stereoisomeric β -form, m.p. 209—210°, of (XV). Dehydrogenation of the β -form with Pd-black at 220—230°, or the action of Pb(OAc)₄-AcOH at 70° on either the α - or β -form, gives (IV) (above), converted by NaOBr-NaOH and subsequent treatment with AcCl into (VI). Dehydrogenation of (VII) with Pb(OAc)₄ or Se at 255—260° affords (V) (above), isomeric with (IV), but also oxidised to (VI). Hence (VII) has the structure A [R=Me; R'=3:4-

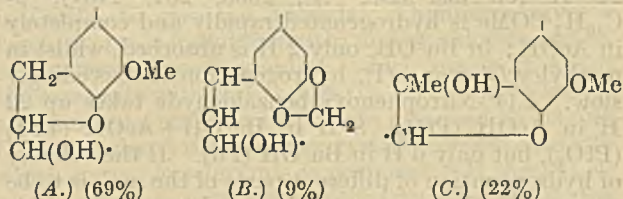
KMnO₄ to 5-methoxy-4-ethoxy-2-(3'-methoxy-4'-ethoxybenzoyl)benzoic acid identical with that obtained by Vanzetti *et al.* (A., 1934, 1099) from isoolivil.

J. W. B.

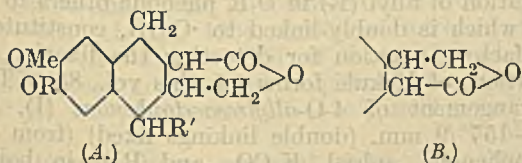
Condensation of oxalic esters with β -methyltricarballic ester. C. K. CHUANG and C. M. MA (Ber., 1935, 68, [B], 882—886).—Me₃ β -methyltricarballic ester and Me₃C₂O₄ condense in presence of NaOMe to Me₂4:5-diketo-2-methylcyclopentane-1:2:3-tricarboxylate (I), m.p. 176—177.5°; the corresponding Et esters do not appear to behave similarly. (I) affords Na₂, Ag₂, and Cu derivatives. With o-C₆H₄(NH₂)₂ it yields the compound, C₁₈H₁₈O₆N₂, m.p. 249—251° (decomp.). The monoxime, m.p. 147—149° (decomp.), monophenylhydrazone, m.p. 154—155°, and monosemicarbazone, m.p. 140—141° (decomp.), are described.

H. W.

Lignin. XIV. K. FREUDENBERG, F. SOHNS, and A. JANSON (Annalen, 1935, 518, 62—85).—Finely divided pine wood is extracted with boiling EtOH-C₆H₆, the product is ground under H₂O and treated with 4% NaOH in absence of air, and submitted to alternate treatments with boiling 1% H₂SO₄ or 7% H₂C₂O₄ and Schweitzer's solution. The lignin (I) thus obtained is about 66% of that present in the wood (as determined analytically); the residue is similar in nature. (I) contains 16% of OMe and yields 0.9—1.1% of CH₂O when treated with mineral acid, thus confirming the presence of CH₂O₂ in (I). After methylation, (I) contains 29% OMe and yields only traces of CH₂O. Since similar treatment of piperonylic acid yields small amounts of veratric acid, it appears that CH₂O₂ is replaced by OMe during methylation. (I) contains OH which cannot be methylated, but is capable of acetylation; the presence of CRR'Me·OH thus indicated is confirmed by the formation of 6% of AcOH when (I) is oxidised by CrO₃. The analytical data are in harmony with the presence of the arrangements A, B, and C in the proportions given:



Incomplete treatment of pine wood with NaHSO₃ does not appear to give lignin- β -sulphonic acid. The α -acid (II) thereby obtained contains less S than the technical product examined by Klason. Titration of (II) shows the presence of 1 phenolic OH and 1 SO₃H in 3 and 5 units, respectively. It is probable that OH results from ring opening and is possibly independent of the no. of SO₃H groups. Addition of (NH₄)₂CO₃ enables the yield of protocathechuic acid (III) obtained by treatment of (I) with molten KOH to be increased to 10%. Since under the experimental conditions about 50% of (III) is destroyed, this corresponds with about 25% of the amount theoretically obtainable. Hemipinic acid similarly gives about 75% of (III). Polymeric coniferyl alcohol



C₆H₃(OMe)₂] and (VIII) is A (R=H), confirmed by oxidation of its Et₂ ether, m.p. 178—179°, with

(IV) behaves qualitatively and quantitatively similarly to (I). Ozonisation of (I) gives about 20% of $H_2C_2O_4$, but mainly other acids sol. in H_2O . Methyl-lignin (V), particularly in AcOH, is more readily attacked yielding $H_2C_2O_4$ and acids, one of which appears to be $CO_2H \cdot C_4H_5O_2(OH)_2$. (V) is oxidised by $KMnO_4$, appears indifferent to HIO_4 , and affords CBu_4 with OBr' . (IV) resembles (I) in its behaviour towards O_3 . Mild treatment of cryst. monomeric coniferyl alcohol with C_5H_5N and Ac_2O gives a product with the same composition, whereas more drastic treatment (also methylation) is accompanied by loss of H_2O . (IV) has 12.5% of total OH of which 7% is phenolic OH. The mechanism of polymerisation is discussed. (IV) reacts with $NaHSO_3$. The main points of distinction between (III) and (I) are the higher degree of oxidation of (I) and its lack of phenolic OH. Comparison of (IV) and (I) indicates that nuclear condensation rather than side-chain polymerisation is the primary process in the formation of (I).

Emphasis is laid on the distinction between analytical (I), (I) as isolated from wood, and (I) as existing in wood. It is considered that the part of pine (I) investigated belongs to the type of guaiacylglycerol, including coniferaldehyde, acetylguaiacylcarbinol, and analogues of similar degree of oxidation. The uniformity in the properties of (I) isolated by different methods suggests that it exists as such pre-formed in the wood and that the formation and polymerisation of the coniferyl system are physiological processes. This view is supported by the behaviour of methylated or non-methylated wood towards O_3 . In beech wood the physiological process appears less advanced.

H. W.

Method of microhydrogenation. K. H. SLOTTA and E. BLANKE (J. pr. Chem., 1935, [ii], 143, 3—17).—The micro-apparatus of Smith (A., 1932, 619), for hydrogenating 1—3 mg. of material, is adapted and described. It is confirmed that carotene takes up 22 H (cf. *loc. cit.*; A., 1933, 254, 1151). β - $C_{10}H_7 \cdot CO$ Me is hydrogenated rapidly and completely in AcOH; in Bu^tOH , only 2 H is absorbed, whilst in methylcyclohexane (I), hydrogenation is exceedingly slow. 4-(4'-Nitrophenoxy)benzaldehyde takes up 22 H in AcOH (PtO_2), 8 H in $Bu^tOH + AcOH$ (4:1) (PtO_2), but only 6 H in Bu^tOH (Pd). If the velocity of hydrogenation of different parts of the mol. is to be compared, a less active catalyst and an unfavourable solvent are employed. Thus the curve for coprostenone in $AcOH + (I)$ (PtO_2) shows no discontinuity, whilst in isoamyl ether (Pd) it shows that slower hydrogenation of $>C:O$ accompanies faster hydrogenation of $>C:C<$.

E. W. W.

Coloured hydrocarbons of the rubene type. I. A. WILLEMART (Bull. Soc. chim., 1935, [v], 2, 867—882).—Mainly a more detailed account of results previously summarised (this vol., 612, 616). $OH \cdot CPhBu^t \cdot C \cdot CPh$ (I) (*Me ether*, m.p. 46°) is converted by 3% H_2SO_4 in Bu_2O into *Ph* β -phenyl- β -tert.-butylvinyl ketone, m.p. 68° (also by boiling the corresponding Cl-compound in EtOH) (*oxime*, m.p. 128 — 129°). $OH \cdot CPh_2 \cdot C \cdot CBu^t$ (II) similarly affords

$\beta\beta$ -diphenylvinyl *Bur* ketone, m.p. 66° (*oxime*, m.p. 128 — 129°). The steric effect of *Bur* is evident in the conversion of (I) into the ketone, and into its chloride [94% in 98 hr.; (II) gives 98% in 1.25 hr.] and may explain the failure of such chlorides to form a rubene.

J. W. B.

Behaviour of β -*p*-dimethylaminobenzoin with alcoholic hydrogen chloride. K. MATSUMURA (J. Amer. Chem. Soc., 1935, 57, 955).— p - $NMe_2 \cdot C_6H_4 \cdot CO \cdot CHPh \cdot OH$ and hot HCl-EtOH, with or without $CuSO_4$, give p - $NMe_2 \cdot C_6H_4 \cdot CH_2 \cdot COPh$ (I) and p - $NMe_2 \cdot C_6H_4 \cdot CO \cdot COPh$ (II). (II) and Sn-HCl yield (I). Benzoin and benzanisoin do not react similarly.

R. S. C.

Oxime of β -*p*-dimethylaminobenzoin. K. MATSUMURA (J. Amer. Chem. Soc., 1935, 57, 955—956).— β -*p*-Dimethylaminobenzoin, $NH_2OH \cdot HCl$, and $NaOAc$ in hot EtOH give the *anti*-phenyl *oxime*, m.p. 184° , which with $SOCl_2$ in $CHCl_3$ gives $PhCHO$ and p - $NMe_2 \cdot C_6H_4 \cdot CN$.

R. S. C.

Isomeric form of benzildihydrazone. Preparation of the dihydrazones of benzil and its derivatives. J. VAN ALPHEN (Rec. trav. chim., 1935, 54, 443—446).— Bz_2 and hot 10% $N_2H_4 \cdot H_2O$ -EtOH give mono- and a trace of di-hydrazone (II). (II) is best prepared by boiling 2:3-diphenyl-5:6-dihydropyrazine with $N_2H_4 \cdot H_2O$ -EtOH, when it is accompanied by a small quantity of an *isomeride*, m.p. 197° (decomp.), 230° (decomp.; block), or 260° (instantaneous). 2:3-Di-*p*-anisyl- and -*di-p*-tolyl-5:6-dihydropyrazine, m.p. 179° , give similarly the known anisil- and tolil-dihydrazones.

R. S. C.

Dimesityl diketones and their derivatives. I. $\alpha\epsilon$ -Dimesityl- $\alpha\epsilon$ -pentanedione and its dibromo-derivatives. T. KAO (J. Chinese Chem. Soc., 1935, 3, 56—59).— $\alpha\epsilon$ -Dimesityl- $\alpha\epsilon$ -pentanedione, m.p. 133 — 134° , results from the Friedel-Crafts condensation of mesitylene and glutaryl chloride; with Br it gives a brown liquid (not identified) and $\beta\delta$ -dibromo- $\alpha\epsilon$ -dimesityl- $\alpha\epsilon$ -pentanedione, m.p. 98 — 99° .

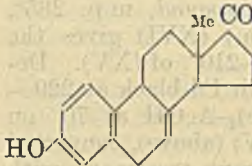
F. N. W.

Constitution of equilin. J. W. COOK and E. ROE

(Chem. and Ind., 1935, 501—502).—The nearly identical absorption spectra curves of equilin (I) and œstrone together with previous work (this vol., 752) establish the annexed formula for (I).

F. N. W.

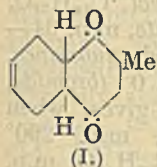
Chelation. II. Stabilisation of Kekulé forms in *o*-hydroxyacetophenones. W. BAKER and (Miss) O. M. LOTHIAN (J.C.S., 1935, 628—633).—Migration of allyl (R) in *O*-R phenolic others to the *o*-C, which is doubly-linked to $\cdot C \cdot OR$, constitutes a satisfactory reaction for detecting the fixation, by chelation, of Kekulé forms (cf. this vol., 85). Thus rearrangement of 4-*O*-allylresacetophenone (I), b.p. 156 — $157^\circ/9$ mm. (double linkings fixed) (from resacetophenone, anhyd. K_2CO_3 , and RBr in boiling $COMe_2$), at 210 — 215° gives 3-allylresacetophenone (II), m.p. 133° (85% yield), converted by Me_2SO_4 -10% aq.



KOH at 30° into its 4-*O-Me ether*, m.p. 61°, and by Me_2SO_4 -20% aq. KOH in COMe_2 into its *Me ether* (III), b.p. 169—170°/15 mm. Similar methylation of (I) affords 2-*O-methyl-4-O-allylresacetophenone*, b.p. 171°/9 mm., m.p. 31° (chelation impossible) (also by allylation of *isopæanol*), which rearranges normally to give 2-*O-methyl-5-allylresacetophenone* (IV), m.p. 136° (60% yield) [4-*O-methyl ether*, m.p. 88—89°, not identical with (III)]. The structure of (II) follows from its reduction (H_2 -PdCl₄-EtOH) to 3-*n-propylresacetophenone* (V), m.p. 127—128°, identical with a specimen synthesised as follows: 7-hydroxy-4-methylcoumarin with $\text{RBr-K}_2\text{CO}_3\text{-COMe}_2$ affords its 7-*O-allyl ether*, m.p. 101°, converted by rearrangement at 210° into 7-hydroxy-4-methyl-8-allylcoumarin, m.p. 193—194°, hydrolysed by 20% aq. NaOH to 2-allylresorcinol, b.p. 155—160°/11 mm., reduced (H_2 -PdCl₄-EtOH) to 2-*n-propylresorcinol*, m.p. 106°. This by condensation with $\text{MeCN-ZnCl}_2\text{-HCl}$ in Et_2O and hydrolysis of the ketimine gives (V). (II) with $\text{RBr-K}_2\text{CO}_3$ in COMe_2 gives 4-*O-allyl-3-allylresacetophenone*, m.p. 34.5°, rearranged to 3:5-diallylresacetophenone (VI), m.p. 89—90°; similar allylation of (IV) gives 2-*O-methyl-4-O-allyl-5-allylresacetophenone*, m.p. 79°, rearranged and methylated to 3:5-diallylresacetophenone *Me ether*, b.p. 178—179°/13 mm. (*semicarbazone*, m.p. 135—136°), identical with a specimen obtained by the action of $\text{Me}_2\text{SO}_4\text{-K}_2\text{CO}_3$ on (VI) in COMe_2 . Orientation of (V) establishes the constitution of 5-*n-propylresacetophenone* (Rosenmund *et al.*, A., 1933, 953).

J. W. B.

Condensation of butadiene with alkylbenzoquinones. C. K. CHUANG and C. T. HAN (Ber., 1935, 68, [B], 876—882).—Butadiene and toluquinone in C_6H_6 at 110° afford *butadienetoluquinone* (I), m.p. 79—81° (*monoxime*, m.p. 155° after darkening at 150°). The constitution of (I) is deduced from its isomerisation by a trace of HBr in AcOH to 2-methyl-5:8-dihydronaphtha-1:4-quinol (II), m.p. 170° after darkening at 165°, which is readily sol. in alkali, gives a *diacetate* (III), m.p. 103—104° [also obtained from (I) and boiling Ac_2O], but does not react with NH_2OH . Reduction of (I) with Zn dust and AcOH gives *dihydrobutadienetoluquinone*, m.p. 85—86° (*dioxime*, m.p. 235—237°). Catalytic hydrogenation (Pt-sponge) of (II) yields 2-methyl-5:6:7:8-tetrahydronaphtha-1:4-quinol, m.p. 163—165° [*diacetate*, m.p. 100—101°, also obtained by hydrogenation of (III)], oxidised by FeCl_3 to 2-methyl-5:6:7:8-tetrahydronaphtha-1:4-quinone, m.p. 50—52°. A similar condensation could not be effected with xyloquinone.



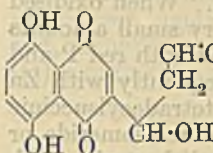
(I)

Quinones. III. Preparation of α -naphthaquinone by hydrolysis of 4-nitroso- α -naphthol. C. L. TSENG and M. HU (J. Chinese Chem. Soc., 1935, 3, 60—66; cf. A., 1934, 1005).—Controlled acid hydrolysis (A., 1934, 1005) of 4:1-NQ· $\text{C}_{10}\text{H}_6\text{OH}$ (modified prep.) gives α -naphthaquinone, m.p. 121.5—124.5° (lit. 126°, 125°, and 123—124°) in 22% yield.

F. N. W.

Enantiomorphous natural dyes. H. BROCKMANN and H. ROTH (Naturwiss., 1935, 23, 246).—Alkannin (I), m.p. 149° (from *Alkanna* roots), is laevo-

rotatory, whilst shikonin (II), m.p. 147° (from *Shikon* roots) (A., 1922, i, 946), is dextrorotatory and is the optical enantiomorph of (I). Treatment with MeOH-HCl converts (I) and (II) into the same optically-inactive OMe-derivative, m.p. 105° (cf. A., 1935, 217). On the basis of numerous degradation experiments the annexed structural formula is proposed for (I) and (II).



H. G. M.

Constitution and reactivity. X. Reaction kinetics of sulphonation by sulphuric acid containing water. K. LAUER and R. ODA (J. pr. Chem., 1935, [ii], 142, 258—272).—The velocity of sulphonation of anthraquinone (cf. A., 1933, 69) by 89.5—100% H_2SO_4 at temp. from 160° to 130° is determined, and velocity coeffs. (*k*) are calc. Graphs connecting *k* with concn. (C_s) of H_2SO_4 at various temp. (*T*) resemble those of v.p. against C_s . When *q* and α (cf. *loc. cit.*) are plotted against *T* or C_s , irregular graphs are obtained, but if $\log k$ is plotted against $1/T$, a series of straight lines for each val. of C_s results. From the tangents of the angles made by these with the $1/T$ axis, *q* and $\alpha \times 10^{-10}$ at varying C_s are calc. *q* falls from 37,900 at 89.5% to 35,500 at 93.3%, and to 27,500 at 100%; $\alpha \times 10^{-10}$ from 224 to 41.7 and to 1.0. From this it is deduced that in the sulphonation of anthraquinone there are two simultaneous reactions: attack by H_2SO_4 , and attack by SO_3 . The former will show greater *q* and α than the latter, and these therefore fall as C_s increases, since this brings an increasing decomp. of H_2SO_4 to give SO_3 . Factors of this kind may explain the different behaviour of H_2SO_4 and HNO_3 in aromatic substitution.

E. W. W.

Ring structure of thymidine. P. A. LEVENE and R. S. TIPSON (J. Biol. Chem., 1935, 109, 623—630; cf. this vol., 610).—Triphenylmethylthymidine (detailed prep.) gives a 3-*p-toluenesulphonate* (I), $[\alpha]_D^{25} + 29.5^\circ$ in COMe_2 , in which the *p*- $\text{C}_6\text{H}_4\text{Me-SO}_3$ is shown to be attached to a *sec. C* by the rate of reaction with NaI in COMe_2 to give the 3-iodide. Thymidine gives a mixture of toluenesulphonylthymidine chloride and di-*p*-toluenesulphonylthymidine, which reacts at about the same rate with NaI as does (I). Thymidine is thus a pyranoside, and the PO_3H_2 are attached to C3 and C5 of the deoxyribose of deoxyribosenucleic acid, for which a complete formula is proposed. If the PO_3H_2 of ribosenucleic acid are attached to C3 and C2, the readier hydrolysis of this acid by alkali and the loss of one PO_3H_2 (that on C2) by the action of acid are explained.

R. S. C.

Fulvic acid, a metabolic product of *Penicillium*.—See this vol., 786.

Constituents of *Nephromopsis stracheyi* f. *ectocarpisma*, Hue. I. M. ASANO and T. AZUMI (Ber., 1935, 68, [B], 995—997).—Prolonged maceration of the thalli with cold Et_2O gives *l*-usnic acid, m.p. 201—202°, $[\alpha]_D^{25} - 510.8^\circ$, caperic acid, m.p. 131—132°, $[\alpha]_D^{10} - 21.7^\circ$ in CHCl_3 (Me_2 ester, m.p. 57—58°), *l*-lichesteric acid, m.p. 121—123°, $[\alpha]_D^{10} - 31.9^\circ$ in CHCl_3 , *nephromopsis acid* (I), $\text{C}_{19}\text{H}_{34}\text{O}_4$, m.p. 137°, $[\alpha]_D^{12} - 85.1^\circ$ in CHCl_3 (*Me* ester, m.p. 60—

61°), and an acid (II), $C_{19}H_{30}O_4$ or $C_{19}H_{32}O_4$, m.p. 106—107° (*Me* ester, m.p. 38—40°). When oxidised with $KMnO_4$ in $COMe_2$ (I) gives very small amounts of higher fatty acids. When treated with red P and HI (*d* 1.7) at 190—200° and subsequently with Zn and AcOH, it yields α -methyl- β -*n*-tetradecylsuccinic acid. (I) is therefore probably a stereoisomeride or diastereoisomeride of dihydroprotolichestic acid. (II) appears closely related to protolichestic acid.

H. W.

Components of Iceland moss. V. Reduction of dihydroprotolichestic acid and of lichestic acid. M. ASANO and T. ASUMI (Ber., 1935, 68, [B], 991—994; cf. A., 1932, 931).—Although unsaturated, lichestic acid does not absorb H in presence of Pt or Pd. It is transformed by red P and HI (*d* 1.7) at 200° followed by de-iodination with Zn and AcOH into α -methyl-*n*-heptadecic (λ -isostearic) acid (I), b.p. about 170°/1 mm., m.p. 48—49° (*amide*, m.p. 104—104.5°; *anilide*, m.p. 86—86.5°; *p*-toluidide, m.p. 82—83°). Lichestic acid (γ -keto- α -methyl-*n*-heptadecic) acid and $N_2H_4 \cdot H_2O$ in boiling EtOH afford 4-methyl-6-*n*-tridecylpyridazinone,

$CO \left\langle \begin{array}{c} CHMe \cdot CH_2 \\ NH \quad N \end{array} \right\rangle C \cdot C_{13}H_{27}$, m.p. 66°, converted by NaOEt in EtOH at 170—180° into (I). *n*-Pentadecyl iodide and $CMeNa(CO_2Et)$, yield *Et_2* methyl-*n*-pentadecylmalonate, b.p. 197—207°/2 mm., hydrolysed to methyl-*n*-pentadecylmalonic acid, m.p. 95.5—96.5°, decomp. about 175°, which passes into (I) when heated. *d*-Protolichestic acid,

$O \cdot CH(C_{13}H_{27}) > CH \cdot CO_2H$, m.p. 104—106°, from European Iceland moss, is catalytically hydrogenated to dihydro-*d*-protolichestic acid, m.p. 104—106° (converted by CH_2N_2 into the *Me* ester, m.p. 51.5—52.5°), which, with red P and HI (*d* 1.7) at 190—200° affords α -methyl- β -*n*-tetradecylsuccinic acid, m.p. 133—135°. H. W.

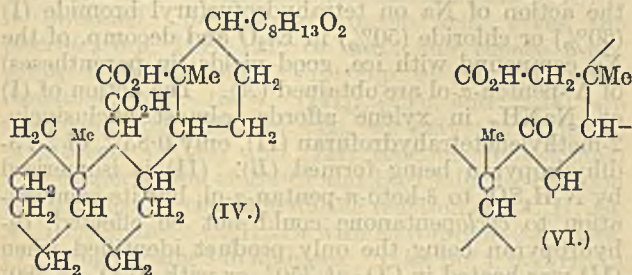
Bitter principles of the Colombo root. I. K. FEIST, P. RINTELEN, and E. KUNTZ (Annalen, 1935, 517, 119—133; cf. A., 1908, i, 100).—Columbin (I), m.p. 182° (decomp.); the m.p. is a poor criterion of homogeneity), is $C_{22}H_{34}O_7$. It contains 1 OH (Zerevitinov) (*acetate*, m.p. 228°), cannot be etherified with CH_2N_2 , and does not give a colour with $FeCl_3$. Probably 4 O are present in lactone groups. OMe and OEt are absent and $:O_2CH_2$ is doubtful. $\cdot CHO$ or $\cdot CO$ could not be detected. Treatment of (I) with acids or alkalis leads to *chasmanthin* (II), $C_{20}H_{22}O_7$, m.p. 265° or m.p. 212°, $[\alpha] \pm 0^\circ$. The mixed m.p. of the two forms is intermediate between that of each. Both forms without change of composition pass into (II), m.p. 246°, which is mainly obtained from Colombo root (extraction described). Neither form reacts with CH_2N_2 or with reagents for $\cdot CO$ or $\cdot CHO$. *Chasmanthin diacetate* has m.p. 275°. Treatment of (II) with NaOH and Me_2SO_4 gives *chasmanthin Me_1 ether* (III), m.p. 271° [obtained similarly from (I) with unexplained loss of 2 C and 2 H], which does not give an Ac or Bz derivative and with the Zerevitinov method gives indecisive results. Catalytic hydrogenation of (I) causes absorption of 4 H_2 with loss of 2 C and 2 H, whereas that of (II)

leads to consumption of 3 H_2 , both operations giving *hydrochasmanthic acid* (III), $C_{20}H_{28}O_7$, m.p. 259°. (III) appears to be a lactonic acid. With CH_2N_2 it gives a *Me_1* ester, m.p. 172°. OH of (II) appears intact in (IV), which with NaOH and Me_2SO_4 gives the *Me_1 ether*, m.p. 189°. When heated in vac. (I) gives (II) and a product (V), $C_{19}H_{22}O_4$, provisionally designated *V-columbin* (vacuum columbin). Under similar conditions, (II) does not pass into (V). Conversion of (I) into (V) is accompanied by loss of OH and of a lactone group, but a lactone ring persists. Attempted acetylation or methylation of (V) was fruitless. A connecting link between (I) and (V) appears to exist in *decarboxycolumbin* (VI), $C_{21}H_{24}O_5$, m.p. 143°, obtained by heating (I) at 192° or by prolonged boiling with H_2O . Treatment of (VI) with boiling Ac_2O affords iso-*V-columbin*, $C_{19}H_{22}O_4$, m.p. 208°, also obtained by treating (V) with alkali. Catalytic hydrogenation of (V) gives *hydro-V-columbin*, $C_{19}H_{30}O_4$, m.p. 186°, which is not isomerised by alkali. Ozonisation of (I) leads to the acid (VII), $C_{17}H_{20}O_8$, m.p. 263° (decomp.) (also +2 H_2O); the *Me*, m.p. 242°, and *Et*, m.p. 236.5°, esters are described. (VI) is oxidised with difficulty, but is transformed by fuming HNO_3 into an acid, m.p. 234° (*Me* ester, $C_{18}H_{21}O_8 \cdot NO_2$, m.p. 228°). Ozonisation of (III) gives a substance, m.p. 257°, probably identical with (VII). H. W.

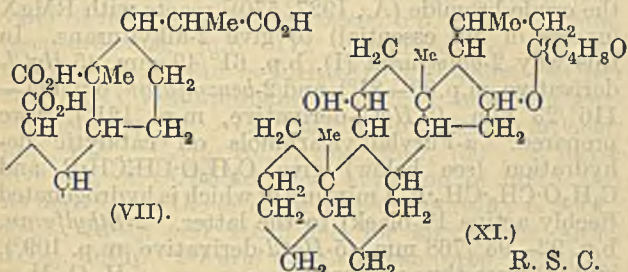
Slash-pine (*Pinus caribaea*, Morelet). I. Fatty constituents of the phloem. J. A. HALL and O. GISVOLD (J. Biol. Chem., 1935, 109, 585—595).—The lignin (b.p. 60—70°) extract of the phloem of *P. caribaea* contains a *sterol*, $C_{29}H_{50}O$, m.p. 137—138°, $[\alpha]_D^{25} -23.4^\circ$ in $CHCl_3$ (*Ac* derivative, m.p. 126°, $[\alpha]_D^{25} -29.7^\circ$ in $CHCl_3$; *digitonide*) (also obtained from the seeds of *P. sabimiana*), an *isocetyl alcohol*, $C_{16}H_{34}O$, m.p. 74—75°, $[\alpha]_D^{25} +9.8^\circ$ in $CHCl_3$ (*acetate*, m.p. 64—65°) (OH not *tert.*), an unsaturated substance, $C_{30}H_{56}O_3$, b.p. 170—172°/0.005 mm., $\alpha 0^\circ$ (*bromide*, m.p. 123—125°; no active H), and gives, when hydrolysed, a *phytosterolin*, $C_{29}H_{50}O$, m.p. 290° [giving with $HCl-C_5H_{11} \cdot OH$ a *sterol*, $C_{29}H_{50}O$, m.p. 136—137°, $[\alpha]_D^{25} -24^\circ$, and a sugar (phenylosazone, m.p. 204°)], *n*- $C_5H_{11} \cdot CO_2H$, oleic, linoleic, palmitic, and behenic (*p*-*bromophenacyl* ester, m.p. 91—92°) acids. R. S. C.

Sarsasapogenin. II. J. C. E. SIMPSON and W. A. JACOBS (J. Biol. Chem., 1935, 109, 573—584; cf. A., 1934, 896).—Since sarsasapogenin (I), $C_{27}H_{44}O_3$ (lit. $C_{25}H_{42}O_3$), m.p. 199.5—200° (from EtOH), 194—195° (from EtOAc), gives Diels' hydrocarbon and ketones, $C_6H_{13} \cdot COMe$ (II) and $C_8H_{14}O_3$, it probably has a sterol structure. (I) or sarsasapogenone (III), m.p. 223—224° (modified prep.); slowly acetylated by cold AcOH), with NaOBr gives a mixture of acids, mostly a dibasic acid (IV), $C_{27}H_{42}O_6$, m.p. 280° (decomp.) (Me_2 (V), m.p. 216—217°, and *Me H* ester [obtained from (V) by 0.1*N*-NaOH], m.p. 224—225°). (I) and CrO_3 -AcOH or (III) and H_2SO_4 - CrO_3 give (IV) and a keto-acid (VI), $C_{27}H_{40}O_5$, m.p. 161—162° [*Na* salt; *Me* ester, m.p. 123—124°, catalytically hydrogenated (1 mol.) to an amorphous product; *Br*-derivative, m.p. 197° (decomp.); *oxide* (by BzO_2H), m.p. 191—192°; no colour with $C(NO_2)_4$]. Relative

rates of hydrolysis of the esters indicate the formulae shown for (VI) (but containing one ethylenic linking) and (IV). (IV) and HNO_3 (*d* 1.5) give a dibasic *lactonic acid* (VII) [also obtained in poor yield from (V)], $\text{C}_{22}\text{H}_{32}\text{O}_6$, m.p. 295° , which with CH_2N_2 gives



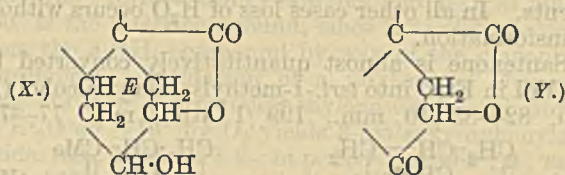
the *Me*₂ ester (VIII), $\text{C}_{25}\text{H}_{38}\text{O}_6$, m.p. $171-172^\circ$. The lactone group is readily opened by 0.1*N*-alkali. (VIII) is difficultly hydrolysed and with 0.5*N*-NaOH gives the *Me H* ester, m.p. $213-215^\circ$, reconverted into (VIII) by CH_2N_2 . Since (II) is a *Me* ketone, (VII) possibly has the structure shown, but with OH on C15, 16, or 17, and (I) may be (IX).



Oxidation of oleanolic and acetyloleanolic acid.

W. AUMÜLLER, W. SCHICKE, and E. WEDEKIND (Annalen, 1935, 517, 211-228).—Oleanolic acid (I) (modified prep.) and KMnO_4 in hot $\text{H}_2\text{SO}_4\text{-COMe}_2$ give oily acids and δ -hydroxyoleanono- γ -lactone (II), $\text{C}_{30}\text{H}_{46}\text{O}_4$, m.p. 304° [*Ac* derivative, m.p. 233° (*oxime*, m.p. 258°)], with either δ -hydroxyoleanolo- γ -lactone, $\text{C}_{30}\text{H}_{48}\text{O}_4$, m.p. $328-330^\circ$ [*Ac*₂ derivative (III), m.p. 292°], or δ -keto-oleanono- γ -lactone (IV), $\text{C}_{30}\text{H}_{44}\text{O}_4$, m.p. 286° (*dioxime*, an oil), identical with the diketone obtained (cf. Kitasato, A., 1934, 1223) from (I) and CrO_3 . (II) and CrO_3 in cold AcOH give (IV). Acetyloleanolic acid (V) and KMnO_4 give similarly acids and δ -hydroxyacetyloleanolo- γ -lactone, $\text{C}_{32}\text{H}_{50}\text{O}_5$, m.p. 337° [*Ac* derivative=(III)], oxidised by $\text{CrO}_3\text{-AcOH}$ to δ -ketoacetyloleanolo- γ -lactone (VI), $\text{C}_{32}\text{H}_{48}\text{O}_5$, m.p. 286° [*oxime*, m.p. 232° (decomp.)], also obtained (*loc. cit.*) from (V) and cold CrO_3 . (V) and CrO_3 at 80° give (VI), an acid, $\text{C}_{27}\text{H}_{40}\text{O}_7$ (*Ac* derivative, m.p. 300°) (A., 1933, 213), now termed acetylviscolic acid, and ketoacetyloleanolic acid, $\text{C}_{32}\text{H}_{50}\text{O}_5$, m.p. 284° (*Me* ester, m.p. 245°). (II) and CrO_3 at 80° give a small amount of a neutral substance, m.p. about 318° , and an acid, $\text{C}_{30}\text{H}_{44}\text{O}_7$, m.p. 303° (*Me* ester, m.p. 219° ; *oxime*, m.p. 190°). (IV) gives similarly a neutral substance, $\text{C}_{28}\text{H}_{38}\text{O}_6$, m.p. 315° , and visconic acid, $\text{C}_{25}\text{H}_{36}\text{O}_6$, m.p. 303° (*Me* ester, m.p. 238°). Viscolic acid and alkaline KMnO_4 give an oily acid (*Me*₃ ester, $\text{C}_{28}\text{H}_{42}\text{O}_9$, m.p. 191°). The oxidations of (I) and (V) are interpreted as addition of 2 OH to the $\gamma\delta$ -ethylenic linking and

subsequent formation of γ -lactone, with or without subsequent oxidation of the new OH in ring *E*, and, sometimes, of the OH in ring *A*. Thus, e.g., (II) contains the grouping (X) and (IV) (Y).



R. S. C.

Constituents of *Datura stramonium*.—See this vol., 905.

Raman spectra of isomeric citronellols and rhodinols. Y. R. NAVES, G. RUS, and J. ALLARD (Compt. rend., 1935, 200, 1112-1114).—Physical characteristics of pure citronellol (from three sources) (I), rhodinol (II), citronelic acid (III) and citronellal (IV) are recorded. Raman spectra prove that *l*-(I), (I) (from the Et ester), and (III) are mixtures of $\text{CH}_2\text{CMe}[\text{CH}_2]_3\text{CHMeCH}_2\text{R}$ (*A*) and $\text{CMc}_2\text{CH}[\text{CH}_2]_2\text{CHMeCH}_2\text{R}$ (*B*) forms, (*B*) predominating, whilst (IV), (II), and (I) [obtained by reduction of (IV)] are found in (*B*) form only.

F. N. W.

Cardiostimulant effect of Japan camphor: a transformation product in the body, *d-trans-7-aldehydroapocamphor*, as the true active substance. K. TAMURA, G. KIHARA, and M. ISHIDATE (Proc. Imp. Acad. Tokyo, 1935, 11, 161-163).— π -apoCamphor-7-carboxylic acid was separated into the *trans*-, m.p. 250° , $[\alpha]_D +3.17^\circ$, and the *cis*-form, m.p. 273° , $[\alpha]_D +67.2^\circ$, and by reduction of its chlorides, *d-trans*-, m.p. $195-196^\circ$, and *d-cis- κ -ketocamphor*, m.p. 205° , have been obtained. The action of the *trans*-compound on the heart was $>$ that of the *cis*-compound, contrary to its action as a convulsant poison. *d-trans- π -apoCamphor-7-carboxylic acid* was isolated from the urine of a dog poisoned with camphor.

H. G. R.

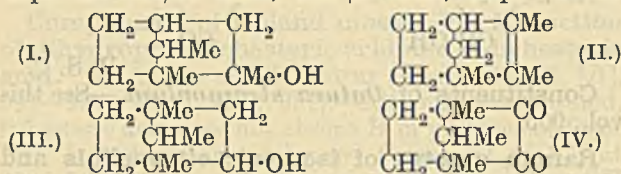
Two new transformation products of camphor in the animal organism. Y. ASAHINA and M. ISHIDATE (Ber., 1935, 68, [B], 947-953).—Tamura's discovery (see preceding abstract) is supported by the isolation of *trans- π -apoCamphor-7-carboxylic acid* from the urine of dogs to which it has been administered. Oxidation of campherol with CrO_3 and KMnO_4 and distillation of the neutral product with steam yields α - (I), m.p. $47-48^\circ$ (semicarbazone, m.p. $235-236^\circ$), and β - (II), m.p. $42-45^\circ$ (semicarbazone, m.p. $220-223^\circ$), -santenone. (I) is oxidised to *cis-allosantenic acid*, m.p. $151-152^\circ$. *trans- π -Hydroxycamphor*, m.p. 233° , is converted into the corresponding *hydrazone*, m.p. about 100° (*acetate*, m.p. 217°), oxidised by HgO in presence of KOH to inactive *teresantalol*, b.p. $97-98^\circ/10\text{ mm.}$, m.p. 118° ; this with 10% H_2SO_4 at 100° gives inactive *apocamphenecarbinol*, m.p. about 146° , oxidised by CrO_3 to (I) and (II), thus probably indicating the mode of production of the latter in the organism.

H. W.

Wagner transformation with tertiary alcohols. *tert*-2-Methylsantenol. G. KOMPPA and G. A. NYMAN (Annalen, 1935, 517, 105-119).—Wagner

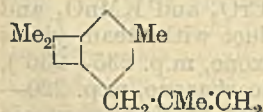
transformation accompanies dehydration of *tert.*-alcohols of the pentocean system only when both bridge-C7 and C1 lying between that to which OH is attached and the bridge C are loaded with substituents. In all other cases loss of H₂O occurs without transformation.

Santenone is almost quantitatively converted by MgMeI in Et₂O into *tert.*-1-methylsantenyl alcohol (I), b.p. 82—83°/10 mm., 199°/1 atm., m.p. 77—79°



(*phenylurethane*, m.p. 134—135°). Treatment of (I) with KHSO₄ at 170° yields 1-methylsantene (II), b.p. 151—152°, ozonised in AcOH to a diketone, b.p. 125—127°/14 mm. [*disemicarbazone*, C₁₂H₂₂O₂N₆, m.p. 230—231.5° (decomp.)], which reddens fuchsin-H₂SO₃, gives CHBr₃ with 'OBr', and does not give appreciable amounts of acid products when oxidised with Ag₂O. (II) is transformed by 50% H₂SO₄ in AcOH at 50—55° followed by hydrolysis into *sec.*-4-methylsantenol (III), b.p. 198—200°, m.p. 33—34.5° (*acetate*, b.p. 92—93°/10 mm.; *phenylurethane*, m.p. 81—82°). Cautious oxidation of (III) with CrO₃ affords 4-methylsantenone (IV), b.p. 199—199.5° (*semicarbazone*, m.p. 217—218°; *hydrazone*, b.p. 86—87°/1.37 mm., and its *Ac* derivative, m.p. 153—154°). (IV) is converted by a large excess of SeO₂ in boiling EtOH into 4-methylsantenone-quinone (V), m.p. 53—54.5° (*quinoxaline* derivative, m.p. 83.5—84.5°). Oxidation of (III) with alkaline KMnO₄ leads to 1:2:3-trimethylcyclopentane-1:3-dicarboxylic (mesantenic) acid, m.p. 239—240° (*anhydride*, m.p. 95—96°; corresponding *anilic*, m.p. 180—181°, and *toluidic*, m.p. 205—206°, *acid*). The occurrence of a Wagner transformation during the hydration of (II) is also established as follows. Catalytic hydrogenation (Skita) of (II) gives 1-methyl-dihydrosantene (VI), b.p. 159—160°. If, however, 4-methylsantenol is transformed into the corresponding *chloride*, b.p. 87°/10 mm., m.p. 73—75°, which is reduced by Na and EtOH, 4-methylsantenone, b.p. 152—154°, results, and differs from (VI). H. W.

Constitution of caryophyllene. L. RUZICKA



(*Chem. and Ind.*, 1935, 509).—A review of the products of the degradation of caryophyllene leads to the annexed constitution.

H. W.

Ledum camphor and the constitution of the ledenes. G. KOMPPA (*Suomen Kem.*, 1935, 8, B, 19—20).—Ledol (I), C₁₅H₂₆O, a *tert.*-alcohol, is dehydrated (KHSO₄) to ledene (II), and with Pd-H₂ gives dihydroledene, which shows that it is saturated. Dehydrogenation of (II) with Se gives cadalene, and with O₃ it affords CH₂O [which shows that in (I), OH and Me are linked to the same C] and a ketone which decomposes when distilled in a high vac. J. L. D.

Essential oil of *Calythrix tetragona*.—See B., 1935, 573.

Stability of the hydrofuran ring. III. Mechanism of the rearrangements accompanying the rupture of the ring in tetrahydrofurfuryl derivatives. Preparation of Δ⁸-penten-α-ol. R. PAUL (*Bull. Soc. chim.*, 1935, [v], 2, 745—754).—By the action of Na on tetrahydrofurfuryl bromide (I) (60%) or chloride (50%) in Et₂O and decomp. of the Na compound with ice, good yields (in parentheses of Δ⁸-penten-α-ol are obtained (A). The action of (I) on NaNH₂ in xylene affords, almost exclusively, 2-methylenetetrahydrofuran (II), only 0.83% of 2:3-dihydropyran being formed (B). (II) is isomerised by N-H₂SO₄ to δ-keto-*n*-pentan-α-ol, but its isomerisation to cyclopentanone could not be effected, dihydropyran being the only product identified when (II) was heated in CO₂ at 350°, or with Al₂O₃ at 380° in N₂. The mechanism of these reactions is discussed on the basis of the electronic theory of Prévost *et al.* (A., 1931, 670), according as to whether X in C₄H₇O·CH₂X is a positive (A) or negative (B) group. J. W. B.

Preparation of α-alkylfurans. R. PAUL (*Compt. rend.*, 1935, 200, 1481—1483).—Furfuryl chloride [or the crude bromide (A., 1927, 570)] reacts with RMgX (excess of Mg essential) to give 2-alkylfurans. In this way 2-butylfuran (I), b.p. 61°/49 mm. (5-HgCl-derivative, m.p. 80—81°), and 2-benzylfuran, b.p. 114—116°/23 mm. (5-HgCl-derivative, m.p. 121°), were prepared. α-Furylalkylcarbinols on catalytic dehydration (see below) give C₄H₃O·CH·CH·R and C₄H₃O·CH₂·CH₂·R, a mixture of which is hydrogenated (feebly active Pt-black) to the latter. 2-Ethylfuran, b.p. 92—93°/768 mm. (5-HgCl-derivative, m.p. 109°), and (I) were thus prepared. H. G. M.

Orientation in the furan series. IX. Friedel-Crafts reaction with 2-furfuraldehyde. H. GILMAN, N. O. CALLOWAY, and R. R. BURTNER. **X. Anomalous Friedel-Crafts reactions.** H. GILMAN and R. R. BURTNER (*J. Amer. Chem. Soc.*, 1935, 57, 906—907, 908—912; cf. A., 1934, 300).—IX. Furfuraldehyde (I) and Pr^βCl-AlCl₃ give 2:4-CHO·C₄H₃O·Pr^β (II), since oxidation and bromination gives 5-bromo-4-isopropyl-2-furoic acid, m.p. 103—104°, also obtained by hydrolysis of its *Et* ester, b.p. 141—144°/17 mm. (from Et 4-bromofuroate, Pr^βCl, and AlCl₃), and by oxidation (Ag₂O) of 5-bromo-4-isopropyl-2-furfuraldehyde (synthesised from 5-bromofurfuraldehyde and Pr^βCl). When the acid is treated successively with Br (0.65 mol.) at 125—140°, hot H₂O, alkaline Ag₂O, and K₃Fe(CN)₆, it yields 5-bromofuran-2:3-dicarboxylic acid and thence (by HgCl₂) 5-bromo-3-furoic acid. 4-isoPropyl-2-furoic acid with Cu-bronze in quinoline at 220—240° gives 3-isopropylfuran, b.p. 111—112° (2-HgCl-derivative, m.p. 90°), or by replacement of the CO₂H 4-isopropylfuran-2-mercurichloride, m.p. 119—120°.

X. (I) with Bu^αCl, Bu^βCl, or Bu^γCl gives (AlCl₃) 2:5-CHO·C₄H₃O·Bu^γ (III), b.p. 93—95°/13 mm. (*semicarbazone*, m.p. 205°), oxidised to the known acid (IV) (*amide*, m.p. 121°), which was converted into 2-*tert.*-butylfuran (5-HgCl-derivative, also obtained directly from the acid by replacement of the CO₂H), and obtained also from (IV) by way of the acid chloride. Et 5-bromo-2-furoate with Bu^γCl (AlCl₃-CS₂) gives

Et 5-bromo-4-*tert.*-butyl-2-furoate (V), b.p. 148—152°/13 mm. (3% yield), hydrolysed (KOH—EtOH) to the acid, m.p. 164°, which is reduced by Zn dust and aq. NH₃ to 4-*tert.*-butyl-2-furoic acid, m.p. 89°, whence, by way of the chloride, 4-*tert.*-butyl-2-furfuraldehyde (VI), b.p. 93—95°/13 mm. (*semicarbazone*, m.p. 187°), is obtained. 5-*iso*Propyl-2-furoic acid gives the *chloride*, b.p. 117—121°/16 mm., and thence 5-*iso*propyl-2-furfuraldehyde (VII), b.p. 91°/11 mm. (*semicarbazone*, m.p. 159°). (III), (VI), and (VII) are unaffected by AlCl₃ in CS₂, so that the differing orientation of (II) and (III) remains unexplained. The isomerisation of Bu^αCl and Bu^βCl during reaction is paralleled by cleavage during reaction of *n*-C₅H₁₁Cl, *n*-C₆H₁₃Cl, and *n*-C₁₈H₃₇Br with *Et* 5-bromo-2-furoate, (V) being obtained in all cases. Like BuCl, *n*-C₅H₁₁Cl with (I) affords 5-(? *tert.*)*amyl*-2-furfuraldehyde (poor yield), b.p. 95—98°/15 mm. (*semicarbazone*, m.p. 196°), oxidised to the oily acid (α -naphthalide, m.p. 201°). Furan is more aromatic than C₆H₆ in being more readily alkylated, but *p*-OMe·C₆H₄·CHO and Pr^βCl with AlCl₃ in CS₂ give a 22·4% yield of 4-methoxy-3-*isopropyl*benzaldehyde, b.p. 146—150°/16 mm. (oxidised to the known acid), and PhCHO gives a poor yield of *m*-*isopropyl*benzaldehyde, b.p. 95—97°/2 mm. [*semicarbazone*, m.p. 172°; oxidised to oily *m*-C₆H₄Pr^β·CO₂H and *m*-C₆H₄(CO₂H)₂], whilst PhCHO and Bu^βCl yield probably a little *m*-*tert.*-butylbenzaldehyde, b.p. 140—150°/13 mm., oxidised to an acid, m.p. 123°. C₆H₆, Ac₂O, and SnCl₄ (60°; 8 days) give 4% of C₆H₅Me. For acylation of furan and its derivatives the order of decreasing utility is SnCl₄, FeCl₃, AlCl₃, and TiCl₄, but for alkylations AlCl₃, FeCl₃, SnCl₄. 2-Furyl CH₂Cl ketone (prep. by AlCl₃; 21%) has b.p. 127—129°/27 mm. R. S. C.

Friedel-Crafts reaction with nitro-compounds. H. GILMAN, R. R. BURTNER, N. O. CALLOWAY, and J. A. V. TURCK, jun. (J. Amer. Chem. Soc., 1935, 57, 907—908).—Me₂ furan-2 : 3-dicarboxylate, Ac₂O, and SnCl₄ in C₆H₆ give Me₂ 2-acetofuran-3 : 4-dicarboxylate, m.p. 108°. In the following Friedel-Crafts reactions NO₂ was replaced by Cl or reduced, or no reaction occurred. 2-Nitrofuran and EtCOCl give 5-chloro-2-propionylfuran, m.p. 55°, but *Et* 5-nitro-2-furoate does not react. PhNO₂ with Bu^βBr or Pr^βBr and AlCl₃ at room temp. (30 days) give *o*- and *p*-C₆H₄Cl·NH₂ (more rapidly with Bu^βBr, if heated), but MeBr and EtBr do not react. R. S. C.

Oxidation and reduction phenomena observed in catalytic dehydration of furylalkylcarbinols. R. PAUL (Compt. rend., 1935, 200, 1118—1120).—Furfuryl alcohol heated (390°) with Al₂O₃ in N₂ yields 2-methylfuran and furfuraldehyde; similarly 2-furylmethylcarbinol gives 2-ethyl- and 2-vinyl-furan and 2-furyl Me ketone, and 2-furyl-*n*-propylcarbinol gives 2-*n*-propylfuran, 2-furyl Pr^α ketone, and α -2-furyl- Δ^2 -butene. F. N. W.

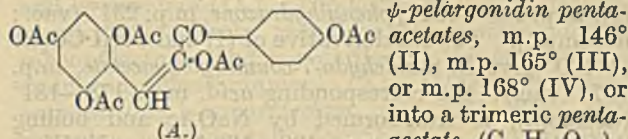
Dibenzofuran [diphenylene oxide]. IV. Orientation and relative aromaticities of the 2-, 3-, and 4-dibenzofuryl radicals. H. GILMAN, W. G. BYWATER, and P. T. PARKER (J. Amer. Chem. Soc., 1935, 57, 885—887; cf. this vol., 91).—The NO₂-derivative, m.p. 100°, formed as by-product from

diphenylene oxide (I) and fuming HNO₃ in AcOH, is a mixture, containing the 2-NO₂-compound, since reduction and acetylation gives some 2-NHAc-compound. The hydroxydiphenylene oxide (II), m.p. 138—139°, formed from resorcinol and WO₃ at 500—550° is the 3-OH-compound, since it is also obtained from the 3-NH₂-compound by way of the diazonium borofluoride. Oxidation of a mixture of Grignard reagents from 2-bromodiphenylene oxide and Bu^βBr in Et₂O at -10° by O₂ yields 2-hydroxydiphenylene oxide, m.p. 134°. Pb 2-, m.p. 158·5—159·5°, 3-, m.p. 125—126°, and 4-*bibenzofuryl*triphenyl, m.p. 99—100°, with HCl give (I). (I) is thus more aromatic than C₆H₆. By analogy the (OH)₂-derivative formed with (II) is probably the 3 : 7-compound. 4-Acetamidodiphenylene oxide and Br give the 1-Br-4-NHAc-compound, whence the 1-Br-compound, m.p. 67°, is obtained. 1-Substitution also occurs with 4-hydroxydiphenylene oxide and Br or PhN₂Cl, but is rare. 1 : 2 : 3 : 4-Tetrahydrodiphenylene oxide is sulphonated in the 7-position. R. S. C.

Tannins and similar compounds. XXVIII. Transformations of anthocyanidins and catechins. K. FREUDENBERG, KARIMULLAH, and G. STEINBRUNN (Annalen, 1935, 518, 37—61; cf. A., 1934, 779).—Reasons are advanced for considering the natural tannins to be formed by autocondensation of catechins. Doubts are expressed with regard to Russell's syntheses (A., 1934, 416, 1107, 1362) of definite flavanols and pinacols and on the identity of his amorphous, synthetic products with individual, natural tannins.

According to conditions pelargonidin chloride (I) is transformed by C₅H₅N and Ac₂O into monomeric ψ -pelargonidin penta-acetates, m.p. 146° (II), m.p. 165° (III), or m.p. 168° (IV), or into a trimeric penta-acetate, (C₂₅H₂₂O₁₁)₃, m.p. 224° (decomp.), which cannot be hydrogenated and does not afford (I) when treated with HCl. (II) and (III) are dimorphous forms, of which (III) is the more stable. (II), (III), and (IV) give the same H₂-derivative, m.p. 148° (PtO₂ in AcOH). Probably (II) and (IV) are *cis-trans* isomerides (cf. A). Fisetinidin chloride (V) affords two ψ -fisetinidin penta-acetates, C₂₅H₂₂O₁₁, m.p. 107° and 149°, respectively, which give amorphous products when hydrogenated and are re-converted into (V) by AcOH-HCl. β -Resorcaldehyde and ω : 4-diacetoxyacetophenone are converted by HCl in EtOAc into 4' : 3 : 7-trihydroxyflavylum chloride, which passes when treated with Ac₂O and C₅H₅N into 4' : 3 : 2(?) : 7-tetra-acetoxyflavene, m.p. 135—136°, which yields only amorphous products when hydrogenated. Cyanidin chloride yields ψ -cyanidin hexa-acetate, m.p. 156° (also obtained from natural cyanidin), which yields two H₂-derivatives, m.p. 151° and 173°, respectively, and possibly a third isomeride, m.p. 145—148°.

The optically active chloride (VI) is transformed by MeOH at room temp. into pentamethyl-d-isocatechin (VII), m.p. 78·5°, [α]_D²⁰ +132·5° in CCl₄, in good yield. Pentamethyl-dl-isocatechin has m.p. 125°. Tetra-



methylethyl-*d*-isocatechin, m.p. 123°, $[\alpha]_{D}^{17}$ +123° in $C_2H_2Cl_4$, and the corresponding *dl*-*com*-*compound*, m.p. 116°, are described. Acetyl-tetramethyl-*d*-isocatechin (VIII), from (VI) and KOAc in

AcOH or from (VI) and AcOH in C_6H_5N , has m.p. 151°, $[\alpha]_{D}^{17}$ +202°. (VIII) is converted into (VII) by HCl-MeOH at room temp. Acetyl-tetramethyl-*dl*-isocatechin,

m.p. 168°, gives a *Br*-derivative, m.p. 149°. (VI) with NaOAc in boiling $COMe_2-H_2O$ or with $CaCO_3$ in $COMe_2-H_2O$ at room temp.

gives the aldehyde (IX), m.p. 136.5°, $[\alpha]_{D}^{17}$ +57.3° in CCl_4 (oxime, m.p. 168°; acetate, m.p. 99.5°, $[\alpha]_{D}^{20}$ -125° in $C_2H_2Cl_4$), which does not give the colour reactions for CHO and in which phenolic OH cannot be detected by $FeCl_3-EtOH$. The corresponding optically inactive aldehyde, m.p. 127°, its monoacetate, m.p. 110°, and (?) triacetate, m.p. 167°, are described.

H. W.

Chemistry of the anthocyanins. R. ROBINSON (Nature, 1935, 135, 732-736).—A summary.

L. S. T.

Natural coumarins. XIV. New synthesis of angelicin (from *Angelica archangelica*, L.). E. SPATH and M. PAILER (Ber., 1935, 68, [B], 940-943; cf. A., 1934, 779).—Umbelliferone does not react with HCN or KOH- $CHCl_3$ but is converted by successive treatments with $(CH_2)_6N_4$ in AcOH at 100° and boiling HCl into umbelliferone-8-aldehyde (I), m.p. 189-191° [phenylhydrazone, m.p. 231° (vac.; decomp.)]. The Na derivative of (I) and CH_2I-CO_2Et at 100° give *Et* 8-aldehydo-7-coumariloxycetate, m.p. 157° (vac.); the corresponding acid, m.p. 178-181° (decomp.), is transformed by NaOAc and boiling Ac_2O into angelicin, m.p. 138-139.5°. H. W.

Synthesis of rotenone and its derivatives. V. Constitution of apotoxicarol. R. G. HEYES and A. ROBERTSON (J.C.S., 1935, 681-684).—In an attempted synthesis of dehydroapotoxicarol (I), Me 4 : 5-dimethoxy-2-cyanomethylphenoxyacetate and phloroglucinol condense ($ZnCl_2$) to 4 : 5-dimethoxyphenoxyacetic acid-2-phloroacetophenone (II) (+2 H_2O),

m.p. 215° (decomp.), and phloroglucinol Me₂ ether similarly affords-2-(2':4'-O-dimethyl)phloroacetophenone, m.p. 196-197°, neither compound undergoing cyclisation. (I) forms a diacetate, m.p. 202°, and with NaOH is converted into (II). In the formation of apotoxicarol by hydrolytic fission (NaOH) of toxicarol (III), $COMe_2$ is formed; this is considered to arise from a 2 : 2-dimethyl- Δ^3 -chromen residue in (III), and reasons for the formula (III) are advanced.

F. R. S.

Constitution of pyrroline. A. TREIBS and D. DINELLI (Annalen, 1935, 517, 170-172).—Pyrroline

(I) is $NH \begin{matrix} CH_2 \cdot CH \\ | \\ CH_2 \cdot CH \end{matrix}$, since ozonisation of the hydrochloride in H_2O and oxidation of the product with H_2O_2 leads to $NH(CH_2 \cdot CO_2H)_2$. Ozonisation of (I) in CCl_4 gives ill-defined results. Treatment of (I) with CS_2 in CCl_4 yields the dithiocarbamate, $C_5H_{14}N_2S_2$, m.p. 201° (sealed tube). (I) and 1 : 2 : 4-C₆H₃Br(NO₂)₂ yield 1-2':4'-dinitrophenylpyrroline, m.p. 124.5°, well adapted to the identification of (I). H. W.

Tschitschibabin condensation of butaldehyde and ammonia. E. BERGMANN (Chem. and Ind., 1935, 534-535).—Correction of misprinted formulae given by Haskelberg (this vol., 628). E. W. W.

Iridium dipyridinobromo-compounds. (MME.) M. DELÉPINE-TARD (Compt. rend., 1935, 200, 1477-1478).— C_5H_5N and K_3IrBr_6 afford pyridinium dipyridinoiriditetrabromide, $[Ir(C_5H_5N)_2Br_4](C_5H_5N)H$ (I), and the salt, $[Ir(C_5H_5N)_2Br_4]K + H_2O$ (II). (I) is more readily obtained by heating C_5H_5N with M_3IrBr_6 (cf. A., 1923, i, 944), and with aq. NH_3 and NH_4Br affords the salt $[Ir(C_5H_5N)_2Br_4]NH_4 + H_2O$ (III), which does not lose H_2O at 100°. (III) is converted into (II) by treatment with KOH and KBr: the corresponding *Rb* and *Cs* salts (each + H_2O) can similarly be obtained, whilst the *Aq* and *Tl* salts are obtained from (III) by double decomp. with $AgNO_3$ -aq. NH_3 and Tl_2SO_4 , respectively. The salts of the alkali metals are oxidised (HNO_3 , Cl_2 - or $Br-H_2O$) forming compounds of the quadrivalent *Ir* base, $Ir^{IV}(C_5H_5N)_2Br_4$, reconverted into the tervalent condition by reducing agents. When an aq. solution of (III) is refluxed for 6 hr. the aquo-compound, $Ir(H_2O)(C_5H_5N)_2Br_3 + 3H_2O$ (IV), is obtained. This is a ψ -acid, dissolves in alkalis and aq. NH_3 , and is re-pptd. by addition of acids. When the NH_3 from a solution of (IV), $AgNO_3$, and NH_3 is allowed to evaporate, the compound, $[Ir(C_5H_5N)_2(OH)Br_3]_3H_2Ag$, is obtained, whilst from HNO_3 medium the salt $[Ir(C_5H_5N)_2Br_3(NO_3)]Ag + 3H_2O$, is obtained. This series of Br-derivatives is similar to that of the corresponding Cl-derivatives of Ir, and is considered to be the *trans*-dipyridino-series. On no occasion have two isomeric derivatives been isolated. H. G. M.

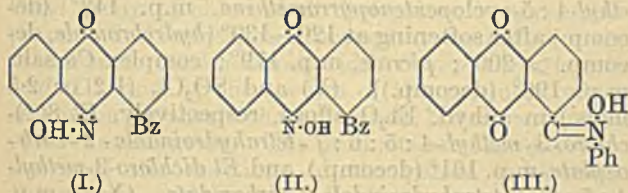
Optically active silver complexes. F. HEIN and H. REGLER (Naturwiss., 1935, 23, 320).—The variations in $[\alpha]$ (in $CHCl_3-C_5H_5N$) of fractions of α -bromod-camphor- π -sulphonate of the Ag complex with 8-hydroxyquinoline, $[Ag(C_5H_5N \cdot OH)_2]$, indicate the presence of optically active stereoisomerides.

F. O. H.

Polymembered heterocyclic compounds. VII. Preparation of 7- to 18-membered saturated and unsaturated cyclic imines by reduction of thioisoximes. L. RUZICKA, M. HURBIN, M. W. GOLDBERG, and M. FURTER (Helv. Chim. Acta, 1935, 18, 659-667; cf. A., 1934, 82).—cycloHexanoneisoxime is converted by P_2S_5 in xylene at 100° into cyclohexanoneisoxime, b.p. 123-128°/0.1 mm., m.p. 107-109°, which is not readily reduced by Zn dust and alkali but is converted electrolytically into hexamethyleneimine. cycloHeptanoneisoxime has m.p. 82-83°. cycloPentadecanone is transformed by HN_3 into cyclopentadecanoneisoxime, m.p. 133°, whence the thioisoxime and pentadecamethyleneimine,

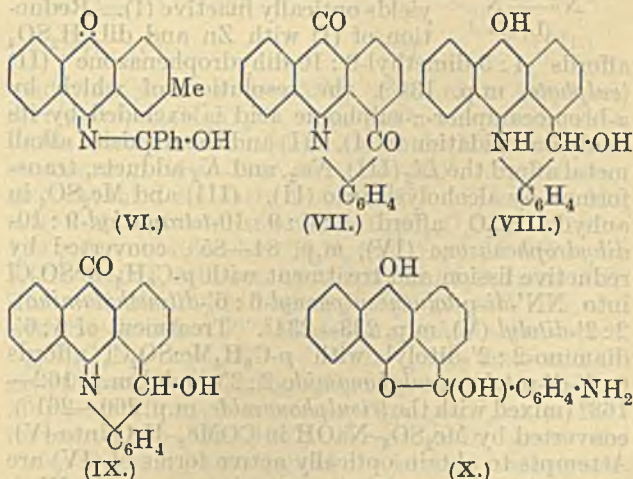
b.p. 112—115°/0.2 mm., m.p. 50—51°. *cycloheptadecanonethioisooxime*, m.p. 110—111°, is electrolytically reduced to *heptadecamethyleneimine*, b.p. 142—147°/0.5 mm., m.p. 64—66° (*tartrate*; *acetate*, m.p. about 68°). Norcivetone is transformed successively into the *isooxime*, m.p. 112—113°, *thioisooxime*, m.p. 93—94°, and Δ^7 (or/and Δ^8)-*dehydrohexadecamethyleneimine*, b.p. 120—121°/0.15 mm., m.p. 36—37° (*picrolonate*, m.p. 199—200°). Civetone is converted by HN_3 and HCl in C_6H_6 into *civetoneisooxime*, m.p. 121—122°, or by excess of HN_3 into the *tetrazole*, $\text{CH}[\text{CH}_2]_7\text{C}\cdot\text{N}\cdot\text{N}\cdot\text{N}\cdot\text{N}$, m.p. 90—91°. *Civetoneisooxime*, b.p. 210—220°/0.15 mm., m.p. 119—120°, is reduced by Na and AcOH in EtOH to Δ^7 -*dehydroheptadecamethyleneimine*, b.p. about 128°/0.1 mm., m.p. 28—29° (*picrolonate*, m.p. 196—197°; *succinate*, m.p. 120°). Compounds with poly-membered ring systems are characterised by a more or less pronounced odour of musk, which is purest with the lactones, followed by the ketones and other compounds. The abs. val. of d of cyclic imines is closer to that of the hydrocarbons than of the ketones, but variation of d from member to member of a series is most similar with imines and ketones. H. W.

Isomerism of oximes of 1-aroylantraquinones and benzoylenemorphanthridone. V. R. SCHOLL and E. J. MÜLLER [with E. STIX] (Ber., 1935, 68, [B], 801—814).—Treatment of 1-benzoylantraquinone with $\text{NH}_2\text{OH}\cdot\text{HCl}$ and Na_2CO_3 in boiling EtOH affords mainly α -(anti)- (I) accompanied by small and varying amounts of β -(syn)-1-benzoylantraquinoneoxime (II), decomp. about 210° after softening and γ -(anti)-*Ph* 1-antraquinonyl ketoxime (III), decomp. about 218°.



(II) is isomerised to (I) rapidly in boiling PhNO_2 , more slowly in boiling AcOH . In contrast to (I) and (III), it cannot be etherified by $\text{HCl}\text{-EtOH}$. (I) and (II) are readily converted by boiling $\text{HCl}\text{-PhNO}_2$ into benzoylenemorphanthridone (IV). These facts and the similarity of (II) to 1-benzoyl-2-methyl-antraquinoneoxime (V) enable the *syn* structure to be assigned to (II). (III) cannot be converted into (IV). It is transformed into a red vat by $\text{Na}_2\text{S}_2\text{O}_4\text{-NaOH}$, from which it is regenerated by air. It readily suffers the Beckmann transformation, giving anthraquinone-1-carboxyanilide, and hence has configuration (III). (V) is not etherified by 2% $\text{HCl}\text{-EtOH}$, whilst with 8% $\text{HCl}\text{-EtOH}$ at 150° it is largely de-oximated to 1-benzoyl-2-methyl-antraquinone. (V) is transformed by boiling $\text{HCl}\text{-PhNO}_2$, possibly owing to liberated NH_2OH , into 2-hydroxy-2-phenyl-3-methyl-6:7-benzoylene- $\beta\beta'$ -benzo-2-pyrroline (VI), m.p. 266—267°, the constitution of which follows from its ready reduction to 2-phenyl-3-methyl-6:7-benzoylene- $\beta\beta'$ -benzopyrrole. Anthraquinone-1-car-

oxyl chloride is converted by AlCl_3 and 1:3:5- $\text{C}_6\text{H}_3\text{Me}_3$ in boiling CS_2 into *mesityl anthraquinonyl ketone*, m.p. 167°, the *oxime*, m.p. 202—203°, of which is closely similar to (I) in prep. and reactions. It is transformed by $\text{HCl}\text{-EtOH}$ into *Et anthraquinone-1-carboxylate*, reaction being probably due to primary de-oximation rather than to Beckmann change.

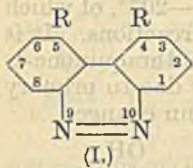


Benzoylenemorphanthridone (VII) is converted by boiling $\text{KOH}\text{-EtOH}$ into two H-compounds giving red and blue solutions, respectively, in alkali which can be separated from one another by means of their differing behaviour towards air. The former, also obtained from (VII) by the protracted action of $\text{Na}_2\text{S}_2\text{O}_4$ in boiling NaOH , is rapidly transformed by air into 9-hydroxy-5:10-benzoylenemorphanthridine (VIII), decomp. 254—257°, readily oxidised by CrO_3 to (VII), and is therefore (IX). The latter, incipient decomp. about 235°, closely resembles the anthraquinol-1-carboxylactones and is regarded as the *lactol* of *o*-aminobenzoylantraquinol (X). *O*-Acetyl-9-anilino-anthran-10-ol-1-carboxylactam, m.p. 251—252° after softening, is incidentally described. H. W.

Action of hydrazine on cyclic ureides (parabanic acid). R. FOSSE, P. E. THOMAS, and P. DE GRAEVE (Compt. rend., 1935, 200, 1260—1264).—Parabanic acid (I) in aq. solution with $\text{N}_2\text{H}_4\cdot\text{H}_2\text{O}$ and $\text{NHPh}\cdot\text{NH}_2$ gives, respectively, *oxalurhydrazide* (II), m.p. 198° (decomp.), and *oxalurphenylhydrazide* (cf. J.C.S., 1888, 53, 556). (I) and (II) with xanthhydrol in AcOH give *dixanthylparabanic acid*, m.p. 214°, and *xanthylloxalurhydrazide*, cryst. (II) and $\text{R}\cdot\text{CHO}$ give the *oxalurhydrazones* of PhCHO , m.p. 215° (decomp.), CH_2O , m.p. 212° (decomp.), and MeCHO , m.p. 224° (darkens at 220°). F. R. G.

Configuration of 4:5-disubstituted phenanthrene and phenazone derivatives. G. WITTIG and O. STICHOOTH (Ber., 1935, 68, [B], 928—935; cf. A., 1933, 944).—With the object of elucidating the steric relationships of phenanthrene derivatives, 4:5-disubstituted derivatives of phenazone have been investigated, since they are more readily accessible and probably similarly constructed. 1:2:3- $\text{C}_6\text{H}_3\text{MeI}\cdot\text{NO}_2$ (improved prep.) is converted by Cu powder at 180—190° and finally at 225—235° into 6:6'-dinitro-2:2'-ditolyl, m.p. 107—108° (yield 81%), which is electro-

lytically reduced to 4:5-dimethylphenazone [(I) R=Me], m.p. 112—113°. The salts of (I) with optically active OH·CHPh·CO₂H, lactic or tartaric acid are too unstable to permit resolution, whereas the α -bromocamphor- π -sulphonate, m.p. 164—167°, [α]_D +52.0° in MeOH, yields optically inactive (I). Reduction of (I) with Zn and dil. H₂SO₄



affords 4:5-dimethyl-9:10-dihydrophenazone (II) (sulphate, m.p. 134°), the resolution of which by α -bromocamphor- π -sulphonic acid is excluded by its ready autoxidation to (I). (I) and the requisite alkali metal afford the Li₂ (III), Na₂, and K₂ adducts, transformed by alcoholysis into (II). (III) and Me₂SO₄ in anhyd. Et₂O afford 4:5:9:10-tetramethyl-9:10-dihydrophenazone (IV), m.p. 84—85°, converted by reductive fission and treatment with *p*-C₆H₄Me·SO₂Cl into NN'-di-*p*-toluenesulphonyl-6:6'-di(methylamino)-2:2'-ditolyl (V), m.p. 233—234°. Treatment of 6:6'-diamino-2:2'-ditolyl with *p*-C₆H₄Me·SO₂Cl affords 6:6'-di-*p*-toluenesulphonamido-2:2'-ditolyl, m.p. 162—163° (mixed with the trisulphonamide, m.p. 260—261°), converted by Me₂SO₄-NaOH in COMe₂-H₂O into (V). Attempts to obtain optically active forms of (IV) are hindered by its sensitiveness to air. H. W.

Pyrrole derivatives with attached isocyclic ring. Bz-Tetrahydroindoles and cyclopentenopyrroles. A. TREIBS and D. DINELLI (Annalen, 1935, 517, 152—169).—Attempts to introduce a single :N·OH group into cyclohexanone (I) were unsuccessful. Similarly treatment of Et cyclohexanone-2-carboxylate with amyl nitrite and HCl gives Et dinitrosocyclohexanone-2-carboxylate, whereas reaction does not occur with NaNO₂ and AcOH. cyclo-Hexanone-2-carboxylic acid and NaNO₂ in AcOH-H₂O afford non-cryst. oximinocyclohexanone (II), which decomposes when distilled, but is identified by transformation into dioximinocyclohexane, m.p. 189—190°, and by reduction to octahydrophenazine, m.p. 108° [hydrochloride, m.p. 159—160° after softening at 150°; picrate, m.p. 165° (decomp.)]. (II) with CH₂Ac·CO₂Et and Zn dust at 70—80° gives Et 2-methyl-4:5:6:7-tetrahydroindole-3-carboxylate, m.p. 134° (yield 20%); 2-methyl-4:5:6:7-tetrahydroindole-3-carboxylic acid, m.p. 170° (decomp.), passes at 180° into 2-methyl-4:5:6:7-tetrahydroindole, b.p. 105—107°/10 mm. COEt·CH₂·CO₂Et similarly affords Et 2-ethyl-4:5:6:7-tetrahydroindole-3-carboxylate, m.p. 130° (yield 20%), whence 2-ethyl-4:5:6:7-tetrahydroindole-3-carboxylic acid, m.p. 178° (decomp.), and non-cryst. 2-ethyl-4:5:6:7-tetrahydroindole, which is very sensitive to air and does not give a picrate. 3-Acetyl-2-methyl-4:5:6:7-tetrahydroindole, m.p. 203° (hydrobromide, decomp. 156°; hydrochloride), is obtained similarly from CH₂Ac₂. Reduction of OH·N·CMe·CH₂·CO₂Et (III) and ketone (IV) by Zn dust in aq. AcOH at 70—80° does not give a tetrahydroindole, whilst in anhyd. media the yield is 0.8—1.6%, increased to 16% by use of a large excess of (IV). By use of isolated (III) at the b.p. the yield may attain 46%. Thus (I) and (III) in anhyd. AcOH afford Et 3-methyl-4:5:6:7-tetrahydroindole-5-carboxylate (V), m.p. 110° (also obtained, accompanied by

Et₂ 2:5-dimethylpyrrole-3:5-dicarboxylate, when CH₂Ac·CO₂Et in AcOH is treated with NaNO₂ and the solution used directly for the condensation). (V) yields 3-methyl-4:5:6:7-tetrahydroindole-2-carboxylic acid, m.p. 130° (decomp.), and 3-methyl-4:5:6:7-tetrahydroindole (VI), m.p. 58° [picrate, m.p. 149° (decomp.)]. (V) is dehydrogenated by Se at 270—300° to skatole. Et oximinopropionylacetate, m.p. 62°, and (I) (4 mols.) yield Et 3-ethyl-4:5:6:7-tetrahydroindole-2-carboxylate, m.p. 189°, whence 3-ethyl-4:5:6:7-tetrahydroindole-2-carboxylic acid, m.p. 129° (decomp.), which passes at 135°/vac. into 3-ethyl-4:5:6:7-tetrahydroindole (VII), m.p. 52°. (VII) gives the aldehyde reaction in cold solution and does not appear to form a picrate. (III) and cyclopentanone yield Et 3-methyl-4:5-cyclopentenopyrrole-2-carboxylate, m.p. 147°, in small amount; 3-methyl-4:5-cyclopentenopyrrole-2-carboxylic acid, m.p. 143—145° (decomp.), passes at 150°/vac. into 3-methyl-4:5-cyclopentenopyrrole (VII), m.p. 28—29° (picrate, m.p. 109°). (VI) is converted by anhyd. HCN and HCl in anhyd. Et₂O into 3-methyl-4:5:6:7-tetrahydroindole-2-aldehyde (VIII), m.p. 170°, which condenses with cryptopyrrolealdehyde (IX) in AcOH at 100° to 3-methyl-4:5:6:7-tetrahydroindole-3':5'-dimethyl-4'-ethylpyrrolenine-2:2'-methene, m.p. 169° (hydrobromide, m.p. 225°; picrate, m.p. 200—201°; Cu salt, C₃₆H₄₆N₄Cu, m.p. 230°), which appears to undergo a porphyrin synthesis. (VI) and HCO₂H containing HBr give di-3-methyl-4:5:6:7-tetrahydroindyl-methine, m.p. 172° [hydrobromide, m.p. 235° (decomp.); picrate, m.p. 212° (decomp.)], also obtained from (VIII) and opsopyrrolecarboxylic acid. Et 2:3:4-trimethylpyrrole-5-carboxylate, m.p. 126°, is obtained in 7% yield from COMeEt, (III), and Zn dust in boiling AcOH. (VIII) and (IX) afford 3:3':5'-trimethyl-4'-ethyl-4:5-cyclopentenopyrromethine, m.p. 142° (decomp.) after softening at 120—130° [hydrobromide, decomp. > 200°; picrate, m.p. 179°; complex Cu salt, m.p. 196° (decomp.)]. (V) and SO₂Cl₂ (1:2 or 2:5 mols.) in anhyd. Et₂O afford, respectively, Et 8(?)chloro-3-methyl-4:5:6:7-tetrahydroindole-2-carboxylate, m.p. 161° (decomp.), and Et dichloro-3-methyl-4:5:6:7-tetrahydroindole-2-carboxylate (X), m.p. 155°. (X) is hydrolysed to the corresponding acid, m.p. 167° (decomp.), which when heated yields a substance, C₂₈H₂₅O₂N₃·HCl, decomp. 230°. Br in AcOH transforms (V) into Et (8?)-bromo-, m.p. 158° (decomp.), or Et dibromo- (XI), m.p. 121° (decomp.), -3-methyl-4:5:6:7-tetrahydroindole-2-carboxylate. Et bromohydroxy-3-methyl-4:5:6:7-tetrahydroindole-2-carboxylate, m.p. 130° (decomp.) after becoming red at 110°, is obtained from (XI) and H₂O in AcOH.

H. W.

γ -Triazines. XXVIII. Dihydroxyphenyltriazine and its derivatives. A. OSTROGOVICH (Gaz-zetta, 1935, 65, 229—241).—Correction and extension of work of Elzanowski (Diss., Fribourg, 1893). 2:4-Dihydroxy-6-phenyl-1:3:5-triazine, m.p. 293—294°, prepared by dissolving benzoylbiuret in dil. KOH, and, later, adding AcOH (A., 1930, 1193), is anhyd. (crystallographic data); its hydrochloride has 1 or 0.5H₂O. The Na (+H₂O, +6H₂O, or +7/3H₂O, + MeOH), Na₂ (+2EtOH), Ag (+0.5H₂O, or +H₂O), Ag₂ (+H₂O), Ba (+3H₂O), Mg (+10H₂O), and Pb salts,

and a complex, $[\text{Cu}(\text{NH}_3)_4(\text{OH})_2](\text{C}_9\text{H}_6\text{O}_2\text{N}_3)_2$ (crystallographic data), are described. E. W. W.

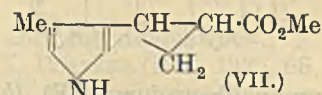
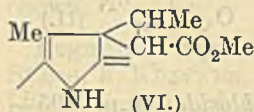
Synthetic d-, l-, and dl-9-araboflavin. R. KUHN and F. WEYGAND (Ber., 1935, 68, [B], 1001—1005).—The oxalates, m.p. 190—191°, 190—191°, and 164—165°, respectively, of d- (I), l-, and dl-arabina-mine are described. (I) and o-C₆H₄(NO₂)₂ in 80% EtOH at 135° afford 1-nitro-2-d-1'-arabitylamino-benzene, m.p. 187—188° (tetra-acetate, m.p. 126—127°), reduced (PtO₂-80% EtOH) and then condensed with alloxan to 9-d-araboflavin (II), m.p. 296° (decomp.), $[\alpha]_D^{17} + 83.5^\circ$, $+75.5^\circ$, $+64.0^\circ$ in 0.1N-NaOH ($c=0.503$, 0.251, and 0.126, respectively), $[\alpha]_D^{17} - 175^\circ$ in 0.1N-NaOH + Na₂B₄O₇ (tetra-acetate, m.p. 265—266°). Similarly are obtained 1-nitro-2-l-1'-arabitylamino-benzene, m.p. 187—188° (tetra-acetate, m.p. 126—127°), and 9-l-araboflavin (III), m.p. 296° (decomp.), $[\alpha]_D^{17} - 82.5^\circ$, -74° , and -68° in 0.1N-NaOH ($c=0.678$, 0.339, and 0.169, respectively), $[\alpha]_D^{17} + 174^\circ$ in 0.1N-NaOH + Na₂B₄O₇ (tetra-acetate, m.p. 265—266°). 1-Nitro-2-dl-1'-arabitylamino-benzene, m.p. 168—169° (tetra-acetate, m.p. 146—147°), 9-dl-araboflavin, m.p. 296°, and its tetra-acetate, m.p. 273—274°, are obtained by admixture of the requisite optical antipodes in equal amount. (II) and (III) do not promote the growth of rats on a vitamin-B₂-free diet. H. W.

[Pyridyl]-substituted barbituric acids.—See B., 1935, 524.

Chlorophyll. LVI. Action of diazoacetic esters on some chlorophyll derivatives. H. FISCHER and H. MEDICK. LVII. Synthesis of deoxyphyllerythroaetio-porphyrin. H. FISCHER and J. HOFMAN [with E. STROBEL] (Annalen, 1935, 517, 245—273, 274—277; cf. this vol., 763).—LVI. CHN₂-CO₂Me (I) (and the Et ester) adds on to the vinyl group of chlorophyll derivatives to give cyclopropane derivatives, as is proved by oxidation of the products to methylmaleinimidecyclopropanecarboxylic acid (II), and by the spectra of the products, which retain the porphyrin characteristics, but show removal of the unsaturation. The products are susceptible to many of the reactions of the parent substances. Derivatives without the vinyl group do not react. CH₂N₂ adds only extremely slowly. It is thus proved that chlorophyll (II), protoporphyrin, and phaeophorbide-a and -b contain the vinyl group. Possible structures for the phaeophorbides are discussed, but certain statements in the lit. require revision before a decision can be reached. (II), hæmin (IV), and bacteriophagephorbide are thus very closely related. The "oxo-reaction" is now explained thus:

$\text{R}\cdot\text{CH}:\text{CH}_2 + \text{HI} \rightarrow \text{R}\cdot\text{CHMeI} \rightarrow (-2\text{H by I})$
 $\text{R}\cdot\text{CHMe}\cdot\text{OH} \rightarrow \text{RAc}$. The structures given below are confirmed by spectral analysis. Protoporphyrin Me₂ ester (best obtained by CH₂N₂ in C₅H₅N; 2 days) adds 2 mols. of (I) at 100° (2 hr.) to give the substance (V), C₄₂H₄₆O₈N₄, m.p. 193—194° (cryst. Zn and amorphous Cu salts), stable to HBr-AcOH at 45°, oxidised by CrO₃ and aq. H₂SO₄ to hæmatic acid and (II), m.p. 205°. Methylphaeophorbide-a adds 1 mol. of (I) to give a poor yield of a substance, C₃₉H₄₂O₇N₄, m.p. about 220°, probably constituted as (VI), giving with HI-AcOH at 65° the isomeric porphyrin derivative, as (VII), m.p. 242°. (VI) with 25% HCl gives a sub-

stance (VIII), C₃₇H₄₀O₅N₄, m.p. 243° (oxime, m.p. 225°), also obtained from pyropheophorbide-a and (I). Catalytic (Pd) hydrogenation of (VIII) in COMe₂ is very slow, and re-oxidation leads mainly to (VIII); hydrogenation in AcOH is somewhat faster, and re-



oxidation gives a 30—35% yield of a porphyrin derivative, C₃₇H₃₈O₅N₄, m.p. 243°, which with CrO₃ yields methylethylmaleinimide and (II) (with substances, m.p. 110—111° and 149—150°, respectively), also obtained similarly from (VIII). Chlorin-e₆ Me₃ ester and (I) give the substance, C₄₀H₄₆O₈N₄, m.p. 187—189°, also obtained by CH₂N₂ in C₅H₅N-MeOH or by KOH-MeOH, followed by CH₂N₂ in Et₂O, from (VI). This with Na₂CO₃ in boiling C₅H₅N gives (VIII), and with HI-AcOH at 50° affords the porphyrin derivative, C₄₀H₄₄O₈N₄, m.p. 235°. Chlorin-e₄ Me₂ ester and (I) give the substance, C₃₈H₄₄O₆N₄, m.p. 184°, and rhodin-g Me₃ ester affords a substance, C₄₀H₄₄O₉N₄, m.p. 241° (oxime, m.p. 194—196°). Protohæmin gives the "oxo-reaction," a poor yield of a ketonic (oxime) substance being obtained. (I) does not react with meso-, hæmato-, tetramethylhæmato-, or ketorhodo-porphyrin, mesoporphyrinogen, mesochlorin, mesorhodin, an ozonide of aetioporphyrin (another prep. reacted), dihydrophaeophorbide-a, phaeoporphyrin-a₅, phyloerythrin, or dimethylphaeopurpurin-7. Phaeopurpurin-18, however, reacts.

LVII. 2-Formyl-4-methyl-3-bromovinylpyrrole-5-carboxylic acid and hæmopyrrole with HBr at 0° give 5-carboxy-4 : 4' : 5' - trimethyl-3' - ethyl-3-bromovinyl-pyromethene hydrobromide, decomp. 285° after discoloration from 170°, which with crytopyrrole-methene-I in molten (-CH₂-CO₂H)₂ gives a mixture of aetioporphyrin with a little deoxyphyllerythroaetioporphyrin, m.p. 360° (block), separable with difficulty by adsorption on talc and perfusion with Et₂O.

R. S. C.

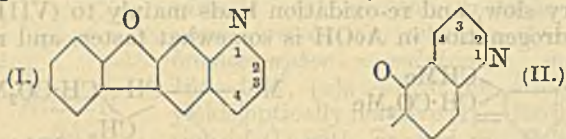
Phthalocyanines. I. Metal-free, nickel, copper, and platinum compounds.—See this vol., 813.

Nucleic acid of ergot.—See this vol., 797.

Constitution of the heterocyclic ring, C₂H₂O.—See this vol., 810.

Benzofuroquinolines. E. MOSETTIG and R. A. ROBINSON (J. Amer. Chem. Soc., 1935, 57, 902—905).—2-Aminodibenzofuran (modified prep.) gives (Skraup) benzofuro-3 : 2-g. (I) (32%), m.p. 168—169° (hydrochloride, m.p. 216—233°), and -2 : 3-f-quinoline (II), m.p. 106—107° (hydrochloride, m.p. 266—285°). The structure of (I) is proved by the degradation given below and that of (II) follows. Hydrogenation (Cu-Cr-BaO in decalin; 100—150°; 1500—1800 lb.) affords the 1 : 2 : 3 : 4-H₄-derivatives, m.p. 111—112° {hydrochloride, m.p. 196—226°; Bz, m.p. 198—200°, and N-Me derivative (prep. by MeI and NaOAc in EtOH at 100°), m.p. 56—57° [hydrochloride, m.p. 195—200° (decomp.); methiodide (III), m.p. 207—209°]}, and m.p. 80—81° {hydrochloride, m.p. 255—235°; Bz, m.p. 158—159°, and N-Me derivative, m.p.

72—73° [hydrochloride, m.p. 204—209° (decomp.); methiodide (IV), m.p. 193—194°], respectively. Emde degradation of (III) affords 3- γ -dimethylamino-*n*-



propyldibenzofuran (V) (hydrochloride, m.p. 195—197°; picrate, m.p. 164—165°; methiodide, m.p. 210—211.5°), identical with the synthetic product (A., 1922, i, 746). Dibenzofuran, ($\text{C}_6\text{H}_4\text{CO}$)₂O, and AlCl₃ in PhNO₂ give β -3-dibenzofurylpropionic acid, m.p. 185—187° (lit. 184—185°). γ -3-Dibenzofurylbutyric acid, purified by way of the Et ester (distills in high vac.) and K salt, m.p. 114—115°, gives the hydrazide, m.p. about 118—120° (lit. 122—123°), which affords the urethane, m.p. 72—74° (and a substance, m.p. 140—160°), whence were obtained the azide (and a substance, m.p. 220—222°), 3- γ -amino-*n*-propyldibenzofuran hydrochloride (96% yield), m.p. 228—231° (lit. 219—220°), and (by HCO₂H-CH₂O at 130—160°) (V). (IV) affords (Emde) 1- γ -dimethylamino-*n*-propyldibenzofuran (hydrochloride, m.p. 168—169°; picrate, m.p. 128—129.5°; methiodide, m.p. 237—238°). Physiological activity is in the order: (I), (II) < H₄-derivatives < (III), (IV). The substances do not cause death in effective doses. All m.p. are corr.

R. S. C.

Hydrolysis of ergotinine and ergoclavine. W. A. JACOBS and L. C. CRAIG (J. Amer. Chem. Soc., 1935, 57, 960—961; cf. this vol., 504, 764).—Hot HCl destroys the lysergic acid fraction of ergotinine, giving amorphous products, *l*-phenylalanine, and *d*-proline. Ergoclavine with alkali gives NH₃, lysergic acid, CH₂Pr ^{β} ·CO·CO₂H, and leucine, and with acid only partly racemised *l*-leucine and another NH₂-acid, but not proline.

R. S. C.

Ergotocin. Active principle of ergot responsible for the oral effectiveness of some ergot preparations on human uteri. M. S. KHARASCH and R. R. LEGAULT (J. Amer. Chem. Soc., 1935, 57, 956—957).—Ergotocine, ergotamine, and sensibamine are ineffective when administered orally in 2 mg. doses to human mothers and in 2—4 mg. doses induce unpleasant side-reactions and caused uterine contraction in only 5 out of 15 cases. Some ergot preps. (U.S.P. method) (I) are ineffective. A dextrorotatory base, ergotocin (II), m.p. 155° (decomp.) [red picrate, m.p. 195—197° (decomp.); some salts sol. in 10 parts of H₂O], is present only in effective (I) and is responsible for the whole of this efficiency; the immediately effective dose of pure (II) for man is 0.3 mg. orally equiv. to 3—4 g. of crude defatted ergot or 0.1 mg. intravenously. (II) is fairly sol. in H₂O, is not pptd. by Meyer's reagent in concn. < 1:7500, and does not liberate NH₃ with hot alkali.

R. S. C.

Alkaloids of jaborandi leaves. VI. Synthesis of *r*-homopilopic acid. N. A. PREOBRASHENSKI, A. M. POLJAKOVA, and V. A. PREOBRASHENSKI. VII. Resolution of the unstable ethylparaconic (*r*-pilopic) acid into its optical antipodes. N. A. PREOBRASHENSKI and V. A. PREOBRASHENSKI. VIII. Synthesis of *d*-homopilopic acid. N. A. PREO-

BRASHENSKI, A. M. POLJAKOVA, and V. A. PREOBRASHENSKI (Ber., 1935, 68, [B], 844—847, 847—849, 850—852; cf. A., 1934, 632).—VI. Treatment of *r*-pilopic acid (I) with PBr₃, H₂(+Pd), I, KCN, H₂SO₄, and HCl in succession leads to *r*-homoisopilopic acid. Inversion is shown to occur during prolonged heating or distillation in vac., under the influence of PBr₃, or by prolonged boiling with acids, but not with the remaining reagents if the changes are effected at low temp. The synthesis is effected as follows: (I) is transformed by SOCl₂ into *r*-pilopyl chloride, b.p. 98°/0.3 mm., converted by H₂-Pd in C₆H₆ into *r*-pilopaldehyde, b.p. 92°/0.2 mm., which is reduced (Al-Hg in Et₂O) to the corresponding alcohol (II), b.p. 117.8°/0.05 mm. (II) and SOCl₂ in presence of C₅H₅N afford *r*-pilopyl chloride, b.p. 92°/0.8 mm., whence the corresponding iodide, nitrile, b.p. 125—130°/0.1 mm., and *r*-homopilopic acid, m.p. 100—101°.

VII. (I) is resolved into its optical antipodes by crystallisation of the brucine or cinchonine salts from H₂O. The vals., m.p. 121.2—122.2°, [α]_D²⁰ +54.60° in H₂O, and m.p. 120—121.8°, [α]_D¹⁵ -54.00° in H₂O, are recorded for the *d*- (II) and *l*-acids, respectively.

VIII. (II) with SOCl₂ gives *d*-pilopyl chloride, converted by CH₂N₂ in Et₂O into *d*-pilopyl CHN₂ ketone (III), m.p. 106—108°. Addition of (III) in H₂O to a mixture of Na₂S₂O₄ and Ag₂O in H₂O affords *d*-homopilopic acid, the identity of which with the material from natural sources is established by converting it into *d*-homopilopyl CH₂Cl ketone, m.p. 88.5—89.2°.

H. W.

[Simplification of Pictet's synthesis of nicotine.] J. B. WIBAUT (Ber., 1935, 68, [B], 768).—Späth *et al.* (this vol., 635) have overlooked the work of Wibaut *et al.* (A., 1928, 1386; 1933, 77, 1312).

H. W.

Sophora alkaloids. IX. Thermopsine. A. OREKHOV and H. GUREVITSCH [with T. OKOLSKAJA] (Ber., 1935, 68, [B], 820—822; cf. this vol., 635).—Attempts to degrade thermopsine (I) by the action of KOH or Ag₂O on its methiodide were unsuccessful, (I) being almost quantitatively recovered. Emde's method is also inapplicable. (I) does not add CNBr in boiling C₆H₆. The attempted Hofmann degradation of tetrahydrothermopsine methiodide, m.p. 261—262° (decomp.), gives unchanged base. (I) in 50% H₂SO₄ is reduced at a Pb cathode to the base C₁₅H₂₈ON₂, m.p. 112—113°, [α]_D²⁰ +55.9° in MeOH, which contains 1 OH (Zerevitinov) and, apparently, NH. Reduction of (I) is accompanied by ring fission.

H. W.

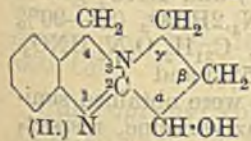
Alkaloids of Convolvulus pseudocantabricus. III. Constitution of convolvine and isolation of two new bases. A. OREKHOV and R. KOŇVALOVA [with E. EREMINA] (Ber., 1935, 68, [B], 814—819; cf. A., 1934, 908).—Convolvine (I) (nitrate, m.p. 115°) is C₁₆H₂₇O₄N (not C₁₅H₂₇O₄N). Alkaline hydrolysis of (I) yields 3:4-C₆H₃(OMe)₂·CO₂H and nortropine, m.p. 159—161°. Treatment of (I) with MeI in COMe₂ gives convolvamine (II), m.p. 109—110°, and its methiodide, m.p. 275—276°. (I) is therefore veratroylnortropine. (I) constitutes 90% of the alkaloidal mixture of the seeds of *C. pseudocantabricus*, whereas (I) and (II) are present in about equal proportion in the foliage. Convolvidine (III), probably C₃₂H₄₂O₈N₂ or

$C_{33}H_{44}O_8N_2$, m.p. 192—193°, optically active, is isolated from crude (I) owing to its very sparing solubility: Alkaline hydrolysis of (III) affords 3 : 4- $C_6H_3(OMe)_2 \cdot CO_2H$ and an *alkamine*, m.p. 274—276° (*picrate*, m.p. 229—231°). *Convolvicine*, C_5H_8N or $C_{10}H_{16}N_2$, b.p. 250—260°/1 atm. (*picrate*, m.p. 200—202°), is obtained from the mother-liquors from the hydrochlorides of (I) and (II).
H. W.

Alkaloids of han-fang-chi. K. K. CHEN and A. L. CHEN (J. Biol. Chem., 1935, 109, 681—685).—Han-fang-chi, *Cocculus diversifolius* (or *japonicus*) (2.3% of total alkaloids), yields to EtOH mainly tetrandrine, $C_{32}H_{24}O_2(OMe)_4(NMe)_2$, m.p. 217—218°, $[\alpha]_D^{25} +252.4^\circ$ in $CHCl_3$ [*dihydrochloride*, m.p. 263°, decomp. 266°, $[\alpha]_D^{25} +224.2^\circ$ in H_2O ; *dihydrobromide*, m.p. 270° (decomp. from 258°), $[\alpha]_D^{25} +200.7^\circ$ in H_2O ; *dinitrate*, decomp. 208° (softens at 205°), $[\alpha]_D^{25} +211.2^\circ$ in H_2O ; *oxalate*, decomp. 165—170° (softens at 147.5—148.5°); *dipicrate*, decomp. 235—242°; *diflavinate*, decomp. 248—250° (cf. A., 1932, 1048)]. M.p. are corr.
R. S. C.

Structure of vasicine. II. **Synthesis of deoxyvasicine.** W. E. HANFORD and R. ADAMS. III. **Position of the hydroxyl group.** R. C. MORRIS, W. E. HANFORD, and R. ADAMS (J. Amer. Chem. Soc., 1935, 57, 921—924, 951—954; cf. this vol., 365).—II. γ -Phenoxybutyryl chloride (prep. by $SOCl_2$), b.p. 154—156°/20 mm., gives the *amide*, m.p. 113°, and with $o\text{-NO}_2 \cdot C_6H_4 \cdot CH_2 \cdot NH_2$ in C_6H_6 the *o-nitrobenzylamide*, m.p. 75—76°, hydrogenated (PtO_2 ; EtOH; 2—3 atm.) to γ -phenoxybutyryl-*o*-aminobenzylamide, m.p. 97.5—98°, which at 270°/1.5 mm. gives H_2O and 2- γ -phenoxypropyl-3 : 4-*dihydroquinazoline*, m.p. 111.5—112.5°. With HBr it gives the γ -Br-compound, converted by alkali into deoxyvasicine (I), m.p. (+2H₂O) 77° (0.5H₂O; prep. over H_2SO_4 in vac.) 88—89°, and (anhyd.; hygroscopic; prep. over P_2O_5 in vac.) 96.5—97.5° (*benzylidene* derivative, m.p. 161—163°, often 157—159°). γ -Chlorobutyryl-*o*-nitrobenzylamide, m.p. 73°, with KOH in C_6H_6 at 50° affords *N*-*o*-nitrobenzylpyrrolidone (14%), m.p. 100°, hydrogenated (PtO_2 ; EtOH; 1 atm.) to the *o*-NH₂-compound, m.p. 63—65°, which distils unchanged at 245—255° and could not be converted into (I). γ -Chlorobutyrylbenzylamide, m.p. 68°, affords quantitatively *N*-benzylpyrrolidone, b.p. 122.5—123°/2 mm., which with conc. HCl at 100° gives γ -benzylaminobutyric acid hydrochloride, hygroscopic, m.p. 158—161°.

III. Contrary to Ghose *et al.* (A., 1933, 77), vasicine (II) does not react with 3% H_2O_2 , but with 30% H_2O_2 at 60—70° gives some of the compound (III), m.p. 213—214°, shown below to be 2 : 3- α -hydroxytrimethylene-4-quinazolone. The substance, m.p. 168°, was not obtained and was probably the equimol. mixture of (II) and (III), which has m.p. 168—170°. (III) and $SOCl_2$ give 2 : 3- α -chlorotrimethylene-4-quinazolone, m.p. 109°, reduced by Zn dust and AcOH to (I). (I) and 3% H_2O_2 at 50—60° give 2 : 3-trimethylene-4-quinazolone (IV), m.p. 110—110.5° (*benzylidene* derivative, m.p. 137—139°), which is synthesised thus. $o\text{-NH}_2 \cdot C_6H_4 \cdot CO \cdot NH_2$ (prep. from the ester and liquid NH_3 at 200°/1200 lb.) affords *o*- γ -phenoxybutyryl-*o*-amino-



benzamide, m.p. 150°, which at 230—235° loses H_2O to give 2- γ -phenoxypropyl-4-quinazolone, m.p. 181°, converted by HBr into the γ -Br-compound, which with hot KOH-EtOH affords (IV). (IV) and $Pb(OAc)_4$ give (III). (II) thus has almost certainly the formula shown.
R. S. C.

Peganine (vasicine) and its derivatives. E. SPATH, F. KUFFNER, and N. PLATZER (Ber., 1935, 68, [B], 935—940; cf. this vol., 635).—Treatment of $o\text{-NO}_2 \cdot C_6H_4 \cdot CH_2Cl$ with pyrrolidine in boiling EtOH yields 1-*o*-nitrobenzylpyrrolidine, b.p. (bath), 100—115°/1 mm., reduced by $SnCl_2$ and fuming HCl to 1-*o*-aminobenzylpyrrolidine, m.p. 31—32°, identical with deoxyhexahydropeganine. Reduction of peganine (I) with Na and isoamyl alcohol gives dihydropeganine (pegan-3-ol), m.p. 132—133°, and pegane. Treatment of (I) with Ac_2O at 100° yields *O*-acetylpeganine, m.p. 122—123° (vac.), readily hydrolysed to (I). Boiling Ac_2O converts (I) into *N*-acetylpegadiene (II), $C_{13}H_{12}ON_2$, m.p. 163—164.5° (cf. Ghose *et al.*, A., 1933, 77), hydrolysed to *pegadiene*, $C_{11}H_{10}N_2$, m.p. 210—211° (vac.), re-converted by boiling Ac_2O into (II).
H. W.

Cactus alkaloids. XIV. Anhalidine. E. SPATH and F. BECKE (Ber., 1935, 68, [B], 944—945; cf. this vol., 635).—Anhalidine, m.p. 131—133° (isolation from *Anhalonium Lewinii* described) is formed by treatment of anhalamine with MeI in MeOH followed by Na_2CO_3 and is therefore 8-hydroxy-6 : 7-dimethoxy-2-methyl-1 : 2 : 3 : 4-tetrahydroisoquinoline.
H. W.

Synthesis of tropinone, ψ -pelletierine, lobelamine, and related alkaloids under physiological conditions. C. SCHÖPF and G. LEHMANN (Annalen, 1935, 518, 1—37; cf. A., 1932, 1046; 1934, 1373).—The formation of tropane alkaloids in the cell can be satisfactorily explained if tropinone (I) is assumed to be an intermediate product (cf. Robinson, A., 1917, i, 581, 876). It is shown that (I) is formed in good yield from $(\cdot CH_2 \cdot CHO)_2$, NH_2Me , HCl, and $CO(CH_2 \cdot CO_2H)_2$ at p_H 3—11 and 20—25°. (I) is not produced from tropinonedicarboxylic acid (II) by KOH used in its isolation. At p_H 13, (II) is formed in large amount. $CH_2Ac \cdot CO_2H$ cannot replace $CO(CH_2 \cdot CO_2H)_2$. The hypothesis that $CO_2Me \cdot CH_2 \cdot CO \cdot CH_2 \cdot CO_2H$ (III) is the initial material in the biosynthesis of cocaine and its analogues is supported by the observation that (III), $(\cdot CH_2 \cdot CHO)_2$, and NH_2Me at p_H 5 afford Me tropinone-carboxylate (IV) in good yield. Reduction of (IV) and esterification of the OH thus produced leads to the alkaloids. Attempts to convert succindialdioxime (V) into $(\cdot CH_2 \cdot CHO)$ by $EtNO_2$ in dioxan at $< 15^\circ$ yield a *compound* (succindialdehyde Et_2 acetal or 2 : 5-diethoxytetrahydrofuran), b.p. 65—72°/12 mm. $(\cdot CH_2 \cdot CHO)_2$ is best obtained by passing N_2O_3 into (V) suspended in H_2O . Glutardialdehyde (VI) is obtained by ozonolysis of cyclopentene or, preferably, from *trans*-cyclopentane-1 : 2-diol and $Pb(OAc)_4$.

At p_H 3—13, preferably p_H 3—7, ψ -pelletierine (VII) is formed in good yield from (VI), NH_2Me , and $CO(CH_2 \cdot CO_2H)_2$. In contrast with observations in the tropinone series, comparatively large yields of (VII) are obtained at p_H 13, doubtless owing to the relative instability of primarily-formed ψ -pelletierinedicarboxylic acid in alkaline solution. (VII) cannot be

formed from COMe₂ in the plant unless an undetected enzyme which catalyses the condensation is present.

By analogy, lobelanine (VIII),

$\text{CH}_2 \left\langle \begin{array}{l} \text{CH}_2 \cdot \text{CH}(\text{CH}_2 \cdot \text{Bz}) \\ \text{CH}_2 \cdot \text{CH}(\text{CH}_2 \cdot \text{Bz}) \end{array} \right\rangle \text{NMe}$, is regarded as the primary product of the biogenesis of *Lobelia* alkaloids. (VIII) is formed in good yield from (VI), NH₂Me, and CH₂Bz·CO₂H in feebly acid solution within a very narrow *p*_H range. At *p*_H 7 the yield is very small, whilst at *p*_H 9, 11, or 13 only traces of (VIII) cannot be detected as the sparingly sol. hydrochloride. In alkaline solution the amount of basic product is very little and the only neutral product is CPhMe. At *p*_H 3 (VIII) is almost completely stable, whereas at *p*_H 5 it suffers noticeable decomp., increasing with the alkalinity of the solution; the effect is not sufficiently pronounced to account for the influence of *p*_H in the synthesis of (VIII). (·CH₂·CHO)₂, NH₂Me, and CH₂Bz·CO₂H at *p*_H 3, 4, 5, 7, and 9 afford 2:5-diphenacyl-1-methylpyrrolidine (IX), m.p. 62° (hydrochloride, m.p. 205—206°), in good yield and its formation is well marked at *p*_H 11 and 13. Unlike (VIII), (IX) is almost completely stable in neutral or feebly alkaline solution. The constitution of (IX) is established by degradation of its methiodide, m.p. 186° (corresponding methochloride), to β-dimethylamino-αζ-dibenzoyl-Δ^ε-hexene, m.p. 110°, the methiodide, m.p. 204—205°, of which passes into αζ-dibenzoyl-Δ^{εε}-hexadiene (X), m.p. 192° after softening at 185°. (X) is hydrogenated (Pd-CaCO₃ in MeOH) to αβ-dibenzoylhexane, m.p. 94° (semicarbazone, m.p. 203—204°), identical with that obtained from suberyl chloride and C₆H₆. The max. yield (83%) of 2:5-diacetoxy-1-methylpyrrolidine, m.p. 57—58° [picrate, m.p. 176—177° (decomp.)], from (·CH₂·CHO)₂, NH₂Me, HCl, and CH₂Ac·CO₂H is obtained at *p*_H 5 and 20—22°. H. W.

Iodobismuthates of quinine and hydrocupreine esters. A. MIHALOVICI and L. VON ULLMANN (Curierul farm., 1934, 4, No. 3, 1—5; No. 4, 1—6; Chem. Zentr., 1935, i, 214).—An amorphous product is obtainable only by pptn. at great dilution. Hydrolysis is avoided by repeated washing with fresh H₂O.

H. J. E.

Hydrocupreine aminoalkyl ethers. K. H. SLOTTA and R. BEHNISCH (Ber., 1935, 68, [B], 754—761).—NMe₂·CH₂·CH₂·OH is transformed by SOCl₂ in C₆H₆ into β-dimethylaminoethyl chloride, b.p. 109°/759 mm. [hydrochloride (I), m.p. 201°]. (I), NaOEt, and hydrocupreine in boiling EtOH afford β-dimethylaminoethylhydrocupreine, m.p. 103°. The following compounds are analogously obtained: β-diethylaminoethyl chloride, b.p. 146—147°/750 mm. (hydrochloride, m.p. 212°), and β-diethylaminoethylhydrocupreine, m.p. 120° (sulphate, m.p. 215°); β-diethylamino-n-propyl chloride, b.p. 59—60°/16 mm., and the non-cryst. β-diethylamino-n-propylhydrocupreine, which passes over P₂O₅ at 80°/high vac. into a cryst. modification, m.p. 124° (sulphate, m.p. 196°); γ-diethylaminoisobutyl chloride, b.p. 35—37°/12 mm. (picrate, m.p. 151°), and γ-diethylaminoisobutylhydrocupreine, softens at 80—90° (sulphate, m.p. 228°); γ-dimethylaminoisomethyl chloride, b.p. 50—53°/12 mm., and γ-dimethylaminoisomethylhydrocupreine, m.p. (indef.) 70—80° (trisulphate, m.p. 216°); tetramethyl-di-

aminoisopropyl chloride, b.p. 68—70°/12 mm. (picrate, m.p. 170°), and non-cryst. tetramethyldiaminoisopropylhydrocupreine [sulphate, m.p. (indef.) 85—90°]. All the ethers exhibit the bactericidal and antimalarial actions of their components in a greatly diminished degree, showing that the most active components can yield inactive mols. if their union produces compounds of mol. wt. beyond the optimal. OPh·[CH₂]₅·Br and NHEt₂ at 140° yield Ph ε-diethylamino-n-amyl ether, b.p. 166°/13 mm. (hydrochloride, m.p. 115°), which is converted by conc. HCl at 160° into PhOH and ε-diethylamino-n-amyl chloride, b.p. 85—90°/12 mm., which very rapidly passes into 1-ethylpiperidine ethochloride, m.p. 275° (picrate, m.p. 241°; aurichloride, m.p. 249°), also obtained by treating 1-ethylpiperidine with EtI and the product with AgCl. Tetramethyldiaminoisopentanol gives the corresponding chloride in which Cl is very mobile. Di-β-chloroethylamine hydrochloride is stable, but the base polymerises very readily. H. W.

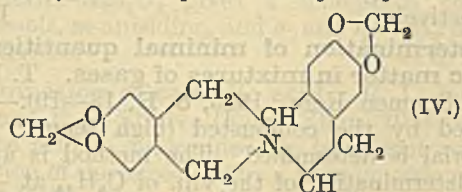
Third hydroxy-base derived from quinidine.

T. DOMAŃSKI and J. SUZKO (Rec. trav. chim., 1935, 54, 481—491).—Quinidine and conc. HCl or HBr give, besides α-isoquinidine (I) (A., 1933, 517), difficultly separable γ-isoquinidine (II), C₂₀H₂₄O₂N₂, m.p. about 70°, [α]_D¹⁵ +51.1° in EtOH [dinitrate, m.p. 196°, [α]_D¹⁵ +50° in H₂O; oxalate, m.p. 185—188° (decomp.), [α]_D¹⁵ -56.9° in H₂O; hydriodide, m.p. 180—183°; H tartrate (III), m.p. 160—161° (decomp.); picrate, m.p. 183—193°; methiodide (IV), m.p. 227—235°, [α]_D¹⁵ +(?)12° in EtOH; dimethiodide, m.p. 241—242° (decomp.), [α]_D²⁵ -95° in EtOH; perbromide, B.HBr₃, m.p. 213—216°, regenerates (II) at once with dil. aq. alkali; N-oxide, +3H₂O, m.p. about 80—100°, decomp. 160°]. (III) at 120° gives γ-isoquinicine, m.p. 113°, [α]_D²⁴ -40° in EtOH (N-NO-derivative, m.p. 103—105°, decomp. about 140°), yielding with cold MeI-Et₂O the N-Me derivative, an oil [dinitrate, m.p. 155° (decomp.); methiodide, m.p. 90—100°, decomp. > 205°, [α]_D¹⁵ -11° in EtOH], also obtained from (IV) and hot 10% KOH. (II) in 10—25% AcOH at 100° gives γ-hydroxydihydroquinotoxin, m.p. 110—118°, [α]_D¹⁵ -15° in EtOH (H tartrate, m.p. about 60°; N-NO-derivative, m.p. 65—80°, [α]_D¹⁵ -17° in EtOH; p-nitrophenylhydrazone, m.p. about 90°), in H₂SO₄ (d 1.80) at 70—80° (1.75 hr.) gives β-isoquinidine (V), and in 60% HBr at 100° yields bromodihydrocupreidine [dihydrobromide, m.p. 288° (decomp.)]. (II) is probably an intermediate between (III) and (V), differing from them sterically at C1 and C5, and having the annexed formula. R. S. C.

Degradations in the brucine series. T. T. CHU (Annalen, 1935, 517, 290—294).—11-Amino-brucine (nitrate, decomp. > 200°) and HNO₃ give a cacotheline derivative, C₂₁H₂₂O₇N₄·2HNO₃ (80—90% yield), and a purple substance, C₂₁H₂₂O₉N₂·HNO₃. Substances, C₂₁H₂₀O₈N₄·HNO₃ (95%) and C₂₁H₂₀O₇N₅·HNO₃ (100% yield), were obtained similarly from 11-oximino- and diazo-brucine, respectively. CrO₃ gives mixtures. Oxidation of the

above products with Br-HBr or Cl₂ at 100° or of their catalytic hydrogenation products gives no colourless, H₂O-sol. degradation product. R. S. C.

Protopine and allied alkaloids. II. New synthesis of the berberine ring-system, and of a ring-homologue of the aporphine alkaloids. T. S. STEVENS (J.C.S., 1935, 663—667).—β-Piperonyl-ethylamine (I) and the lactone (II) of 1 : 2 : 4 : 5-CH₂O₂:C₆H₂(CH₂·OH)·CH₂·CO₂H give 6-hydroxymethylhomopiperonyl-β-piperonylamine (III), m.p. 176°. (I) with 1 : 2 : 4 : 5-CH₂O₂:C₆H₂(CH₂Cl)·CH₂·CN forms 6-β-piperonyl-ethylaminomethylhomopiperonylnitrile, m.p. 77—79°, and with 1 : 2 : 4 : 5-CH₂O₂:C₆H₂(CH₂Br)·CH₂·CO₂Me yields 3-keto-6 : 7-methylenedioxy-2-β-piperonyl-ethyl-1 : 2 : 3 : 4-tetrahydroisoquinoline, m.p. 144—146°, which could not be dehydrated, and bis-(6-carboxymethylhomopiperonyl)-β-piperonyl-ethylamine, m.p. 225—230° (decomp.). 6-Methoxymethylhomopiperonyl-β-piperonyl-ethylamine, m.p. 103—105°, and PCl₅ afford 2 : 3 : 10 : 11-bismethylenedioxyprotoberberinium chloride. (III) and POCl₃ give a product, reduced (Zn) to a base "A," probably 6 : 7 : 3' : 4'-bismethylenedioxy-8 : 6'-methylene-1 : 2 : 3 : 4-tetrahydrotopapaverine, m.p. 188° (p-nitrobenzoyl derivative, decomp. 285°). "A" and Me₂SO₄, followed by KBr, afford 6 : 7 : 3' : 4'-bismethylenedioxy-8 : 6'-methylene-protolaudanosine methobromide (+H₂O), m.p. 210—220° (decomp.), which with MeOH-KOH forms the methine, m.p. 101° [hydrochloride, m.p. 170—174°; methobromide (+2H₂O), decomp. 275°]. (II) is reduced (Zn) to 6-methylhomopiperonylic acid, m.p. 148—151°, which with (I) affords 6-methylhomopiperonyl-β-piperonyl-ethylamine, m.p. 158—160°. The amide is cyclised and reduced to 6 : 7 : 3' : 4'-bismethylenedioxy-6'-methyl-1 : 2 : 3 : 4-tetrahydrotopapaverine, m.p. 92—94° [picrate, m.p. 240° (decomp.)], which differs from "A." The base (IV) and CNBr followed by NaOMe yield 6 : 7 : 3' : 4'-bismethylenedioxy-2-carbamyl-6'-methoxymethyl-1 : 2 : 3 : 4-



tetrahydrotopapaverine, m.p. 75—80°, which with POCl₃ and subsequent hydrolysis is converted in small yield into "A."

6 : 7 : 3' : 4'-Bismethylenedioxy-2-methyl-1 : 2 : 3 : 4-tetrahydrotopapaverine (picrate, decomp. 210°) is prepared from Me₂SO₄ and the cyclisation product of homopiperonyl-β-piperonylamine; the 2-benzenesulphonyl compound, m.p. 110—113°, is similarly obtained. Aceto-6-bromo-β-piperonyl-ethylamide, m.p. 125°, and 6-bromohomopiperonylic acid [Me ester, m.p. 84°; amide, m.p. 181°; nitrile, m.p. 65—67°, oxime, m.p. 166—167° (decomp.)] do not condense with CH₂O. F. R. S.

Chloropropyl yohimboate and its derivatives. D. E. WORRALL (J. Amer. Chem. Soc., 1935, 57, 900).—The following are prepared: α-chloro- [from

CH₂(CH₂Cl)₂], m.p. 110—111° [*H sulphate*, decomp. 283°; apo-form, m.p. 105—106° (decomp.)], α-diethyl-amino-, m.p. indef. > 75° (*dihydrochloride*, m.p. 192—193°; *methiodide*, m.p. 195—196°; apo-form, m.p. 95—96°), and α-piperidino-propyl, m.p. 107—108°, cetyl, a gum (*hydrochloride*, m.p. 238°), and benzyl yohimboate, m.p. 77—78° (*hydrochloride*, m.p. 253—254°). R. S. C.

Stereochemistry of trivalent arsenic. I. G. KAMAI (Ber., 1935, 68, [B], 960—965).—Addition of AsMeEtI to a solution of Mg and *p*-C₆H₄Br₂ yields *p*-bromophenylmethyl-ethylarsine (I), b.p. 132—133°/8 mm., which gives an additive compound with CuBr and a cryst. arsonium salt with CH₂BrBz. *p*-Bromophenyl-*p*-tolylmethylarsine (II), b.p. 211—215°/9 mm., is obtained from *p*-C₆H₄Me·AsMeI and *p*-C₆H₄Br·MgBr. Attempts to convert (I) or (II) into the corresponding acids failed on account of their non-reactivity with Mg. *p*-Tolylethyl-*n*-propylarsine is oxidised by KMnO₄ to *p*-carboxyphenylethyl-*n*-propylarsine oxide hydrochloride, m.p. 119—120° (converted by H₂S into *p*-carboxyphenylethyl-*n*-propylarsine sulphide, m.p. 142°), which is reduced by SO₂ in presence of I to *p*-ethyl-*n*-propylarsinobenzoic acid (III), AsEtPr·C₆H₄·CO₂H, m.p. 58—59° (NH₄ and Ba salts; compound with HgCl₂, m.p. 69—70°). *p*-Carboxyphenylmethyl-ethyl-*n*-propylarsonium iodide has m.p. 154—156°. (III) gives strychnine, m.p. 145—147°, [α]_D²⁰ -29.88° in CHCl₃, and quinine, m.p. 194—195°, [α]_D²⁰ -71.45°, salts, but evidence of resolution is not obtained. H. W.

Organic selenium compounds. Chemical properties of some arylselenonium compounds. Preparation of diarylselenonium acetates. D. G. FOSTER (Rec. trav. chim., 1935, 54, 447—460; cf. A., 1934, 539).—SePh₂Br₂ or SePh₂Cl₂ and AgOAc in Et₂O or C₆H₆ gives the acetate (I), OH·SePh₂·OAc, m.p. 81—82°, which loses AcOH when kept or heated in vac., and absorbs Ac₂O vapour to form the diacetate, SePh₂(OAc)₂, m.p. about 132°. SePhEtBr₂ or SePhEtCl₂ and AgOAc in cold Et₂O or C₆H₆ afford SePhEt, PhSeO₂H, and AcOH; when heated, however, SePhEt, SePh₂, and AcOH are produced, probably by decomp. of SePh₂O, produced from the monoacetate. SePh₂O and Ac₂O give (I), but (*p*-C₆H₄Me)₂SeO and (*p*-C₆H₄·OEt)₂SeO give the diacetates, m.p. 88—90° and 81—82°, respectively; SePhMeO and *p*-C₆H₄Br·SeEtO probably react, but give no definite products. CH₂R·SePhO (R=H or Me), when distilled/high vac. or heated in conc. aq. solution, decompose thus: (a) CH₂R·SePhO → SePh·CH₂R (II) + PhSeO₂H + RCHO; (b) PhSeO₂H + (II) → Se₂Ph₂ + RCHO + H₂O. Reaction (b) can be realised alone. SePh₂Br₂ and NaOEt give SePh₂, MeCHO, and EtOH, but SePhEtBr and NaOEt give probably SePhEtO, since the final products are SePhEt, PhSeO₂H, Se₂Ph₂, and MeCHO. SePhBu^c·Br₂ and NaOBu react similarly. The following are incidentally described: *Ph Bu^c*, b.p. 105°/5 mm. (*dibromide*, m.p. 84°), *n*-amyl, b.p. 116°/5 mm. (*dibromide*, m.p. 88—90°, and *n*-hexyl selenide, b.p. 133°/5 mm. (*dibromide*, m.p. 95°); *phenyl-ethyl*-, m.p. 181—183°, and *methyl-selenonium oxide*, m.p. 53—54°, hygroscopic. R. S. C.

Influence of the stibino-group on the reactivity of nuclear chlorine. C. B. BISWELL and C. S. HAMILTON (J. Amer. Chem. Soc., 1935, 57, 913—914).— SbO_3H_2 has less influence than AsO_3H_2 on the reactivity of aromatic Cl. 3-Chlorophenylstibinic acid (from $o\text{-C}_6\text{H}_4\text{Cl}\cdot\text{NH}_2$) [chloride, $\text{C}_6\text{H}_4\text{Cl}\cdot\text{SbOCl}_5$, m.p. 82° after sintering (NH_4Cl additive compound, m.p. $87\text{--}89^\circ$)] does not react with NH_2Ph , is unchanged by $6N\text{-NaOH}$ at 100° , and affords at 50° the 5- NO_2 -acid (I) [chloride, m.p. 250° (NH_4Cl additive compound, m.p. 250°)], and thence the 5- NH_2 - and (by $6N\text{-KOH}$ at 97°) 5- OH -acids. The above acids are amorphous, m.p. $> 250^\circ$. (I) and the appropriate amino in PhNO_2 or, better, $\text{C}_6\text{H}_{11}\cdot\text{OH}$ with, best, polished Cu, give 5-nitro-2-anilinophenylstibinic acid, decomp. 250° , and the 2-alkylamino-acids, substituted by Pr^a , decomp. 220° , Bu^a , decomp. 170° , Bu^b , decomp. 200° , $n\text{-amyl}$, decomp. 120° , and $isoamyl$, decomp. 200° . R. S. C.

Ultracentrifugal study of gliadin. L. KREJCI and T. SVEDBERG (J. Amer. Chem. Soc., 1935, 57, 946—951).—Gliadin, which is stable from p_H 1.46 to 12, is shown by centrifuging to be heterogeneous, being composed at p_H 2.23 and 20° of whole and half-mols. (mol. wt. 34,500 and 17,250; dissymmetry nos. 1.92 and 1.21, respectively), but solely of whole mols. at lower p_H and higher temp. The least sol. fraction contains mostly whole, the most sol. almost entirely half-mols. The sedimentation const. of the main constituent is 2.10×10^{-13} . R. S. C.

Attempts to isolate dihydroxyproline-alanine from gelatin hydrolysates. O. H. EMERSON and C. L. A. SCHMIDT (Proc. Soc. Exp. Biol. Med., 1934, 32, 291—296).—No definite cryst. compound corresponding with dihydroxyproline-alanine was isolated from the phosphotungstic acid ppt. from the Van Slyke technique. R. N. C.

Relations between colloidal and constitutive charges of proteins. II. Heat-denaturing action of albumin. III. Casein and edestin.—See this vol., 822, 823.

Titration curves of protein fibres.—See this vol., 826.

Dilatometric study of the denaturation of albumin solutions by heat.—See this vol., 822.

Isoionic point of proteins.—See this vol., 822.

Chromatographic adsorption and its applications. E. LEDERER (Chim. et Ind., 1935, 33, 1072—1078).—The development of the method and its application to the separation of numerous org. compounds are reviewed. R. S.

Detection of elements in organic compounds. I. Simultaneous detection of carbon, hydrogen, and mercury. II. Improved sodium fusion test for the detection of sulphur, nitrogen, iodine, bromine, and chlorine. C. L. TSENG (J. Chinese Chem. Soc., 1935, 27—32, 33—38).—I. Usual tests do not detect Hg in many org. compounds. The method recommended is to heat the compound with CuO , C and H being detected as usual, whilst the Hg is deposited on the cooler parts of the tube. This is subsequently treated with I vapour, when the Hg is converted into HgI_2 .

II. The sample is made into a pellet with excess

of lactose with addition of EtOH if necessary, and is dropped into the melted Na, which is then submitted to an exhaustive series of tests for S, N, and halogens. J. W. S.

Determination of organic halogens. I. Parr bomb method. C. L. TSENG, M. HU, and M. C. CHIANG (J. Chinese Chem. Soc., 1935, 3, 39—51).—Modified procedures are described for determination of halogens by the Parr bomb method. Solutions containing I are reduced by SO_2 before gravimetric determination as AgI . Details are given of the separation of F as CaF_2 . J. W. S.

Combination of catalysts to reduce digestion time in determination of nitrogen. I. In organic compounds. C. F. POE and M. E. NALDER (Ind. Eng. Chem. [Anal.], 1935, 7, 189).—Quickest digestion was obtained with $\text{CuSO}_4 + \text{HgO} + \text{Se}$. Addition of H_2O_2 has little effect. J. S. A.

Rapid determination of iodine value. W. RUCZCZKA (Mikrochem., 1935, 17, 215—221).—A solution of 5—10 mg. of material in EtOH or COMe_2 is treated with 2 c.c. of $0.2N\text{-I} + 20$ c.c. of H_2O . The excess of I is titrated back with $0.05N\text{-Na}_2\text{S}_2\text{O}_3$. J. S. A.

Ebulliometric determination of the degree of decomposition of an organic substance. W. SWIENTOSELAWSKI (Nature, 1935, 135, 829).—The lowering of the b.p. of azeotropic mixtures of certain org. liquids produced by small amounts of H_2O is used as the basis of a method for determining with an accuracy of 0.001% the amounts of H_2O resulting from the partial decomp. of some org. compounds. L. S. T.

Ebulliometric determination of the amount of a substance adsorbed on the surface of solid substances. M. WOJCIECHOWSKI (Nature, 1935, 135, 830).—The principle underlying the above method has been used to investigate the amount of substances adsorbed on the surfaces of glass or of metals. At 18° , the amounts of C_6H_6 adsorbed on 1 sq. cm. of glass and Cu are 0.00026 and 0.00034 mg., respectively. L. S. T.

Determination of minimal quantities of organic matter in mixtures of gases. T. E. BREHMER (Suomen Kem., 1935, 8, B, 18—19).—The CO_2 formed by the combusted (high temp.; catalyst) material is determined. The method is applied to the determination of the v.p. of C_6H_{14} at -77° and -72° , and of PhMe at -40° to -54° , and gives vals. close to those recorded in the lit. J. L. D.

Determination of formic, acetic, propionic, and oleic acids. S. I. SUCHANOVSKI and E. V. ROGINSKAJA (Lesokhim. Prom., 1934, 3, No. 5—6, 26—29).—The mixture of acids is evaporated with PbO to separate EtCO_2H . PbSO_4 is pptd. from the filtrate with H_2SO_4 and filtered, excess of H_2SO_4 being removed with Ba(OH)_2 . The solution, containing salts of HCO_2H and AcOH , is extracted with gasoline in presence of a saturated solution of CaCl_2 and NaCl . The aq. part is neutralised and evaporated to dryness, and the residue fused with KOH and CuO for the determination of AcOH . HCO_2H is determined in a separate sample by the Skala method or by oxidising with HgO . Oleic acid is determined by difference.

Detection of organic compounds by means of drop reactions. IX. **Detection of acetic acid and methyl ketones by formation of indigotin.** F. FEIGL, R. ZAPPERT, and S. VÁSQUEZ (Mikrochem., 1935, 17, 165—169; cf. this vol., 507).—The solution containing AcOH is evaporated to dryness with CaCO₃. The residue is dry-distilled, and the COMe₂ formed brought into contact with paper moistened with an alkaline solution of *o*-NO₂·C₆H₄·CHO, forming indigotin. Sensitivity 0.06 mg. of AcOH. Me ketones may be detected by warming with a drop of the same reagent and extracting with CHCl₃. A blue coloration indicates the presence of Ac. J. S. A.

Identification of small quantities of formaldehyde. R. FOSSE, P. DE GRAEVE, and P. E. THOMAS (Compt. rend., 1935, 200, 1450—1454).—CH₂O reacts with β-C₁₀H₇·OH (I) and HCl at 100° to give methylenedi-β-naphthol (II), m.p. 191—195° (decomp.) (cf. A., 1893, i, 100), which with POCl₃ affords dinaphthoxanthen (*ibid.*, 222). This with Br affords a dinaphthopyrylium bromide (cf. A., 1901, i, 604), converted by HCl into the chloride, which gives a platinichloride. Thus 0.1 mg. of CH₂O at a dilution of 1:10⁵ can be pptd. and characterised microchemically by the use of the foregoing reactions. Glyoxylic acid combines with (I) and HCl more slowly than does CH₂O, and forms a compound, m.p. 215°, with cryst. properties different from those of (II). H. G. M.

Colour test for the identification of mono-, di-, and tri-nitro-compounds. R. W. BOST and F. NICHOLSON (Ind. Eng. Chem. [Anal.], 1935, 7, 190—191).—(NO₂)₂- and (NO₂)₃-compounds of the C₆H₆ series give a blue and a blood-red colour, respectively, with COMe₂-5% KOH. (NO₂)₁-compounds give no coloration, nor do highly substituted derivatives. J. L. D.

Sensitive test for *p*-phenylenediamine. O. HEIM (Ind. Eng. Chem. [Anal.], 1935, 7, 146).—*p*-C₆H₄(NH₂)₂ (0.0005 mg.) with a trace of NH₂Ph in dil. AcOH-K₂S₂O₈ gives a blue-green colour. Aminophenols, *m*-anisidine, and *o*- and *m*-C₆H₄(NH₂)₂ do not interfere. J. L. D.

Determination of salicylic acid. R. L. RAIGORODSIKA and E. S. BENOVA (Farm. Zhur., 1934, 137—140).—The acid is determined by treatment with I and titration of the excess, or by a bromometric modification of Kolthoff's method. CH. ABS. (e)

Determination of thiol and disulphide compounds, with special reference to cysteine and cystine. I. **Colour reaction between the phospho-18-tungstic acid reagent and thiol compounds.** K. SHINOHARA (J. Biol. Chem., 1935, 109, 665—679).—The effect of varying the conditions on the colorimetric determination (±0.37 and 2%, respectively) of cysteine (> 0.0048 mg.) and SH·CH₂·CO₂H by P₂O₅(WO₃)₁₈·3H₂O is measured. The best results are obtained at *p*_H 5 (maintained by a NaOAc buffer). Excess of halides should be avoided, H₂SO₄ being used for hydrolysis of proteins or HCl being neutralised by LiOH. CN' interferes by retarding the development of colour. H₂S may be removed in a stream of CO₂ or N₂. R. S. C.

Separation of large amounts of tyrosine from cystine. F. R. GREENBAUM (Amer. J. Pharm., 1935, 107, 162—173).—Tyrosine is removed from aq. solution by adding NH₃; the cystine is then isolated by adjusting the *p*_H to 1.72—2.0. E. H. S.

Determination of small amounts of pyridine in presence of nicotine and ammonia. L. BARTA (Biochem. Z., 1935, 277, 412—415).—The colour developed on addition of C₅H₅N (I) to a mixture of BrCN and β-C₁₀H₇·NH₂ is used for the colorimetric determination of (I) down to concns. of 1 in 10⁶. A solution containing (I), nicotine (II), and NH₃ in citrate buffer (*p*_H 3) on steam-distillation yields only (I), which can then be determined in the distillate. (I) may be determined in (I)-(II) mixture by pptn. of (II) with silicotungstic acid, making alkaline, and distilling, the (I) content of the distillate being then obtained colorimetrically. P. W. C.

Determination of tryptophan. T. TOMIYAMA and S. SHIGEMATSU (Proc. Soc. Exp. Biol. Med., 1934, 32, 446—449).—The blue colour produced by tryptophan with HCl and Ehrlich's reagent is matched with that resulting from the reduction of phosphomolybdic acid with NH₂·C₁₀H₆·SO₃H (eikonogen) and NaHSO₃. R. N. C.

Microchemistry of antipyrine. M. WAGENAAR (Pharm. Weekblad, 1935, 72, 642—644).—Antipyrine gives characteristic ppts. or colorations with the following reagents (sensitivity given in parentheses): NaCl, HNO₃ violet (2 mg.), HCl-NaNO₂ sea-green cryst. (0.1 mg.; 1:300), K₄Fe(CN)₆ (0.1 mg.; 1:200), K₃Fe(CN)₆ (0.2 mg.; 1:200), Na nitroprusside and acid (0.1 mg.; 1:200), PtCl₄ (0.2 mg.; 1:200), PtCl₄-NaI dark red crystals. Optical and crystallographic properties are given. S. C.

Microchemical reactions on pyramidone. M. WAGENAAR (Pharm. Weekblad, 1935, 72, 612—615).—Pyramidone (I) gives characteristic cryst. ppts. with the following reagents (sensitivity given in parentheses): NaCl (0.1 mg.), KHgI₃ (0.05 mg. in concn. 1:200), KClO₃, KI-ZnI₂ (0.2 mg.; 1:100), PtCl₄ (0.1 mg.; 1:100), AuCl₃-HNO₃ (0.05 mg.; 1:100), picric acid (0.1 mg.; 1:200), *p*-NO₂·C₆H₄·OH (0.1 mg.; 1:200), KI-I (0.02 mg.; 1:200), chinosol (II) (0.2 mg.; 1:100). (II) gives no ppt. with antipyrine (III) and may be used for detecting 1% of (I) in (III). S. C.

Determination of pilocarpine and its salts. J. A. SANCHEZ (Rev. Centr. Estud. Farm. Bioquim., 1934, 24, 48—51; Chem. Zentr., 1934, ii, 3535).—The amount of alkali necessary to open the lactone ring is measured acidimetrically. R. N. C.

Colorimetric determination of small quantities of morphine. R. HOFMANN and N. POPOVICI (Pharm. Zentr., 1935, 76, 346—348).—In the absence of other reducing substances morphine (I) may be determined by addition of 2 c.c. of a solution of silicomolybdic acid to 25 c.c. of a solution of (I) (0.2—10 mg.) in 1% HCl, addition of 5 c.c. of 5% aq. NH₃, and colorimetric comparison (yellow light filter) of the blue colour produced with that obtained from a 0.1% solution of (I) in 1% HCl. Examples are given, the error varying from 0.1 to 2%. J. W. B.

Biochemistry.

Determination of gaseous metabolism. H. WOLLSCHITT and G. KRAMER (Arch. exp. Path. Pharm., 1935, 178, 378—389).—A modified form of Haldane apparatus and its application are described.

F. O. H.

Conditions of foetal respiration in the goat. J. BARCROFT, R. H. E. ELLIOTT, L. B. FLEXNER, F. G. HALL, W. HERKEL, E. F. MCCARTHY, T. McCLURKIN, and M. TALAAT (J. Physiol., 1934, 83, 192—214).—The O_2 -dissociation curve for the blood of the pregnant goat moves to the right of the normal, and that of the foetus to the left, the max. divergence occurring at 18—19 weeks. The movements are due to fall of p_H in the case of the curve of the mother, and to specificity of haemoglobin in the case of that of the foetus.

R. N. C.

Methylene-blue and anoxaemia. G. CRISLER (Amer. J. Physiol., 1935, 110, 580—581).—Methylene-blue augments the symptoms of anoxaemia by formation of methaemoglobin.

R. N. C.

Arterialisation of blood. IV. Balance of oxygen tension between alveoli and blood and the diffusion constant. H. SARRE (Z. Biol., 1935, 96, 352—363; cf. this vol., 371).—The "diffusion const." of O_2 can be calc. from equations for the difference in average O_2 tension between alveolar and arterial blood and successfully applied to conditions due to incomplete balance of O_2 tension and to changes in depth of respiration or in partial pressure of O_2 .

F. O. H.

Oxygen equilibrium of haemoglobin and its structural interpretation. L. PAULING (Proc. Nat. Acad. Sci., 1935, 21, 186—191).—It is suggested that the haemoglobin mol. contains 4 interacting haem groups arranged at the corners of a square, and on this basis equations are derived each containing only 2 consts. The first represents data on O_2 equilibrium at const. p_H , the second the change in O_2 equilibrium with change in p_H .

H. T.

Haemoglobin function in the developing chick. F. G. HALL (J. Physiol., 1934, 83, 222—228).—Haemoglobin from the chick embryo has an O_2 affinity $>$ that from the mature fowl. The val. changes progressively in chicks during incubation and early growth, suggesting that embryonal haemoglobin is different from that of latter life.

R. N. C.

(A) **Use of Ringer-Locke solutions containing haemoglobin as a substitute for normal blood in mammals.** W. R. AMBERSON, J. FLEXNER, F. R. STEGGERDA, A. G. MULDER, M. J. TENDLER, D. S. PANKRATZ, and E. P. LAUG. (B) **Oxygen consumption with haemoglobin-Ringer solution.** A. G. MULDER, W. R. AMBERSON, F. R. STEGGERDA, and J. FLEXNER. (C) **Influence of p_H on the elimination of haemoglobin by the perfused frog's kidney.** M. D. WEBSTER, F. L. ENGEL, E. P. LAUG, and W. R. AMBERSON (J. Cell. Comp. Physiol., 1934, 5, 359—382, 383—397, 399—413).—(A) Substitution of Ringer-Locke solutions containing haemoglobin (I) permits life in animals for many hr. (I) slowly passes from blood vessels into urine and lymph. In addition

to transporting O_2 ; (I) produces a colloidal osmotic pressure which maintains a normal fluid balance in all tissues except kidneys.

(B) Animals surviving on (I)-Ringer-Locke solutions have a normal O_2 utilisation.

(C) Elimination of (I) from perfused frog kidney is large at p_H 5.5 and small at 7.8. In the more acid solutions there is either an increased permeability of glomerular capillaries or dissociation of (I) which acting as a cation below its isoelectric point permeates the capillary membranes more easily.

A. G. P.

Physical chemistry of proteins. XII. Solubility of human haemoglobin in concentrated salt solutions. A. A. GREEN, R. J. COHN, and M. H. BLANCHARD (J. Biol. Chem., 1935, 109, 631—634).—Horse carboxyhaemoglobin (I) is pptd. at lower ionic strengths than human (I), the vals. of β and K_s in the salting-out equation being lower. The solubility of cryst. human (I) in conc. PO_4^{4-} buffers has been determined.

H. G. R.

Haemoglobin and solids of the blood of Australian aborigines and whites. H. S. H. WARDLAW, H. C. BARRY, I. W. McDONALD, and A. K. MCINTYRE (Austral. J. Exp. Biol., 1935, 13, 1—7).—Whites in central Australia and aborigines in natural surroundings showed a lower haemoglobin and total solids content than whites in Sydney. In the whites the increase of blood-solids resulting from exercise was much $>$ in the blacks.

W. O. K.

Blood-pigment. XVII. Human haemoglobins. XVIII. Globin and its haemaffinic groups. XIX. Methaemoglobin and its compounds with hydrogen peroxide, cyanides, fluorides, and sulphides. F. HAUROWITZ (Z. physiol. Chem., 1935, 232, 125—145, 146—158, 159—164; cf. A., 1931, 857, 972).—XVII. In man there are three distinct haemoglobins, foetal (I), adult (II), and muscle-haemoglobin (III) (myoglobin). The existence of a fourth special haemoglobin in pernicious anaemia is not established. The blood of new-born infants contains 70—85% of (I) and 30—15% of (II). (I) was obtained in cryst. form. The Fe content and O_2 capacity of (I) and maternal haemoglobin (IV) is the same; the O_2 affinity differs. In solution the O_2 affinity of (IV) is greater, in the intact corpuscles that of (I). (III) is not identical with any of the blood-pigments and is characterised by its high affinity for O_2 . The different vals. of O_2 affinity are caused by binding of the same haemin to different globins, or by specificity of the corpuscles in which the haemoglobin occurs.

XVIII. It is assumed that all globins have a special at. group in common which can fix O_2 reversibly. Since the isoelectric point of globin (V) (p_H 6.8—6.9) is $<$ that of methaemoglobin (VI) (p_H 7.0) in spite of the loss of 2 CO_2H from (VI) in formation of (V), the haemin-Fe of (VI) is probably bound to an acid group of (V). I-KI inhibits the power of (V) to couple with haemin more than various other reagents. This suggests a haemaffinic SH group. Most of the (V)-S is present as cystine or cysteine.

XIX. Like HCN, HI, and H_2S , H_2O_2 reacts quickly with brown (acid), and slowly with red (alkaline) methaemoglobin. To change the brown into the red type requires 1 mol. of H_2O_2 per Fe atom. The complex with H_2O_2 contains Fe^{III} . All the reagents affect the prosthetic group since the absorption spectrum is altered. They are presumably attached to the Fe^{III} atom. Types of co-ordination compounds are suggested for the complexes formed. J. H. B.

Action of picric acid on globin and haemoglobin. A. BOLLIGER and E. GOULSTON (Austral. J. Exp. Biol., 1935, 13, 23—26).—Globin picrate obtained from globin prepared by the method of Hamsik (A., 1930, 630) or directly from haemoglobin and picric acid forms a well-defined but amorphous compound containing 25.5% of picric acid.

W. O. K.

Haemoglobinuria caused by injection of haemoglobin. T. MINATOYA (Tohoku J. Exp. Med., 1934, 24, 11—20).—Intravenously injected globin or horse haemoglobin is excreted in the urine of rabbits as such. Autogenous haemoglobin was not detected.

CH. ABS. (p)

Measuring red blood-cells with special reference to a new diffraction apparatus. A. PIJPER (Lancet, 1935, 228, 1152—1153).

L. S. T.

Blood-proteins of children. II. Distribution in the same specimen of blood of hydrolysable, amide-, humin-, basic amino-, and monoamino-nitrogen of the whole blood, red cells, and serum-proteins. A. BERNHARD, J. S. LEOPOLD, and I. J. DREKTER (Amer. J. Dis. Children, 1934, 48, 819—829; cf. this vol., 230).—Comparative data for children and adults are recorded.

CH. ABS. (p)

Validity of rapid determinations of the osmotic pressure of protein solutions. H. S. WELLS, D. G. MILLER, jun., and B. M. DRAKE (J. Clin. Invest., 1935, 14, 1—6; cf. A., 1934, 674).—Serum is osmotically stable within the temp. range 10—37° for a sufficient time to permit determinations of osmotic pressure. Membranes previously described are completely impermeable to serum-proteins over a wide range of permeability vals.

CH. ABS. (p)

Determination of the colloidal osmotic pressure in blood-serum and similar fluids. A. KEYS and H. TAYLOR (J. Biol. Chem., 1935, 109, 47—53).—A true equilibrium method and osmometer are described requiring 2 ml. of colloid solution, single determinations being obtained with 0.5 ml.

P. W. C.

Behaviour of plasma-colloids in recovery from brief severe work and the question as to the permeability of the capillaries to protein. A. KEYS and H. TAYLOR (J. Biol. Chem., 1935, 109, 55—67).—The O_2 capacity, serum-protein, and serum colloidal osmotic pressure of the blood of normal young men before and after exercise to exhaustion in a treadmill are investigated. Although large increases in O_2 capacity and even larger increases in serum-protein were obtained, the colloid osmotic pressure generally decreased, due probably to a change in the mean size of the protein mol. From an application to the data of a method of analysis by

successive approximations, it appears that about 400 ml. of filtrate containing about 1% of protein left the blood during work and that at the same time between 5 and 20 ml. of new red cells entered the active circulation.

P. W. C.

Solubility of plasma-proteins. II. Dependence on p_H , temperature, and lipin content in concentrated solutions of potassium phosphate. Fractional precipitation of the proteins. A. M. BUTLER, H. BLATT, and H. SOUTHGATE (J. Biol. Chem., 1935, 109, 755—767; cf. A., 1933, 293).—Variations in temp. (20—30°), p_H (5.4, 6.5, 7.7), or concn. of lipins do not appreciably affect the solubility of proteins (I) (from horse-plasma) in the solutions. Constituents of (I) are separated by fractional pptn. (at p_H 6.5) with the following mol. concns. of $KH_2PO_4 + K_2HPO_4$: 1.25 fibrinogen, 1.25—1.5 67% of the euglobulin (II), 1.5—2.4 30% of the (II) and 80% of the pseudoglobulin (III), 2.4—2.58 albumin (IV) and (III), 2.58—3.0 (IV).

W. McC.

Behaviour of pathological sera in the ultracentrifuge. A. S. McFARLANE (Biochem. J., 1935, 29, 1175—1201).—The results of centrifugal analysis of the proteins (I) in a wide variety of pathological sera are given, together with clinical data. The proportion of globulin to albumin in most cases is > in normal sera; this appears to be a general effect. The proportion of the third constituent X of normal sera varies more widely in these sera, and some react more readily to dilution. There is evidence of other constituents in some of the sera (malignant disease; myeloma). An unknown cause affects the sedimentation rates of the (I) in some sera; in others, there is evidence of the presence of polydisperse (I) mols.; this is associated with the presence of (I) in the urine.

F. A. A.

Ultracentrifugal analysis of normal and pathological serum fractions. A. S. McFARLANE (Biochem. J., 1935, 29, 1209—1226).—Globulin (I) fractions, obtained from normal human and animal sera by $(NH_4)_2SO_4$ pptn., are heterogeneous, still containing albumin (II), but pathological human and anti-diphtheritic horse sera give practically pure (I). (I) and (II), separated by cataphoresis, are nearly homogeneous. ψ -Globulin separated by electro dialysis resembles (I) in mol. wt. Euglobulin appears to be polydisperse. The new mol. species found in pathological sera retain their individuality after $(NH_4)_2SO_4$ treatment.

F. A. A.

Pectin-phenomenon of blood and its physico-chemical basis. W. ZIEGELMAYER (Kolloid-Z., 1935, 71, 214—230).—Addition of apple-pectin (I) to fresh equine or human blood accelerates contraction of the clot and expression of serum, which latter can then exert a similar, though weaker, action on fresh blood. The clot, in spite of greater shrinkage, is softer when formed in presence of (I) and is easily re-dispersed in H_2O . The max. effect is obtained with 10% of (I), and increases with acidity.

F. L. U.

Vapour pressure of human blood by Hill's thermoelectric method. Apparatus and technique. R. W. CULBERT (J. Biol. Chem., 1935, 109, 547—563).—Hill's method is elaborated. The aver-

age val. of the v.p. of children's blood, ranging from 1 month to 12 years, is equiv. to 0.9029 ± 0.0016 g. of NaCl per 100 g. of H_2O , a significant difference being noted between the sexes. H. G. R.

Critical temperature of serum. IX. Ionic equilibrium as a function of temperature and p_H . P. L. DU NOÛY and V. HAMON (Ann. Inst. Pasteur, 1935, 54, 442—460; cf. A., 1933, 293).—Normal serum (horse, sheep, ox) heated under conditions to minimise loss of CO_2 has a fairly const. p_H up to 56° ; at approx. 60° a decrease (average 0.05) occurs. When loss of CO_2 is not prevented, the val. returns to normal or even higher levels at 60 — 62° . With dil. sera, the decrease commences at approx. 55° and attains a min. at approx. 60° . With sera acidified to p_H 6.80—6.90, the decrease approaches zero, whilst at p_H 5.4 an increase (approx. 0.05 p_H) occurs. Heating to 62° does not modify the buffering power of serum. F. O. H.

Temperature of serum and Kottmann reaction. P. SIMONIN and J. R. HELLUY (Compt. rend. Soc. Biol., 1935, 118, 1554—1558).—The intensity of the Kottmann reaction in serum is not increased by heating under a layer of paraffin. R. N. C.

Nature of difference in phospholipin content of oxalated and heparinised plasma. L. H. SCHMIDT (J. Biol. Chem., 1935, 109, 449—453).—The difference in plasma-phospholipin between oxalated and heparinised blood is due to a contraction in vol. of the erythrocytes on addition of oxalate. H. D.

Colorimetric determination of small amounts of cholesterol in blood and other biological fluids. M. NORIEGA DEL AGUILA (Bol. Soc. Quim. Peru, 1935, 1, No. 3, 73—74).—0.1 c.c. of blood etc. is hydrolysed with cold 0.5% NaOH in 50% EtOH, to decompose the esters of cholesterol, which is extracted with Et_2O , and determined by means of the colour reaction with $CHCl_3$, Ac_2O , and H_2SO_4 , known solutions of cholesterol being used as standards. E. L.

Distribution of lactate between the corpuscles and the plasma in blood. S. C. DEVADATTA (Quart. J. Exp. Physiol., 1934, 24, 295—303).—The ratio, R , of lactate (I) concn. in the corpuscles to that in the plasma is 0.6—0.9 in the blood of resting animals, and 0.5—0.6 in that of fatigued animals. This change is not due to a delay in the diffusion of (I) from the plasma into the corpuscles, or to the presence, either in the corpuscles or plasma, of some indiffusible substance determined as (I). R is increased by increased partial pressure of CO_2 , by decreased partial pressure of O_2 , and by increased $[H^+]$. Hence "(I) shift" analogous to the "Cl" shift" occurs during each respiratory cycle. R is reduced by increased concn. of (I) in the whole blood. There are at least three variables which determine the distribution of (I) between the corpuscles and plasma: partial pressure of O_2 and of CO_2 and concn. of (I) in the whole blood. The increased blood-(I) level of fatigued individuals is $>$ sufficient to account for the fall of R observed in these circumstances.

NUTR. ABS. (b)

Micro-method for determination of the individual or total ketonic substances in blood.

O. CANTONI (Biochem. Z., 1935, 277, 448—450).—The method is described for the determination individually or collectively of $COMe_2$, $CH_3Ac \cdot CO_2H$, and β -hydroxybutyric acid. P. W. C.

Determination of bilirubin in animal and human serum. R. HELLER (Z. ges. exp. Med., 1933, 87, 17—21; Chem. Zentr., 1934, ii, 3535).—Bilirubin (I) is not present in the blood of normal or splenectomised rabbits, guinea-pigs, or rats. The method of Ernst and Forster is untrustworthy for the determination of (I) in lipochrome-rich blood. R. N. C.

Apparatus for determination of urea in blood-serum. R. BIOT (Semana méd., 1934, 41, I, 1867—1871; Chem. Zentr., 1934, ii, 3997).— N_2 is liberated by NaOBr and measured volumetrically. J. S. A.

Determination of alkali reserve, (A) by the method of Van Slyke, (B) by the method of Van Slyke and Cullen. R. A. TREULES (Semana Méd., 1934, II, 913—915, 1469).—(A) Use of petrolatum to protect blood from contact with air may be omitted if the plasma is subsequently saturated with air containing 5% CO_2 or with alveolar air from the operator.

(B) If blood is taken without exposure to air the treatment with 5% CO_2 may be omitted.

CH. ABS. (p)

Clinical determination of phosphorus in blood. J. C. J. BURKENS (Nederl. Tijds. Geneesk., 1934, 78, 4944—4950; Chem. Zentr., 1935, i, 277).—A discussion, with reference to changes after sampling.

H. J. E.

Evidence of adsorption experiments on the forms of calcium and inorganic phosphorus in blood-serum. D. M. GREENBERG and C. E. LARSON (J. Biol. Chem., 1935, 109, 105—121).—Adsorption experiments with variously prepared $BaSO_4$ powders, permutit, and kaolin gave no evidence of either a citrate-like Ca compound or a specifically adsorbable Ca-P complex in blood-serum, all the characteristics attributed to these hypothetical substances being obtainable under proper conditions with merely Ca^{++} and PO_4^{---} . P. W. C.

Forms of calcium and inorganic phosphorus in human and animal sera. IV. Reply to Greenberg and Larson. H. R. BENJAMIN (J. Biol. Chem., 1935, 109, 123—129).—The statement of Greenberg and Larson (see above) that the $BaSO_4$ prep. described previously (A., 1933, 521) adsorbs Ca^{++} is rebutted on the grounds that it was impossible to remove all the Ca from a serum ultra-filtrate by repeated additions of $BaSO_4$, and the alternative theory suggested by these authors is rejected as not in accordance with facts previously described, and is not able to account for low-P rickets. The hypothesis that the adsorbable Ca is in the form of a Ca-P complex is re-affirmed. H. D.

Blood-calcium after injections of blood-serum of parathyroidectomised animals. C. Y. CHOI (J. Chosen Med. Assoc., 1934, 24, 89).—Injection of serum from parathyroidectomised animals into normal rabbits tended to decrease the blood-Ca.

NUTR. ABS. (m)

Determination of inorganic sulphate in human blood-serum. W. S. HOFFMAN and R. CARDON (J. Biol. Chem., 1935, 109, 717—727).—The serum (4 c.c.) is freed from PO_4^{4-} and protein by treatment with FeCl_3 in dil. HCl, aq. NH_3 , and NH_4OAc , and SO_4^{2-} is determined by pptn. with benzidine hydrochloride in COMe_2 , the benzidine sulphate being subsequently oxidised with excess of 0.1N- KMnO_4 . Excess of 0.1N- $\text{Na}_2\text{C}_2\text{O}_4$ is then added and the excess titrated with 0.02N- KMnO_4 . The vals. given by other methods are 35—300% too high. Normal serum contains SO_4^{2-} equiv. to 0.34—1.09 mg. of S per 100 c.c. The vals. agree with those of Denis (A., 1922, ii, 225). W. McC.

Determination of bromine in blood and sera. C. O. GUILLAUMIN and B. MEREJKOWSKY (Bull. Soc. Chim. biol., 1935, 17, 485—501).—A modification of the method of Damiens (A., 1920, ii, 768) is employed for the determination of Br in 1 c.c. of serum with an accuracy of 2×10^{-6} g. The serum of normal individuals contains 8—9 mg. of Br per litre. A. L.

Results of repeated determinations of the blood-cerebrospinal fluid barrier. H. W. LOVELL and J. R. BROWN (Proc. Soc. Exp. Biol. Med., 1934, 32, 516—520).—In patients given Br' *per os* for 5 days, a state of equilibrium is established between blood- and cerebrospinal fluid-Br' for 9 days after cessation of Br' ingestion. The permeability quotient rises with the passage of time; it does not vary widely when blood-Br' is high. R. N. C.

Clotting of blood. III. Indefinite fluidity of blood in body-vessels, and the relation between setting time and syneresis of blood clot. S. PRAKASH (Allahabad Univ. Stud., 1935, 11, 431—442).—The fluidity of blood is maintained in the body by the const. swing between the acid and alkaline range. Syneresis is inhibited by substances which inhibit the setting. H. G. R.

Calcium metabolism in the first phase of blood-clotting. I. Action of oxalate in the second phase of blood-clotting. H. SCHEURING (Biochem. Z., 1935, 277, 437—447).—Thrombin (I) is a colloidal Ca compound, and during its formation in serum Ca is converted from the ionised into the colloidal condition. $\text{H}_2\text{C}_2\text{O}_4$ thus has a double action, inhibiting (I) formation by Ca pptn. and leading to the degradation of formed (I) by Ca removal. P. W. C.

Effect of nicotine on the blood-coagulation time in rabbits. S. KANOWOKA (Tōhoku J. Exp. Med., 1934, 24, 307—312).—The effect was variable and not influenced by loss of the adrenaline-secreting mechanism. CH. ABS. (p)

Variations in the time of coagulation [of blood] by X-rays. R. REDING (Compt. rend. Soc. Biol., 1935, 119, 342—344).—Irradiation by X-rays is followed by an immediate retardation of the coagulation of the blood, which then develops into an acceleration and finally a further retardation. This is most pronounced in cases of cancer. H. G. R.

Hæmolysis by solanine and cholesterogenesis, studied *in vitro*. V. DE LAVERGNE and P. KISSEL

(Compt. rend. Soc. Biol., 1935, 118, 1551—1552).—Cholesterol liberation during hæmolysis by solanine is masked by its pptn. owing to the low p_{H} of the solution. R. N. C.

Hæmolysis by saponin and cholesterogenesis, studied *in vitro*. V. DE LAVERGNE and P. KISSEL (Compt. rend. Soc. Biol., 1935, 118, 1553—1554).—Neutral or alkaline saponin solution causes liberation of cholesterol (I) during hæmolysis similar to that caused by H_2O , but < that from the action of hæmolysins. In acid solution (I) is pptd. as it appears. R. N. C.

Hæmolytic action of lecithins. B. S. LEVIN (Compt. rend. Soc. Biol., 1935, 119, 80—82).—The hæmolytic action of pure, freshly-prepared lecithins is effective at greater dilutions than the anti-hæmolytic action. The anti-hæmolytic action of commercial lecithins is masked by the hæmolytic action of the impurities present. R. N. C.

Kinetics of hæmolytic systems. VII. Disappearance of lysin during stromatolysis. E. PONDER (Biochem. J., 1935, 29, 1263—1272; cf. A., 1934, 1380).—The reaction of saponin (I) with erythrocyte stroma is completed before either of the components of the reaction is used up; the final amount of (I) is a linear function of its initial concn. The curves of reaction are not described by the ordinary kinetic equations and it is concluded that the velocity coeff. varies. The quantity of (I) disappearing for a given quantity of stroma and that used up by stroma for complete hæmolysis of an equiv. amount of erythrocytes are independent of temp. H. D.

Hæmolysing action of the smokes of tobacco and other plant products on the blood *in vitro*. F. BATTELLI, D. ZIMMET, and P. GAZEL (Arch. Sci. phys. nat., 1934, 16, Suppl., 185—186).—Tobacco smoke hæmolyses the blood of animals and men *in vitro* to an irregular extent. All other plant smokes examined had the same effect. H. D.

Anti-hæmolytic action of liver extract. E. ROSENTHAL and J. PATAI (Z. klin. Med., 1934, 127, 284—285; Chem. Zentr., 1934, ii, 3975).—Liver extract inhibits hæmolysis of red corpuscles by $\text{NHPh}\cdot\text{NH}_2$, the action being due to its hypotonic character. R. N. C.

Viscosity and precipitation [in immune sera]. M. COPPO (Compt. rend. Soc. Biol., 1935, 119, 175—177).—The antibody content of an immune serum rises as the quantity of antigen required to produce max. η falls. Max. η is higher for sera pptd. at higher dilutions. The rate of increase \propto the antibody content. For each antibody concn. there is a corresponding antigen concn. that gives a min. val. of η . R. N. C.

Serological studies of azo-proteins. Antigen-containing azo-compounds with aliphatic side-chains. K. LANDSTEINER and J. VAN DER SCHEER (J. Exp. Med., 1934, 59, 751—768).—Notable specificity is exhibited in the reactions of short-chain compounds containing CO_2H . Succinic acid can be differentiated from malonic or glutaric acid. Reactions of compounds with longer chains, although sp.

to a certain extent, depend mainly on the physico-chemical properties of long aliphatic chains. The influence of halogen, OH, and NH_2 groups on serological specificity is examined. Inhibition reactions permit observation of the specificity of *cis-trans*-isomerides.

CH. ABS. (p)

Serological specificity of peptides. II. K. LANDSTEINER and J. VAN DER SCHEER (J. Exp. Med., 1934, 59, 769—780; cf. A., 1932, 957).—When examined by inhibition reactions immune sera exhibited high specificity and permitted distinction between peptides of similar structure.

CH. ABS. (p)

Action of temperature and adsorption on the elements controlling the reactions of flocculation and deviation of the complement. R. D. DE LA RIVIÈRE and N. KOSOVITCH (Compt. rend. Soc. Biol., 1935, 119, 42—43).—Successive rapid chilling and heating of the antigen-antibody flocculate causes it to dissociate, and also produces deviation of the complement, neither of these reactions being produced by either chilling or heating alone. The antibodies of heated serum are not adsorbed by kaolin or C, both of which, however, adsorb them from active serum, and also the substances controlling the Wassermann reaction from syphilitic serum if they have previously been in contact with the antigen.

R. N. C.

Vitamin-C and alexin. E. HARDE and A. E. THOMSON (Compt. rend., 1935, 200, 1425—1427).—Evidence is adduced in favour of alexin being a compound of ascorbic acid and proteins and, possibly, of lipins.

H. W.

Contractile factors of the chromosome micelle. D. M. WRINCH (Nature, 1935, 135, 788—789; cf. this vol., 231).—A discussion of the contractile factors which this micelle may be expected to possess. They include attraction between acidic and basic groups, variation in the no. of such groups within the mol. due to changes in p_H , and intramol. folding as in keratin.

L. S. T.

Carnosine and anserine in mammalian skeletal muscle. W. A. WOLFF and D. W. WILSON (J. Biol. Chem., 1935, 109, 565—571).—Both carnosine and anserine (I) are present in the muscle of the dog, cat, deer, gnu, and opossum. (I) has been isolated from the llama.

H. G. R.

Glyoxalines of some foodstuffs. M. LOEPER, A. LESURE, and A. MOUGEOT (Compt. rend. Soc. Biol., 1935, 119, 173—175).—The glyoxaline (I) contents of a no. of foodstuffs of animal origin are given. (I) is higher in prepared than in fresh foods.

R. N. C.

Lipochromes of marine animals. V. Astacene from fish-livers. N. A. SØRENSEN (Tids. Kjemi, 1935, 15, 12—13).—Astacene was isolated from the liver oil of *Regalecus glesne* and *Lophius piscatorius* (cf. A., 1934, 1246).

F. O. H.

Body-oil of "Aburazamé" (*Squalus sucklii*, Girard). M. TSUJIMOTO (Fettechem. Umschau, 1935, 42, 69—70).—Samples (A, B) of pale oil, each obtained by boiling out the mixed body-flesh of two fishes (one male and one female) had respectively: d_4^{25} —, 0.9168; n_D^{20} 1.4800, 1.4760; acid val. 3.16, 0.84;

sap. val. 178.1, 167.3; I val. (Wijs) 173.7, 167.8; unsaponifiable matter 4.87, 8.20. The respective fatty acids had m.p. 33°, 33—34°; neutralisation val. 192.2, 188.3; I val. 187.1, 178.1; Et_2O -insol. bromides 63.5%, 53.9% (Br content of 71.27%). Me ester fractionation indicated that the bulk of the acids from (B) were C_{18} to C_{22} acids, the bulk of the C_{20-22} acids being highly unsaturated; C_{16} acids occur in small amount, and only very little, if any, acids below C_{16} were present. The unsaponifiable matter (m.p. 37—38°) included batyl and selachyl alcohols, and (?) small amounts of chimyl and more unsaturated alcohols. The characteristics of the liver oils (sap. val. 161.2—168.9, I val. 122—137.9, unsaponifiable matter 9.8—16.23%) from the four fishes are also detailed separately. No oil could be separated from the flesh of *Centroscyllium ritteri*, Jordan and Fowler ("Korokozamé").

E. L.

Seasonal variations of fats in the organisms of *Pyrhocoris apterus*. C. MACIUCA (Compt. rend. Soc. Biol., 1935, 119, 224—225).—Fat is max. in autumn and min. in spring, i.e., three months later than the corresponding max. and min. for glucose and glycogen.

R. N. C.

Compounds between muscle-proteins and dextrans. IV. Polysaccharoproteins. S. J. VON PRZYŁECKI and R. MAJMIN (Biochem. Z., 1935, 277, 1—14).—Myosin (I) gives both irreversible and reversible complex compounds with dextrin (II). The influence of the method of prep. of (I), the purity and concn. of (I), the p_H and the concn. of (II) on the formation of these complex compounds is investigated.

P. W. C.

Chemical groups of protein which possess affinity for polysaccharides. Experiments with organic solvents. S. J. VON PRZYŁECKI and H. RAFAŁOWSKA (Biochem. Z., 1935, 277, 416—419).—The adsorbability of P-free dextrin at the H_2O -solvent interface (16 org. solvents little sol. in H_2O and possessing groupings known to be present in the protein chain were used) was determined, and it was found that in the formation of complexes resembling the polysaccharoproteins the NH_2 -group was especially important.

P. W. C.

Polysaccharoclupeins. S. J. VON PRZYŁECKI and R. MAJMIN (Biochem. Z., 1935, 277, 420—423).—When 1% solutions of clupein are mixed with solutions of starch, glycogen, or dextrin and the p_H is suitably adjusted, a ppt. of the polysaccharoprotein is obtained, neither solution individually giving a ppt. at this p_H . Sucrose and raffinose do not give these ppts. The NH_2 -groups of the arginine of clupein are probably used in forming these complexes.

P. W. C.

Dextrino-guanidine. S. J. VON PRZYŁECKI and H. RAFAŁOWSKA (Biochem. Z., 1935, 277, 424—425).—Guanidine forms complex compounds with dextrin and starch, but not with sucrose or raffinose.

P. W. C.

Chemical and histological studies of bones and teeth of new-born infants. K. U. TOVERUD and G. TOVERUD (Acta paediat., 1933, 16, 459—467).—The average Ca content of the ash of the parietal bone

of full-term infants of mothers on average good diet during pregnancy was 39.74% as against 38.43% for infants of mothers on deficient diet. Similar but smaller differences were obtained for the ribs. For premature infants all figures were lower but the same difference was noted. The ash-P did not reflect the dietary difference. A bone with low ash and low Ca from birth is probably more disposed to the development of a rachitic or osteoporotic process during deficient post-natal feeding than a normal bone.

NUTR. ABS. (b)

Muscle-potassium in man. A. LEULIER, B. POMMÉ, and A. BERNARD (Compt. rend. Soc. Biol., 1935, 119, 201—202).—Vals. are given for the K of the various muscles in amputated legs. R. N. C.

Copper content of human and animal organs. W. GERLACH (Virchow's Archiv, 1934, 294, 171—197).—The Cu content of human liver is 0.003—0.013 mg. per g. of fresh tissue (average 0.0075 mg.). The vals. for foetal livers are 0.015—0.25 mg. (average 0.0679 mg.), with no definite parallelism between age and Cu content. In and at the end of pregnancy there is no relationship between Cu of the foetal livers and the no. and development of blood-forming foci. In the 1st year of life Cu of livers progressively diminishes, being about 0.02 mg. at the end of the 1st year, and between 5 and 15 years the normal level for adults is reached. Between the ages of 5 months and 80 years there is no evidence of sex differentiation. The average Cu content of placenta from normal or still births is 0.0032 mg. per g. In cirrhosis of livers the average Cu is 0.0383 mg. and in typical Laennec cirrhosis normal to 0.18 mg. Vals. are given for livers from other diseases. The spleen is poor in Cu, vals. for ages from 5 foetal months upwards being 0.0001—0.010 mg. (average 0.0026 mg.). No very high vals. are found and there is no definite relationship between the Cu content of the spleen and that of the liver, although the val. for spleen is higher in cases of cirrhosis. The average Cu of the lungs is 0.0025 mg. and of the kidneys 0.00298 mg. The vals. for heart, brain, pancreas, skin, and bones are 0.001—0.006 mg. In adult eyes the vals. are 0.0004—0.0166 mg. and in foetal eyes 0.00022—0.0277 mg. Vals. are given for Cu content of liver, spleen, kidney, and lung of animals of different species suffering from different diseases.

NUTR. ABS. (m)

Occurrence of strontium and barium in human organs and excreta. W. GERLACH and R. MÜLLER (Virchow's Archiv, 1934, 294, 210—212).—Samples of bones and of different organs from 63 cases, varying in age from fetus to old age, were examined spectroscopically and Sr was invariably detected. The amount varied with the Ca content of the tissues, and was between 0.01 and 0.1×10^{-6} per g. fresh substance. Ba could not be detected in human bones. Similar results were obtained with a no. of bones from animals, wild and domesticated. The relationship of Ba to Ca in faeces is very variable.

NUTR. ABS. (b)

Osmotic pressure of fixing solutions. J. Z. YOUNG (Nature, 1935, 135, 823—824).—With marine animals, fixatives should be made up in salt solutions similar to those found in the animal's blood to prevent

distortion or bursting of the cells through the entrance of H_2O .

L. S. T.

Colouring matter of the domestic cocoon. VII. Colouring matter of the green cocoon, *Bombyx mori*, var. *Seihaku*. VIII. Quercetin glucoside from mulberry leaves. M. OKU (J. Agric. Chem. Soc. Japan, 1934, 10, 1014—1028, 1029—1038; cf. A., 1934, 204).—VII. The green cocoon (2.5 kg.) was extracted with 70% EtOH, and EtOH was expelled from the extract. The Et_2O extraction of the residue gave a flavone-like substance, in addition to bombilupsol. An orange ppt., obtained with $Pb(OAc)_2$ from the Et_2O -insol. part, was decomposed with 7% HCl, and the filtrate neutralised with NaOH; it gave a yellow ppt. (11.4 g.) of bombycin, which was hydrolysed by 5% H_2SO_4 to mol. proportions of glucose, aglucone, and bombycetin, $C_{20}H_{19}NO_7$ (I), a yellowish-brown powder, m.p. 170—180°. The absorption spectrum of (I) resembles that of quercetin.

VIII. Mulberry leaves were extracted with 80% EtOH, the chloroplast pigments were removed with Et_2O , $Pb(OAc)_2$ was added to the aq. solution. From the yellow ppt., isoquercitrin, m.p. 220—221°, was isolated in a yield, based on air-dried leaves, of approx. 0.05%.

CH. ABS. (e)

Behaviour of aqueous solution of the domestic cocoon. XX. Resistance of sericin to alkali. H. KANEKO and Y. NAKAZAWA (J. Agric. Chem. Soc. Japan, 1934, 10, 997—1000; cf. this vol., 511).—The aq. solution of sericin (I) was heated under reflux. To 10 c.c. of (I) were added 5 c.c. of 0.4M-CuCl₂ and 4 c.c. of 10N-NaOH, the solution being diluted to 50 c.c. and filtered. 10 c.c. of the filtrate were acidified with AcOH and titrated iodometrically. Sericin-A was more resistant to alkali than sericin-B.

CH. ABS. (e)

Antigenic differences between the venoms of the tiger-snake *Notechis scutatis* and the black tiger-snake *Notechis scutatis*, var. *niger*. C. H. KELLAWAY and F. E. WILLIAMS (Austral. J. Exp. Biol., 1935, 13, 17—21).—The thrombin-free venoms of the tiger-snake and the black tiger-snake differ in their antigenic and immunological properties, but not sufficiently to justify their separation into two distinct species.

W. O. K.

p_H and acid-neutralising power of saliva. B. C. SOYENKOFF and C. F. HINCK, jun. (J. Biol. Chem., 1935, 109, 467—475).—Ordinary human saliva had p_H 6.64; that stimulated by paraffin had p_H 7.13. The titration curve of the former showed buffering above p_H 4.

H. D.

Galactose in the thoracic lymph of the dog. M. FAY and P. S. WHARTON (J. Biol. Chem., 1935, 109, 695—701).—Injection of galactose (I) into the duodenum results in the appearance of (I) in the blood and thoracic lymph, the proportion which appears increasing with the rate of absorption of (I), but < 0.5% of the (I) is absorbed by way of the thoracic duct. During the absorption the concn. of (I) in thoracic lymph is > in femoral blood. Blood-glucose usually increases, but sometimes decreases, following injection of (I).

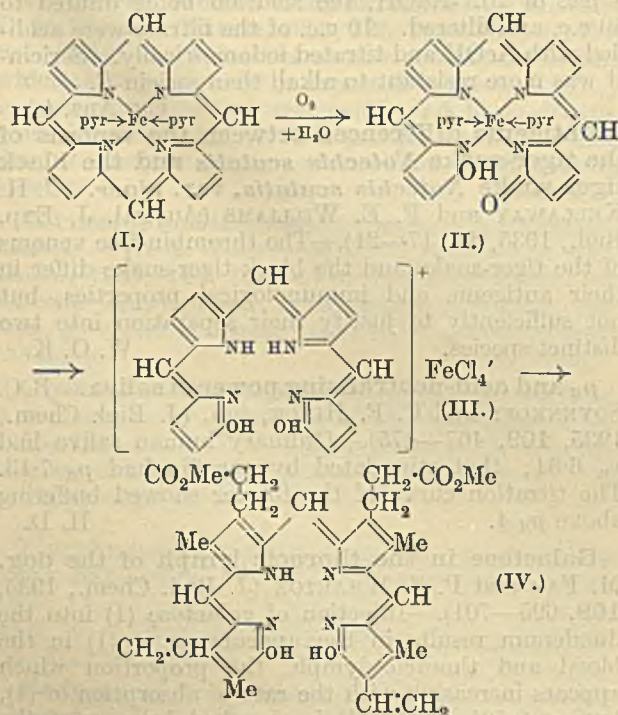
W. McC.

Composition of pure gastric juice. F. HOLLANDER (Amer. J. Digest. Dis. Nutrition, 1934, 1, 319—329).—A review. CH. ABS. (p)

Gastric acidity as influenced by pyloric closure and stenosis. R. ELMAN and C. T. ECKERT (Arch. Surg., 1934, 29, 1039—1046).—Pyloric stenosis leads to high gastric acidity and interference with the normal neutralisation of acids produced in the stomach. Closure of the pylorus delays neutralisation, which is re-established on opening. CH. ABS. (p)

Inhibition of gastric secretion by oil of peppermint. H. NECHELES and J. MEYER (Amer. J. Physiol., 1935, 110, 686—691).—Oil of peppermint applied locally to secreting mucosa causes a suppression of acid flow which is not associated with any relative increase in buffer activity. R. N. C.

Transformation of hæmin into bile-pigments. R. LEMBERG (Biochem. J., 1935, 29, 1322—1336).—The "green hæmins" prepared by oxidation of pyridinehæmochromogen (I) (Warburg and Negelein, A., 1930, 1199), for which the name verdohæmochromogen (II) is now suggested, are not related to the chlorophyll-hæmins, but are characterised as pyridinehæmochromogens of isobiliverdin. The compound is formed by oxidative scission of the porphyrin nucleus of the hæmochromogen. The "green ester" of Warburg and Negelein is identified as the ferri-chloride of biliverdin Me₂ ester (III), which is transformed into the biliverdin ester (IV) and identified by m.p. and mixed m.p. with an authentic specimen from gall-stone bilirubin. Mesohæmin gives a similar series of compounds in which the vinyl groups are



replaced by Et. It is suggested that the formation of bile-pigments in the animal body proceeds similarly, yielding biliverdin (dehydrobilirubin) which is later reduced to bilirubin, and that the unsaturated

side-chains of bilirubin and biliverdin are vinyl groups as in hæmin. P. W. C.

Oxidase system of milk and cytochrome. E. J. BIGWOOD and J. THOMAS (Compt. rend. Soc. Biol., 1935, 119, 337—339).—Previous conclusions that the enzymic and oxidising systems of raw, fresh milk consist of dehydrogenases and oxidases activating mol. O₂ are confirmed. H. G. R.

Relation of the reductase test to the bacterial content of milk. J. MÜLLER (Z. Fleisch- u. Milchhyg., 1934, 45, 85—87; Chem. Zentr., 1935, i, 493).—The influence of bacteria on the reductase test is so marked as to render it valueless by itself. H. N. R.

Relation between quantity and fat content of milk. B. VON H. SZABO (Mezög.-Kutat., 1934, 7, 180—185; Chem. Zentr., 1935, i, 493).—There is a linear relationship between quantity and fat content of cows' milk; an increase of 0.25% in fat corresponds with an annual decrease of 300 kg. in quantity. Improved feeding may cause a considerable increase in quantity but affects fat content only slightly. Milk-secretion is controlled mainly by the activity of the gland cells; increased activity increasing their permeability and hence the H₂O content of the milk. H. N. R.

Influence of soya-bean cake on milk production and the quality of butter. E. TAKAHASHI, K. IGUCHI, K. MITAMURA, and K. SHIRAHAMA (Pub. S. Manchuria Railway Co., 1934, 66 pp.).—Soya-bean cake fed to stock at the rate of 20, 35, and 50% of the production ration (calc. on the Hansson standard) caused progressive increase in milk yield and no ill effects on quality of milk or health of the cow, but at the highest level the butter was too soft. NUTR. ABS. (b)

Passage into milk of some diffusible substances (urea, sodium chloride, methylene-blue). E. LESNÉ, G. DREYFUS-SÉE, and LARDÉ (Acta pædiat., 1933, 16, 539—541).—No evidence was obtained of the passage into human milk of substances such as urea or NaCl when consumed in excess or of methylene-blue when given to the extent of 0.15 g. NUTR. ABS. (b)

Factors influencing the utilisation of cow's milk. J. H. HESS, H. G. PONCHER, and J. WOODWARD (Amer. J. Dis. Children, 1934, 48, 1058—1071).—Milk treated by a process of base exchange (B., 1934, 39) retains sufficient Ca and P to maintain positive Ca and P balances in growing infants receiving 100 c.c. of milk per kg. body-wt. per day. The increased efficiency of utilisation of treated milk is due to the increased proportion of ultra-filterable Ca, greater ash alkalinity, and the formation of a fine flocculent curd by the action of rennin. CH. ABS. (p)

p_H of the contents of the duodenum. G. LOEWY (Compt. rend. Soc. Biol., 1935, 119, 286—287).—After a meal, the p_H of the duodenal contents of the dog varies between 4.69 and 6.25. H. G. R.

Urinary protein. C. A. SAGASTUME and R. A. CRESPI GHERZI (Rev. Fac. Cienc. quim., La Plata, 1934, 9, 49—57).—Sulphosalicylic acid is at least as sensitive as CCl₃-CO₂H or HNO₃ in detecting protein-

uria, and has the advantage that it less readily forms a ppt. with mucin. F. A. A.

Behaviour of urinary proteins in the ultra-centrifuge. A. S. McFARLANE (Biochem. J., 1935, 29, 1202—1208).—An indication, similar to that found in the sera (cf. this vol., 879), of a polydisperse albumin fraction was found in the urinary protein from 5 patients. Globulin, although high in the sera, was absent from 3 of the urines. F. A. A.

High porphyrin excretion in the new-born: theory of hæmatogenous nature of icterus neonatorum. L. HEROLD (Arch. Gynäk., 1934, 158, 213—215).—A high excretion of porphyrin was found from the 2nd to the 6th day after birth, with a max. of about 8×10^{-6} g. per day. This is attributed to hæmoglobin destruction. NUTR. ABS. (b)

Calcium and ammonium excretion in urine of rabbits. M. A. LOGAN (J. Biol. Chem., 1935, 109, 481—487).—Unlike the cat, the rabbit excretes more Ca^{++} than normal during fasting; this increase is depressed by feeding NaHCO_3 and accentuated by feeding NH_4Cl . In the latter case the extra Ca^{++} appears to be excreted at the expense of skeletal tissue, although an equiv. amount of P is not excreted. H. D.

Presence in egg-white and in rice-polishing concentrate, low in vitamin- B_2 , of an anti-pernicious anæmia principle. D. K. MILLER and C. P. RHOADS (New England J. Med., 1934, 211, 921—924).—The thermostable dietary factor which, together with the heat-labile enzyme present in gastric secretion, is required for normal hæmatopoiesis occurs in egg-white and concentrates from rice polishings. The identity or otherwise of this factor with vitamin- B_2 is unproved. CH. ABS. (p)

Chemical composition of liver preparations. J. ERDOS (Biochem. Z., 1935, 277, 337—341).—A method is described for the separation of an active antianæmic prep. from liver, the active principle being pptd. as the Ag salt, analysis of which corresponds with $\text{C}_{650}\text{H}_{720}\text{O}_{36}\text{N}_{30}\text{S}_3\text{P}_2\text{Ag}_3$. The mol. contains 6 free NH_2 -groups and on hydrolysis 18 further NH_2 are liberated. P. W. C.

Evaluation of liver and stomach preparations. J. ERDOS (Biochem. Z., 1935, 277, 342—348).—The max. decrease in erythrocyte count in dogs after injection of $\text{NHPh}\cdot\text{NH}_2$ occurs after 48—72 hr., whereas if antianæmic preps. are first administered (orally or subcutaneously) the max. decrease occurs 48 hr. later still. P. W. C.

Nature of hæmatopoietic substance occurring in liver. H. D. DAKIN and R. WEST (J. Biol. Chem., 1935, 109, 489—522).—Commercial liver extract is pptd. with $\text{Ca}(\text{OAc})_2$ in 75% EtOH and the filtrate is pptd. with Reinecke acid, which is removed from an EtOH solution of the ppt. as its NPhMe_2 salt, and the active material is salted out repeatedly with $(\text{NH}_4)_2\text{SO}_4$. From an aq. solution of the ppt. further purification is achieved by pptn. with MgSO_4 and NaCl , Reinecke, picric, or flavianic acid. The purified product (I) is approx. 1% of the liver extract. On hydrolysis with 20% HCl it yields histidine < 0.1%, arginine 14%, lysine 5%, leucine 15%,

hydroxyproline 10%, monoaminodicarboxylic acids 41—45%, glycine 5%. The NH_2 -hexose (II) present is not isolated by pptn. with $\text{Hg}(\text{OAc})_2$; the Elson-Morgan determination of glucosamine (A., 1934, 175) is tentatively adapted to its determination and gives a val. of 15%. Phenylglucosazone is obtained from (II); $p\text{-NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{NH}\cdot\text{NH}_2$ gave no osazone either before or after hydrolysis. No purine bases were present in the hydrolytic products of (I). Peptic digestion of (I) was slight, whilst that by erepsin was almost complete. H. D.

Antitryptic activity of synovial fluid in patients with various types of arthritis. W. F. HOLMES, jun., C. S. KEEFER, and W. K. MYERS (J. Clin. Invest., 1935, 14, 124—130).—Synovial fluid contains antitrypsin. It may be extracted with CHCl_3 , and is reduced in quantity when there are a large no. of cells. CH. ABS. (p)

Inhibition of tryptic digestion of cartilage by synovial fluid from patients with various types of arthritis. C. S. KEEFER, W. F. HOLMES, jun., and W. K. MYERS (J. Clin. Invest., 1935, 14, 131—135).—Synovial antitrypsin probably limits the destruction of cartilage by the enzymes of purulent exudates. CH. ABS. (p)

Significance of concentration and dilution tests in Bright's disease. A. S. ALVING and D. D. VAN SLYKE (J. Clin. Invest., 1934, 13, 969—998).—The d of urine is examined in relation to urea clearance and the interpretation of concn. and dilution tests. The principal factor in determining d is the concn. of mineral salts. CH. ABS. (p)

Calcinosis. W. D. W. BROOKS (Quart. J. Med., 1934, 3, 293—319).—In a case of severe generalised calcinosis (girl aged 15 years) serum-Ca was 12.2 mg., plasma-inorg. PO_4''' 7.7 mg. per 100 ml., and phosphatase 0.33 unit. All the bones showed diminished Ca. There was increased retention of both Ca and P. Treatment with Na_2HPO_4 resulted in equilibrium in Ca metabolism, reduction of blood-Ca, and mobilisation of abnormal Ca deposits. NUTR. ABS. (m)

Glycolysis in cancer tissue. I. C. FRISCH and R. WILLHEIM (Biochem. Z., 1935, 277, 148—151).—Glycolysis inhibited by addition of benzoquinone becomes again evident on adding boiled juice of mouse-carcinoma tissue. P. W. C.

Properties of the causative agent of a chicken tumour. X. Chemical properties of chicken tumour extracts. XI. Composition of extracts containing the active principle. A. CLAUDE (J. Exp. Med., 1935, 61, 27—40, 41—57).—A protein and a phospholipin are the principal constituents of the active material. CH. ABS. (p)

Effect of active gonadotropic substances from pregnancy urine on collum carcinoma. E. STÖCKL (Z. Krebsforsch., 1934, 41, 292—301; Chem. Zentr., 1935, i, 263).—Injection of "pregnyl" (I) in carcinomatous women does not increase excretion of gonadotropic substances or of hormones in the urine. Very high doses of (I) increase growth of connective tissues and inhibit tumour growth. Genital bleeding is favourably influenced. R. N. C.

Effect of anterior pituitary and pineal hormones on the growth of inoculation tumours. P. ENGEL (Z. Krebsforsch., 1934, 41, 281—291; Chem. Zentr., 1935, i, 264).—Growth of inoculation tumours in mice is increased by the growth hormone of the anterior pituitary; the effect is abolished by pineal extract. Growth is inhibited by this extract or the gonadotropic pituitary hormone, the effects of which are additive when they are injected together. Mouse sarcoma is less easily influenced by hormones than mouse carcinoma. R. N. C.

Carcinogenic action of synthetic 1:2-benzopyrene. P. RONDINI and A. CORBELLINI (Atti R. Accad. Lincei, 1935, [vi], 21, 128—133).—1:2-Benzopyrene, made by a modification of Cook and Hewett's method (A., 1933, 601), is one of the most powerful carcinogenic agents when administered externally or subcutaneously to rats and mice. T. H. P.

Tumour-growth inhibiting factor from normal human connective tissue. J. J. MORTON and D. N. BEERS (J. Exp. Med., 1935, 61, 59—66).—Active material occurs in extracts of fresh connective tissue (rectus sheath) but not of muscle. CH. ABS. (p)

Ætiology of convulsions in early infancy. S. GRAHAM (Acta pædiat., 1933, 16, 572—579).—There is a greater incidence of infantile convulsions in the winter and spring months; serum-Ca is frequently reduced but Ca × P is rarely < 30. Administration of CaCl₂ is often successful. NUTR. ABS. (b)

Cystinuria. III. Metabolism of serine. E. BRAND and G. F. CAHILL (J. Biol. Chem., 1935, 109, 545—546).—Cystine excretion in cystinuria is unchanged by feeding *dl*-serine alone or with *l*-cystine. H. G. R.

Composition of serum-proteins in Bence-Jones albuminuria. K. LANG (Arch. exp. Path. Pharm., 1935, 178, 372—377).—Bence-Jones protein (I) is rich in tyrosine (II) (8.21%) and tryptophan (III) (3.60%) but poor in histidine (0.30%). The corresponding serum-proteins (euglobulin, pseudoglobulin, albumin-I, but not albumin-II) differ considerably from the normal in their composition in that they approach (I), *i.e.*, have a high content of (II) and (III). F. O. H.

[Composition of] Bence-Jones protein. H. O. CALVERY and R. H. FREYBURG (J. Biol. Chem., 1935, 109, 739—743).—The ash, H₂O, total N, NH₂-N, P (nil), S, amido-N, humin-N (nil), tyrosine, tryptophan, cystine, arginine, lysine, aspartic and glutamic acid contents of two samples of the protein (from the same patient) are given. Some of the vals. are very close to those for serum-globulin. W. McC.

Factors determining the effect of exercise on blood-sugar in the diabetic. R. RICHARDSON and A. L. CASE (J. Clin. Invest., 1934, 13, 949—961). CH. ABS. (p)

Eczema and the hydrogen-ion concentration in blood-plasma. K. EDEL (Nederl. Tijds. Geneesk., 1934, 78, 3673).—In patients suffering from eczema the p_H of the blood-plasma varies from 7.15 to 7.45. There is no correlation between degree of p_H disturbance and intensity of disease. Changing the p_H

by feeding K Na tartrate or H₃PO₄ does not influence rate of recovery. NUTR. ABS. (m)

Effect of muscular work on metabolism in diseases of the extrapyramidal system. I. Effect on lactic acid metabolism. II. Effect on gas metabolism. H. SUGIMOTO and T. MIYAMOTO. III. Effect on colloid osmotic pressure of the blood. T. MIYAMOTO and H. SUGIMOTO (Tôhoku J. Exp. Med., 1934, 24, 215—224, 225—237, 238—248).—I. Blood-lactic acid is approx. 30% > normal in cases of disease. The increase following muscular work is accentuated and the return to normal is prolonged. Treatment with atropine and harmine causes a return, in these factors, towards normal.

II. Basal metabolism is only slightly increased. Variations in O₂ consumption, O₂ deficit, and R.Q. during exercise are examined.

III. Serum-protein concn., colloid osmotic pressure, and pressure per unit serum-protein are normal in diseased patients. The increase in all vals. after work is > normal and the return to original levels is prolonged. CH. ABS. (p)

Excretion of creatine substances in fever. F. LIEBEN and E. ASRIEL (Biochem. Z., 1935, 277, 159—164).—The excretion of creatine (I) by rabbits after injection of 2:4-dinitrophenol without and with subcutaneous injection of (I) and administration of arginine, histidine (II), and glycine (III) is investigated. In this type of fever, excretion of (I) is increased, the excretion quotient after administration of (I) is decreased, and after (II) and (III) both total (I) and urinary (I) are increased. P. W. C.

Phosphate and creatine metabolism in fever. W. W. PAYNE (Biochem. J., 1935, 29, 1310—1317).—In cases of juvenile general paralysis undergoing malaria treatment, the following changes occur. During rise of temp. the PO₄^{'''}, creatine (I), and creatinine in the blood decrease and the PO₄^{'''} and (I) in urine may even disappear. The reverse change occurs as the temp. falls. When the fever is stopped by administration of quinine, the blood-PO₄^{'''} and (I) decrease. The renal threshold for PO₄^{'''} in children appears to be between 1.8 and 3.2 mg. per 100 ml., but no evidence of a threshold for (I) was obtained. It is suggested that during rise of temp. a rapid breakdown of phosphagen and formation of hexose phosphate occur in muscle, the process being reversed when the temp. falls. P. W. C.

Chemical nature of the so-called syphilis antigen. Animal immunisation experiments. T. RÓNAY (Z. Immunitäts., 1932, 75, 125—142).—The Kiss cholesterol-free phosphatide prep., coupled with pigs' serum, produces *in vivo* antisera which react with immunising preps. and with cholesterol-containing heart extract. The reactivity to syphilis serum and the antibody-producing power are removed by preliminary adsorption with Al(OH)₃. Sera of rabbits immunised with the Kiss prep., but not the Al(OH)₃-adsorbed extracts, react with these extracts. R. N. C.

Orientation and pyroelectricity of crystals of magnesium ammonium phosphates in gallstones.—See this vol., 811.

Behaviour of blood-choline in pallid and florid hypertension. Chemical method of determination of choline in small quantities of blood. H. BOHN, W. SCHLAPP, and K. STERN (*Z. klin. Med.*, 1934, 127, 226—232; *Chem. Zentr.*, 1934, ii, 3534—3535).—Blood-choline is depressed in hypertension the depression in pallid being > that in florid hypertension. Choline is extracted by diluting with EtOH, removing any ppt., concn., and dialysis into H₂O; it is then determined by the method of Roman. R. N. C.

Determination of pressor substances in blood in pallid hypertension. H. BOHN and W. SCHLAPP (*Z. klin. Med.*, 1934, 127, 233—242; *Chem. Zentr.*, 1934, ii, 3535).—The pressor substances are extracted by adding the blood to 5 vols. of EtOH, decanting after 2 hr., evaporating the EtOH at 37°, and repeated pptn. from EtOH until the solution is protein-free. R. N. C.

Effect on renal efficiency of lowering arterial blood-pressure in cases of essential hypertension and nephritis. I. H. PAGE (*J. Clin. Invest.*, 1934, 13, 909—915).—Reduction of blood-pressure by NaSCN, by colloidal S, or spontaneously did not affect the efficiency of kidneys. CHEM. ABS. (p)

Protein content of subcutaneous œdema fluid in heart disease. R. G. BRAMKAMP (*J. Clin. Invest.*, 1935, 14, 34—36).—The protein content of the fluid in cases of congestive heart failure varied from 0.03 to 0.54%. CH. ABS. (p)

Idiopathic hyperproteinæmia. C. L. COPE and H. K. GOADBY (*Lancet*, 1935, 228, 1038—1040).—A case of generalised œdema in an otherwise healthy man, due to low plasma-protein concn., is described. L. S. T.

Mandelic acid in the treatment of urinary infections. M. L. ROSENHEIM (*Lancet*, 1935, 228, 1032—1037).—The bacteriostatic powers *in vitro* of a no. of org. acids on the growth of *B. coli* have been compared with that of β -hydroxybutyric acid (I). Benzoylactic acid had the greatest effect, whilst β -hydroxypropionic and lævulic acids were satisfactory. Mandelic acid compares favourably with (I), is non-toxic, and is excreted unaltered in the urine. Clinical trials showed it to be effective in cases of urinary infection. L. S. T.

Phosphatase content of blood-serum in jaundice. C. H. GREENE, H. F. SHATTUCK, and L. KAPLOWITZ (*J. Clin. Invest.*, 1934, 13, 1079—1087).—Phosphatase (I) occurred in bile and was increased in serum during jaundice. Bile-(I) is probably hepatic in origin. Part of the serum-(I) may be derived from liver and not from bone. CH. ABS. (p)

Naturally occurring porphyrins. I. Isolation of coproporphyrin-I from urine in a case of atophan cirrhosis. II. Isolation of a hitherto undescribed porphyrin occurring with an increased amount of coproporphyrin-I in fæces in familial hæmolytic jaundice. III. Coproporphyrin-I from fæces in untreated cases of pernicious anæmia. C. J. WATSON (*J. Clin. Invest.*, 1935, 14, 107—109, 110—115, 116—118).—II. The

new porphyrin had some of the characteristics of deuteroporphyrin.

III. Coproporphyrin-I occurred in fæces in cases of pernicious anæmia. None was detected during remission with liver therapy, or in other types of anæmia or in normal fæces. CH. ABS. (p)

Effect of loss of bile on some elements of the blood. G. LØWY (*Compt. rend. Soc. Biol.*, 1935, 119, 178—179).—Removal of bile by anastomosis of the bile duct and the urethra in the dog causes a temporary fall in red-cell count, but hæmoglobin, Ca, and cholesterol show no significant variations. Fibrin shows a slight rise. R. N. C.

Basal metabolism and iodine content of the blood in myelogenous leucæmia: influence of di-iodotyrosine. R. DASSEN and E. B. DEL CASTILLO (*Semana méd.*, 1934, II, 1854—1855).—Basal metabolism and blood-I are increased in leucæmia but revert to normal after administration of di-iodotyrosine. CH. ABS. (p)

Specific dynamic action of foodstuffs in the endogenous forms of obesity and its influencing by the thyrotropic hormone. A. SYLLA (*Z. klin. Med.*, 1934, 127, 396—414; *Chem. Zentr.*, 1935, i, 103).—Five cases of "hypophyseral" corpulence were influenced favourably by the thyrotropic hormone. R. N. C.

Lipin metabolism and electrolytes in obesity. N. P. SOLOTAREVA, G. SCHAAL, L. N. GOLDMANN, and E. J. ZVILICHOVSKAJA (*Acta med. scand.*, 1934, 83, 596—609).—Obesity is associated with an excessive storage of fat in cells and tissues and with a quant. change in blood-lipins and electrolytes. The lecithin and cholesterol contents of serum are always considerably > in normal men and the ratios cholesterol:lecithin and K:Ca become sub-normal. Administration of thyreoidin causes a decrease of wt. and a return of these ratios to normal vals.

Calcium and phosphorus content of the skeleton and blood-serum in simple senile osteoporosis. E. RUTISHAUSER and A. MAULBETSCH (*Beitr. path. Anat.*, 1934, 94, 332—344).—Bones (ribs, vertebræ, and femurs) from cases of senile osteoporosis did not differ from the normal either in ash content or in Ca and P. Blood-Ca and -inorg. P were also normal. NUTR. ABS. (b)

Clinical significance of determinations of total serum-calcium. M. C. EHRSTRÖM (*Acta med. scand.*, 1934, Suppl. 58, 182 pp.).—Results of analyses of 20 normal and 140 pathological sera are given. Normal serum-Ca varies widely from day to day and from hr. to hr. The variations are not related to time of day or food intake. Sera from patients suffering from a variety of diseases show much the same variations as do normal sera. These facts explain the lack of agreement in the lit. concerning serum-Ca in normal and abnormal conditions. Day curves of serum-Ca should be given rather than isolated figures. NUTR. ABS. (m)

Blood-glutathione in cases of pellagra. J. NITZULESCU, I. ORNSTEIN, and M. TEODORU (*Bull. Soc. Chim. biol.*, 1935, 17, 227—231).—The variation of

blood-glutathione in cases of pellagra falls very close to the normal variations. P. W. C.

Alterations in mineral constituents of anterior horn cells in experimental poliomyelitis. W. E. PATTON (Amer. J. Path., 1934, 10, 615—627).—Nerve-cell destruction in poliomyelitis involves three stages: (i) oedema with diminution of inorg. contents of the cell, (ii) granulation with hypermineralisation, (iii) acidophilic necrosis with decrease in mineral content. CH. ABS. (p)

Utilisation of oxygen by the uterus in the rabbit. J. BARCROFT, L. B. FLEXNER, E. F. MCCARTHY, and T. McCLURKIN (J. Physiol., 1934, 83, 215—221).—The % saturation with O₂ of the venous blood from the uterus falls progressively during the later stages of pregnancy, and rises sharply after parturition. R. N. C.

Specific dynamic action of protein, fat, and carbohydrate during pregnancy. H. WYANDT and F. L. DUNN (Biochem. Z., 1935, 277, 15—16).—During pregnancy the sp. dynamic action of protein and to a smaller extent that of glucose does not differ essentially from that of normal women. The influence of fat is more uniform and increases during the whole period of pregnancy. P. W. C.

Ætiology of acute rheumatism. (A) B. SCHLESINGER, A. G. SIGNY, and W. W. PAYNE. (B) B. SCHLESINGER, A. G. SIGNY, and C. R. AMIES [with J. E. BARNARD] (Lancet, 1935, 228, 1090—1095, 1145—1149).—(A) Streptococcal precipitins can be demonstrated in the blood of rheumatic patients following acute streptococcal throat infections. The nucleoprotein and globulin fractions of the bacterial substance provide the best antigens for demonstrating the reaction. The relationship of hæmolytic streptococcal infection to acute rheumatism is reviewed.

(B) Evidence supporting the view that the virus elementary bodies obtained by high-speed centrifugation of pericardial exudates represent the infective agent of acute rheumatism has been obtained.

L. S. T.

Late rickets with chronic nephritis and glycosuria. R. DEBRÉ, J. MARIE, F. CLÉRET, and R. MESSIMY (Arch. Méd. Enfants, 1934, 34, 597—606).—Typical clinical and X-ray appearances of late rickets in a girl aged 11 are described. Fasting blood-sugar was normal, but high after glucose; the blood-fats were also increased. Blood-urea was normal, serum-Ca low, and -P rather low. Three possible explanations are: (1) a glycosuria due to gross renal damage; (2) true renal glycosuria; (3) a renal glycosuria with acidosis. NUTR. ABS. (b)

Variations in serum-protein fractions during an attack of rinderpest and the effect of the plane of nutrition thereon. (Ann. Rept. Dept. Vet. Sci. Tanganyika, 1933 [1934], 42—48).—The different protein fractions of the serum undergo definite changes during the course of rinderpest. The plane of nutrition may affect the composition of serum. On poor dry pasture the serum has a lower protein content than on fresh grass. The ratio of albumin to globulin is higher on the poor ration. These changes can

probably be correlated with those occurring during an attack of rinderpest, since stock often go off their food at that time. NUTR. ABS. (b)

Lactic acid and glutathione contents of the blood of schizophrenic patients. J. M. LOONEY and H. M. CHILDS (J. Clin. Invest., 1934, 13, 963—968).—The less easy removal of lactic acid from the tissues in schizophrenic than in normal patients may be partly due to a lowered content of glutathione.

CH. ABS. (p)

Nitrogen balance and the O : N ratio in experimental scurvy. I. L. D. KASHEVNIK and S. A. EIDMAN (Biochem. Z., 1935, 277, 401—411).—The development of scurvy in guinea-pigs on a scorbutic diet is divisible into three periods, an initial period in which the body-wt. increases, the urinary N decreases, and the urinary oxidation coeff. (O : N) increases considerably, a second period in which the body-wt. decreases steadily but the urinary N increases considerably and the O : N ratio remains high, followed by the third period characterised by negative N balance and rapid loss in body-wt.

P. W. C.

Formation of intercellular substance by administration of ascorbic acid in experimental scurvy. V. MENKIN, S. B. WOLBACH, and M. F. MENKIN (Amer. J. Path., 1933, 10, 569—575).—Ascorbic acid produces the same reparative process as does orange juice. CH. ABS. (p)

Carbohydrate metabolism. II. Rôle of the thyroid gland. J. A. JOHNSTON (Amer. J. Dis. Children, 1934, 48, 1015—1029; cf. A., 1934, 211).—Impaired carbohydrate oxidation is associated with hyperthyroidism. If glycogen storage is maintained, injected carbohydrate is oxidised more readily than in normal cases owing to improved glycogenolysis. Delayed oxidation in cretinism is due to decreased glycogenolysis and administration of thyroid extract results in a sparing action on proteins due to increased availability of glycogen and greater oxidation of fat.

CH. ABS. (p)

Calorigenic action of *d*- and *l*-thyroxine. W. T. SALTER, J. LERMAN, and J. H. MEANS (J. Clin. Invest., 1935, 14, 37—39).—*d*- and *l*-Thyroxine are equally effective in relieving human myxoedema.

CH. ABS. (p)

Clinical significance of the level of blood-iodine in Graves' disease and toxic goitre and the therapeutic action of tissue hydrolysates. L. A. JAKOBSSON and F. S. TSCHERNJAK (Acta med. scand., 1934, 84, 147—156).—Blood-I in various forms of hyperthyroidism (0.023—0.033 mg. per 100 ml.) is > in healthy persons (0.018—0.020 mg.). A case of myxoedema gave 0.015 mg. There is no correlation between basal metabolic rate or severity of symptoms and blood-I level in hyperthyroidism, and injection of hydrolysates of endocrine organs and tissues has no definite effect on clinical symptoms or blood-I.

NUTR. ABS. (m)

Carbohydrate metabolism in human hypothyroidism induced by total thyroidectomy. I. Glucose-tolerance curve and fasting serum-sugar concentration. D. R. GILLIGAN, M. I. ABRAMS, and B. STERN. II. Blood-sugar response to insulin.

M. I. ABRAMS and D. R. GILLIGAN (Amer. J. Med. Sci., 1934, 188, 790—796, 796—800).—The response of the sympathetic adrenal system to insulin is normal in hypothyroidism. There is no antagonism between the internal secretion of the normal thyroid gland and the pancreas. NUTR. ABS. (m)

Action of iodine in hypothyroidism. E. DELCOURT-BERNARD (Rev. belge Sci. méd., 1934, 6, 749—762).—In goitre with hypothyroidism, equiv. amounts of I given as Lugol's solution and di-iodotyrosine (I) cause increase in pulse-rate, O₂ consumption, and basal metabolic rate. Lugol's solution causes sometimes an increase, sometimes a decrease in basal metabolic rate in hypothyroidism without goitre. In myxœdema, Lugol's solution and (I) increase basal metabolic rate and pulse rate, but not so effectively as thyroxine. NUTR. ABS. (m)

Purified protein derivative, a standardised tuberculin for uniformity in diagnosis and epidemiology. F. B. SEIBERT, J. D. ARONSON, J. REICHEL, L. T. CLARK, and E. R. LONG (Amer. Rev. Tuberc., 1934, 30, 707—768).—A review. CH. ABS. (p)

Preparation and biological properties of the active principle of tuberculin (β -tuberculin). I. II. Sensitisation tests. III. Allergy and immunity relations in tuberculosis. P. KALLÓS and E. NATHAN. IV. Further sensitisation tests. P. KALLÓS and C. ZOBOLI (Acta med. scand., 1934, 83, 130—164, 165—168, 169—196, 197—211; Chem. Zentr., 1935, i, 94).—I. β -Tuberculin (I) is obtained from the collodion ultrafiltrate from tubercle bacilli cultures by dissolving and re-pptg. with EtOH-Et₂O, is hygroscopic, optically active, protein-free, and sol. in feebly alkaline solution, and is probably a nuclein derivative. It provokes sp. skin-reactions in tuberculous guinea-pigs, and anaphylaxis followed by desensitisation in the isolated tuberculous uterus. It reacts with the sera of skin-tuberculous animals, and with lung-tuberculous patients. Old tuberculin does not give these reactions.

II. Guinea-pigs are not sensitised by pre-treatment with (I), but the skins of rabbits are locally sensitised to subsequent intravenous injection of (I).

III. Tuberculin allergy is closely dependent on tuberculosis immunity.

IV. Guinea-pigs are sensitised by (I) if horse-serum is used as restrainer. If collodion suspension is used as restrainer the anaphylactic reaction occurs only with a non-adsorbed solution of (I), which hence has the properties of a haptén. R. N. C.

Physiology of whales. A. H. LAURIE (Nature, 1935, 135, 823).—Direct observations indicate that whales do not fill their lungs with H₂O when diving, thus preventing caisson sickness (cf. A., 1933, 844). L. S. T.

Degree of constancy in human basal metabolism. F. G. BENEDICT (Amer. J. Physiol., 1935, 110, 521—530).—The physiological functions in a well-conditioned man in complete muscular and mental repose, at least 12 hr. after food, are uniform from day to day. Ingestion of much carbohydrate increases the R.Q. for one day, but does not affect

O₂ consumption. An emotional disturbance causes an increase in metabolism lasting several days. R. N. C.

Basal metabolism of American-born Chinese girls and of American girls of the same age. C. C. WANG (Amer. J. Dis. Children, 1934, 48, 1041—1049).—No differences were observed. CH. ABS. (p)

Respiratory metabolism of *Galleria mellonella* (bee moth) during metamorphosis at different constant temperatures. F. CRESCITELLI (Anat. Rec., 1934, 60, Suppl., 35—36).—The level of the respiratory metabolism is a function of temp. Total O₂ consumption or CO₂ production is at a min. at 30°. NUTR. ABS. (b)

Respiratory quotient of developing grasshopper embryos (*Melanoplus differentialis*). E. J. BOELL (Anat. Rec., 1934, 60, Suppl., 47).—In the first 5 days of embryonic life R.Q. is about unity. In the next 5 days it falls to 0.75 and remains about this level for a further 10 days, after which, as the embryo enters the diapause, it falls to 0.70. NUTR. ABS. (b)

Chemical changes associated with metamorphosis in a beetle (*Tenebrio molitor*, L.). A. C. EVANS (J. Exp. Biol., 1934, 11, 397—401).—Noticeable changes take place in the distribution of carbohydrates, fatty acids, unsaponifiable matter, and N during the metamorphosis of the mealworm. NUTR. ABS. (b)

Metabolic rate of developing amphibia with special reference to sexual differentiation. I. A. WILLS (Anat. Rec., 1934, 60, Suppl., 63).—There is increased O₂ consumption during the period of metamorphosis. No significant difference was found between the average metabolic rates of males and females at the time of sexual differentiation or at metamorphosis. NUTR. ABS. (b)

Growth of blow-fly larvæ on blood and serum. II. **Growth in association with bacteria.** R. P. HOBSON (Biochem. J., 1935, 29, 1286—1291; cf. A., 1934, 226).—Infected *Lucilia* larvæ grow better on muscle than on blood, the difference disappearing on adding yeast autolysate to the blood. The period of slow growth is lengthened by transferring them each day to sterile blood. On transference of aseptic larvæ to a vitamin-B-deficient diet growth is at first normal and declines later, showing that the site of bacterial synthesis of vitamin-B is the blood and not the intestines. The growth-promoting effect of yeast is due to the presence of HPO₄" and K⁺; blood is deficient in P. The larvæ grow readily on blood infected with pure cultures of various bacilli isolated from the intestines and blown meat. H. D.

Fat-soluble growth factor required by blow-fly larvæ. I. **Distribution and properties.** R. P. HOBSON (Biochem. J., 1925, 29, 1292—1296).—Muscle-oil, wool-wax, wheat-germ oil, egg yolk, cod-liver oil, and butter contain growth-promoting power for blow-fly larvæ which runs parallel with the sterol content and is present in the unsaponifiable residues. Growth-promoting power is not associated with the presence of vitamin-A, -D, and -E. H. D.

Oxygen consumption in perfused dog's liver. N. FIESSINGER, H. BÉNARD, and G. SYLLABA (Compt. rend. Soc. Biol., 1935, 119, 182—183).—The O_2 consumption of the surviving perfused liver is 800—1100 c.c. per kg. per hr. It is not affected by glucose, insulin, glycine, or antelobin. It is lowered by 0.001*N*-KCN, the action of which is antagonised by $Na_2S_2O_4$. R. N. C.

Gaseous metabolism of frog kidney. F. O. SCHMITT, R. S. KERR, and E. D. BUEKER (Amer. J. Physiol., 1935, 110, 539—544).—Vals. are given for the O_2 consumption and R.Q. of frog's kidney in Ringer's solution with or without HCO_3' or PO_4''' . Glucose increases O_2 consumption slightly without affecting the R.Q., whilst phloridzin decreases them both, and neutral-red and phenol-red are without effect. R. N. C.

Respiratory quotient of frog's muscle under conditions of rest and work. C. L. GEMMILL (J. Cell. Comp. Physiol., 1934, 5, 277—289).—The R.Q. of resting frog's muscle (0.81) indicates a mixed metabolism. During stimulation the val. rises (0.94) as a result of increased utilisation of protein and/or carbohydrate (I). It is probably not exclusively a combustion of (I). A. G. P.

An oxidative reserve as source of anaerobic carbon dioxide in heart-muscle. W. O. FENN (J. Cell. Comp. Physiol., 1934, 5, 347—358).—Anaerobic CO_2 exceeds the pre-formed CO_2 after correction for O_2 in solution or in combination with hæmoglobin. A. G. P.

Connexion between muscle metabolism and weather. III. Experiments at high altitudes. O. RIESSER, G. KUNZE, and K. GALLE (Biochem. Z., 1935, 277, 349—364).—Experiments on the changes of muscle metabolism (measured in terms of changes of P_2O_5 and glycogen contents) in rabbits originally carried out at sea-level (this vol., 387) are repeated at an altitude of 3500 m. As before, an attempt is made to correlate abnormal variations with changes in weather conditions. P. W. C.

Co-ordination of chemical processes in muscle. V. Phosphate transfer through phosphopyruvic acid. T. MANN (Biochem. Z., 1935, 277, 380—382).—Inhibition of glycogenolysis by addition to muscle of $CH_2I \cdot CO_2H$ or NaF leads to deamination of adenosinetriphosphoric acid which is itself inhibited in exactly the same way by either phosphoglyceric or phosphopyruvic acid or by $AcCO_2H + PO_4'''$. P. W. C.

Glutathione in the aestivation of *Helix aperta*, Born. F. DULZETTO (Atti R. Accad. Lincei, 1935, [vi], 21, 195—198).—This organism becomes lethargic in May and active again with the first autumnal rains. In August the foot contains reduced glutathione (I), which is localised in the muscles, whereas in the hepato-pancreas and albumen glands (I) occurs in the oxidised form. In October the foot shows no sensible increase of reduced (I), which is absent from the hepato-pancreas, but apparent in the albumen glands. T. H. P.

Tyrosine content of tissues after intravenous injection. F. B. KING, R. SIMONDS, and M. AISNER

(Amer. J. Physiol., 1935, 110, 573—579).—Tyrosine injected intravenously in the dog disappears rapidly from the blood. Urea-N shows no significant rise that would suggest deamination, whilst phenols increase only in the thyroid, adrenals, and pancreas.

R. N. C.

Availability of *d*- and *l*-homocystine for growth purposes. H. M. DYER and V. DU VIGNEAUD (J. Biol. Chem., 1935, 109, 477—480; cf. A., 1933, 1074).—*d*- and *l*-Homocystine support growth of rats on a cystine-deficient diet equally well.

H. D.

Effect of addition of small amounts of cystine to a diet deficient qualitatively in protein on metabolism. K. KLAPPER (Biochem. Z., 1935, 277, 376—379).—The high urinary C : N and vacate O : N ratios brought about in white rats by feeding a diet sufficient in caloric val. but deficient in essential NH_2 -acids cannot be rendered normal by adding small amounts of cystine to the diet, the latter leading to a further increase in these ratios and to increased retention of N. P. W. C.

Pig's blood as human food in China. W. PENG-CHU (J. Chinese Chem. Soc., 1935, 3, 67—77).—The biological val. of dialysed dried pig's blood is about half that of caseinogen. F. N. W.

"Lipotropic" effect of protein. C. H. BEST, M. E. HUNTSMAN, and J. H. RIDOUT (Nature, 1935, 135, 821—822; cf. A., 1934, 920).—The power of proteins and choline and betaine to decrease the fat content of liver is discussed. Experiments on rats indicate that the effect of slight or moderate undernutrition on the deposition of liver-fat has been unduly emphasised (cf. this vol., 523). A slight change in body-wt. does not affect liver-fat balance. L. S. T.

Results of feeding lecithin and pancreas in depancreatised dogs on the liver-fat and its saponifiable and unsaponifiable fractions. E. P. RALLI, G. FLAUM, and R. BANTA (Amer. J. Physiol., 1935, 110, 545—551).—Pancreas combined with cod-liver oil (I) is more effective than egg-lecithin (II) with (I) in preventing the deposition of liver-fat. (II) alone produces a slightly lower liver-fat than pancreas alone. Sugar excretion is diminished slightly by (II) and increased by pancreas. In normal dogs total liver-fat is < in depancreatised dogs.

R. N. C.

Significance of the liver in the metabolism of lipins. IV. Lipins in the blood and bile in cases of oral administration of glucose to rabbits. Y. ASODA (Japan J. Gastroenterol., 1934, 6, 42—45; cf. A., 1934, 1393).—Injection or feeding of glucose to rabbits lowers the blood-cholesterol and -lecithin and increases these lipins in bile. Liver regulates the level of blood-lipins by excretion into the bile.

CH. ABS. (p)

Exchange of lipins in the umbilical circulation at birth. E. M. BOYD and K. M. WILSON (J. Clin. Invest., 1935, 14, 7—15).—Phospholipins (I) and cholesterol are regularly absorbed by the fœtus at birth. The fatty acids of (I) in the fœtal circulation are more saturated than those of the maternal circulation. CH. ABS. (p)

Fat metabolism in infants. L. E. HOLT, jun., H. C. TIDWELL, and C. M. KIRK (*Acta paediat.*, 1933, 16, 165—176).—Different fats are compared both as regards their ease of assimilation and their fate after absorption. Mineral intake is inversely related to fat retention. Decreasing the size of fat particles did not favour assimilation. Increasing the volatile acid fraction of the fat did not cause clinical disturbances and the shorter-chain fats were more completely absorbed. Unsaturated fat was far better absorbed than saturated, unsaturation being much more important than m.p. The more saturated character of faecal fat on mixed-fat diets is due to selective absorption of unsaturated fat. Intravenous administration of emulsified fat has diagnostic and therapeutic val. NUTR. ABS. (b)

Ketosis. VI. Quantitative studies on β -oxidation. J. S. BUTTS, C. H. CUTLER, L. HALLMAN, and H. J. DEUEL, jun., with H. BLUNDEN (*J. Biol. Chem.*, 1935, 109, 597—613).— δ -Oxidation was observed in the increase in the production of ketonuria after administration of *n*-octoic acid (I) in place of $\text{CH}_2\text{Ac}\cdot\text{CO}_2\text{H}$ (II), whereas with butyric (III) or *n*-hexoic (IV) acid the vals. are practically identical. α -Oxidation is small since administration of valeric acid is followed by slight ketonuria. After administration of (I), (III), or (IV), 70—75% of the ketonic substances consists of β -hydroxybutyric acid (V), the val. being slightly lower after (I) and 85—95% after (V). The female animal is more susceptible to ketonuria after feeding the above acids than the male. H. G. R.

Urinary excretion of ketones and ammonia in minimum endogenous protein metabolism. H. TRIMBACH (*Arch. internat. Physiol.*, 1934, 39, 417—433).—The classification of animal species according to their excretion of ketones or NH_3 per unit of body-wt. when on a strict carbohydrate (I) diet is the same as that of their heat production. Since ketonuria exists when the caloric requirements of the organism are met by (I), it may be ketogenic, but other evidence suggests that it may, according to circumstance or perhaps simultaneously, be ketogenic or antiketogenic. NUTR. ABS. (m)

Ketogenesis during fasting. H. TRIMBACH (*Arch. internat. Physiol.*, 1934, 39, 462—501).—The hyperketonuria which appears to be the rule in the young is an exception in the case of the adult and is observed only in a very limited no. of species. During prolonged fasting there is no systematic variation in the daily excretion of ketones, indicating no tendency to a more complete oxidation of fat. There is no relation between ketonuria and NH_3 excretion in fasting. NUTR. ABS. (b)

Effect of ingestion of alkali on ketone excretion during inanition. H. TRIMBACH (*Arch. internat. Physiol.*, 1934, 39, 502—515).—Administration of NaHCO_3 during prolonged fasting and in amounts which cause the urine to become alkaline never diminishes ketogenesis and may cause an increase. NUTR. ABS. (m)

Physiological ketogenesis. P. H. FLEURET (8ème Réunion, Assoc. Physiol. Nancy, May, 1934).—In the goat, rabbit, and dog there is no const. level

of excretion of ketones (I) for a given diet. Starvation reduces excretion of (I) in the goat and rabbit and usually in the dog, although there may occasionally be an increase. In the goat, proteins more easily increase production of (I) than do carbohydrates (II), and (II) more easily than fats. The rabbit has less tendency to increased production than the goat. There is no relationship between reaction of the urine and the excretion of (I), which may be formed not only by β -oxidation, but also from MeCHO .

NUTR. ABS. (m)

Nitrogen metabolism. II. Effect of an alkalinising salt, sodium citrate, on endogenous nitrogen metabolism on a fat diet. IV. C. ZUMMO (*Arch. internat. Physiol.*, 1934, 40, 129—139).—The administration of Na citrate to dogs on a fat diet led to a diminution in the N excretion. The urinary N excretion found in one case was as low as that observed when the animal was transferred from a fat to a carbohydrate diet. NUTR. ABS. (b)

Excretion of inulin by the dogfish, *Squalus acanthias*. J. A. SHANNON (*J. Cell. Comp. Physiol.*, 1934, 5, 301—310).—The inulin (I) clearance is $>$ that of xylose (II). The discrepancy is abolished by phloridzin, and hence is attributable to the active reabsorption of (II). The creatinine clearance is much $>$ that of (I) and is a function of the plasma concn. both in the presence of (I) and in that of (II). A. G. P.

Oxidation occurring after ingestion of galactose in the dog. J. H. ROE, A. GILMAN, and G. R. COWGILL (*Amer. J. Physiol.*, 1935, 110, 531—538).—The R.Q. of normal fasting dogs is not raised by ingestion of 2 g. of galactose (I) per kg., but a delayed elevation occurs with 5 g. per kg. In depancreatized dogs this does not occur. The observations suggest that (I) is not oxidised as such, but is converted into glucose. R. N. C.

Carbohydrate metabolism in hypophysectomised frogs. E. SILAËVA (*J. Cycle méd.*, 1933, 3, 259—267).—For 5 days after total hypophysectomy an increased blood-sugar was observed in frogs; after that time it fell continuously until the animals died. The glycogen content of the liver and muscles followed the blood-sugar curve, and the processes of oxidation and glycolysis in the liver were considerably diminished. A slight temporary hypoglycaemia occurred immediately after the operation. NUTR. ABS. (b)

Relationship between tissue growth, glycolysis, and oxygen tension. E. KNAKE (*Z. Chirurg.*, 1934, 243, 633—654).—The growth of embryonic connective tissue (chicken) is increased in an atm. of 5% of O_2 , retarded in 0.2%, and uninfluenced in 66%. In pure O_2 the growth rate is unchanged for 3 or 4 days; thereafter the cells are permanently injured. Epithelial tissue growth is retarded in pure O_2 , but the cells are not injured; reduction of O_2 to $<$ 5% injured the cells. The optimal conditions for growth probably depend on glycolysis and oxidation and differ for different tissues. NUTR. ABS. (b)

Liver-glycogenesis. P. BARREDA (*Arch. exp. Path. Pharm.*, 1935, 178, 333—341).—Formation of sugar occurs in surviving glycogen-poor or -rich liver-

tissue (rat) in PO_4 or HCO_3 buffer at p_{H} 7.4, and is increased by addition of pyruvic or lactic acid. Glycogenesis probably occurs to some extent, but the concomitant glycogenolysis masks it so that only an increase in total carbohydrate is detectable. Addition of insulin alone has no significant action, but sugar + insulin tends to increase glycogenesis. F. O. H.

(A) **Lactic acid formation in liver.** (B) **Concentrations of lactic acid in blood and liver of rabbits.** P. A. BOTT and D. W. WILSON (J. Biol. Chem., 1935, 109, 455—462, 463—466).—(A) The CuSO_4 - $\text{Ba}(\text{OH})_2$ filtrate of liver gives a bad endpoint in the Friedemann (A., 1927, 800) determination of lactic acid (I). Saturation of the filtrate from the pptd. proteins with $(\text{NH}_4)_2\text{SO}_4$ and extraction with Et_2O continuously for 3 hr., removal of the latter, and determination of (I) in the aq. residue gives good results. The glycolytic activity of liver is decreased by mincing and destroyed by freezing in liquid air; that of muscle is uninfluenced by mincing.

(B) Well-fed rabbits show a rise in blood- and liver-(I) under amytal anaesthesia which is correlated with their increased muscular activity. Fasting animals show smaller rises. Blood-(I) is always > liver-(I). H. D.

Absorption of glucose from the colon. W. W. EBELING (Arch. Surg., 1934, 29, 1039—1046).—Absorption of glucose depends on the concn. and vol. of the solution placed in the colon. Use of hypertonic solutions may be harmful owing to abstraction of H_2O . CH. ABS. (p)

Effect of introduction of hydrochloric acid into the duodenum on intestinal absorption of glucose. E. DE KOKAS and G. DE LUDANY (Compt. rend. Soc. Biol., 1935, 119, 283—285).—An increased absorption of glucose of the order of 20% was observed.

H. G. R.

(A) **Effect of irradiation with mixtures of ultra-violet and visible light on carbohydrate metabolism.** (B) **Effect of irradiated oats on carbohydrate metabolism.** L. PINCUSSEN (Strahlenther., 1934, 51, 537—540, 685—688).—(A) When white rats fed on a diet of bread and oats were irradiated, even a small amount of ultra-violet light in the radiation had a notable effect in increasing the carbohydrate reserves.

(B) The feeding of oats which had been irradiated with visible and ultra-violet light to rats on a rachitogenic diet not only prevented the appearance of rickets, but also caused a rise in the ratio of carbohydrate to lactic acid in the blood, liver, and muscles. The R.Q. of the muscle tissues was also raised in the rats which had received the irradiated oats.

NUTR. ABS. (b)

New aspects of deficiencies in nutrition. D. HUNTER (Lancet, 1935, 228, 1025—1032).—A lecture.

L. S. T.

Physico-chemical properties of fruits and the effect of apple diet on acid-base balance. H. MARYNOWSKA-KAULBERSZ (Acta pædiat., 1933, 16, 219—227).—The juice of citrous fruits, when administered to dogs, produced a change towards acidosis in the alkali reserve of the blood, whereas with apple

juice the reverse was the case. With the citrous juice the change in the p_{H} of the digestive tract was much > with apple juice. With children, an apple diet again tended towards an alkalosis. Neither these results, nor the fact that apple pulp has little or no absorptive capacity for tetanus toxin, explain the beneficial effect of an apple diet in the treatment of infantile diarrhoea.

NUTR. ABS. (b)

Effect of a diet extremely low in sodium chloride on the composition of urine and blood and on blood-volume in healthy persons. R. STÖHR (Z. ges. exp. Med., 1934, 95, 55—66).—Two subjects were kept for 51 and 36 days on low-NaCl diets. At first there was a rapid fall in NaCl output, later a stationary low output, and finally a slight increase accompanied by a rise in blood-Cl⁻ and serum-albumin, a decrease of globulin, and a loss of wt. (8 kg. and 1.6 kg.). After addition of a small amount of NaCl to the diet the output of NaCl increased, but did not equal the intake; blood-Cl⁻ fell, but not to the original val.

NUTR. ABS. (b)

Effect of diet poor in inorganic salts on the albino rat, edestin being the source of dietary protein. P. P. SWANSON, G. H. TIMSON, and E. FRAZIER (J. Biol. Chem., 1935, 109, 729—737; cf. A., 1933, 90).—The diet (ash 0.27%) does not produce such pronounced changes in the composition of the blood as does the corresponding diet (ash 0.5%) in which caseinogen is the source of dietary protein, there being no sp. erythropoietic effect and no polycythæmia. The size of the erythrocytes is reduced only slightly, and their hæmoglobin concn. is not so greatly reduced. Severe diuresis accompanied by polydipsia occurs with the first diet and growth is greatly retarded, whereas, with the second, diuresis is only slight.

W. McC.

Effect of deprivation of water on the composition of animal tissues. B. HAMILTON and R. SCHWARTZ (J. Biol. Chem., 1935, 109, 745—753).—In puppies, almost complete removal of H_2O from the diet results in loss of extracellular fluid and concn. of electrolytes in the body-fluids. The losses of H_2O (per 100 g. of fat-free dry substance) and of base are: skin 43, 24, muscle 35, 22, brain 14, 0, liver 13, 0, kidneys (about) 9%, 0. No loss of K from any tissue occurs.

W. McC.

Determination of the state of hydration of the body by the amount of water available for dissolution of sodium thiocyanate. L. A. CRANDALL and M. X. ANDERSON, jun. (Amer. J. Digest. Dis. Nutr., 1934, 1, 126—131).—The method is applied to experimentally dehydrated and superhydrated dogs and human beings with oedema as well as to normal animals and man. It depends on the fact that after intravenous injection of aq. NaCNS, its concn. in the blood-serum becomes relatively const. in about 2 hr. and then decreases very slowly until elimination is completed in about 6 days. The quantity of fluid available for the dissolution of the NaCNS is calc. from the concn. in the blood-serum 2—4 hr. after the injection of 15—20 mg. per kg. The vals. obtained, calc. as a % of body-wt. or preferably (for man) as litres per sq. m. of body-surface, are compared with normal vals.

NUTR. ABS. (b)

Calcium and phosphorus exchange in young growing pigs. L. S. SPILDO (Beretn. Forsogslab. Kobenhavn, 1933, No. 151, 246 pp.; Bied. Zentr., 1934, A, 5, 193—194).—When ultra-violet light is excluded, rations having a high (2.5) P_2O_5 : CaO ratio produce in young growing pigs "ostitis fibrosa" combined with osteoporosis. Osteoporosis occurs with a ratio of approx. 0.4. The min. requirement for growth only is 7 g. of CaO and 13 g. of P_2O_5 daily. The optimum ratio with favourable light conditions is 1.6.
A. G. P.

Silicigenous functions of silicoderms. A. LABBÉ (Compt. rend., 1935, 200, 1880—1882).— SiO_2 is used metabolically by silicoderms. The morphology of the process is described.
R. S. C.

Narcosis. III. K. H. MEYER and H. HEMMI (Biochem. Z., 1935, 277, 39—71).—The lipin and adsorption theories of narcosis are critically reviewed. No parallelism exists between adsorbability and narcotic activity. Experiments with a series of alcohols up to $C_{18}H_{35}OH$ lead to the view that narcosis occurs when any chemically indifferent substance reaches a certain molar concn. in the lipin alcohols of the cell substance. This concn. depends on the kind of animal or cell, but not on the chemical nature of the narcotic. The degree of activity in the gaseous condition is compared with that in aq. solution, and an explanation given for the fact that $CHCl_3$ is more strongly narcotic in air and less strongly in aq. solution than is CCl_4 .
P. W. C.

Physical chemistry of blood during narcosis. I. R. BACHROMEJEV and L. PAVLOVA (Arch. exp. Path. Pharm., 1935, 178, 390—395).—With the stimulating stage of $CHCl_3$ narcosis in dogs, the serum-Ca and -K fall and rise, respectively; with Et_2O both levels rise. With complete narcosis by $CHCl_3$, Et_2O , chloral hydrate, urethane, morphine, and $MgSO_4$ and also with asphyxia, Ca and rate of coagulation increase, whilst K and velocity of sedimentation of erythrocytes decrease; alkalisation of the blood has the opposite effect. A return to normal vals. occurs during recovery.
F. O. H.

Ether apnoeas. A. E. GUEDEL and D. N. TREWEEK (Anesthesia and Analgesia, 1934, 13, 263—264).—The effect, on respiratory activity, of varying the CO_2 supply in Et_2O anaesthesia is examined.
CH. ABS. (p)

Initial effect of some anaesthetic substances on the movements of cilia and smooth muscle. G. H. W. LUCAS (Anesthesia and Analgesia, 1934, 13, 206—211).—Some narcotics (Et_2O , C_2H_4) produce initial stimulation of movement prior to the depression. Others ($CHCl_3$) induce depression from the beginning.
CH. ABS. (p)

Analgesia and anaesthesia with special reference to such substances as trichloroethylene and vinesthene (divinyl ether). D. E. JACKSON (Anesthesia and Analgesia, 1934, 13, 198—204).—Properties and means of administration are described.
CH. ABS. (p)

Effects of preoperative medication and anaesthesia on movements of the small intestines. H. E. CARLSON (Anesthesia and Analgesia, 1934, 13,

221—226).—Comparison is made of the action of atropine and morphine in Et_2O and N_2O anaesthesia.

CH. ABS. (p)

Effect of barbiturates and morphine. J. T. HALSEY (Anesthesia and Analgesia, 1934, 13, 204—205).—Effects of injection of neonal, dial, and morphine after Et_2O anaesthesia are described.

CH. ABS. (p)

Influence of the anion combined with cocaine on the anaesthetic activity of the alkaloid. J. REGNIER and R. DAVID (Compt. rend., 1935, 200, 1428—1430).—At p_H 4 the anaesthetic activities of solutions of cocaine citrate, lactate, tartrate, sulphate, phosphate, hydrochloride, hydriodide, thiocyanate, formate, acetate, salicylate, benzoate, and phenylacetate are in the ratio 0.2, 0.4, 0.6, 0.8, 1, 1, 1.2, 1.5, 2.5, 2.9, 4, 5, 12. The alkaloidal salt behaves therefore as an entity.
H. W.

Influence of yohimbine on the action of morphine and of chloral hydrate on blood-sugar. S. YAMANCHI (Folia Pharmacol. Japon., 1934, 19, No. 1, 44—53).—Yohimbine (I) in dosages which only slightly increase the blood-sugar decreases the hyperglycaemia caused by morphine or chloral hydrate. (I) also increases the decline in blood-sugar following poisoning by the drugs.
CH. ABS. (p)

Mechanism of the action of strychnine or the combination of it with cardiac tonics on the isolated heart of *Rana esculenta*. K. IBA (Folia Pharmacol. Japon., 1934, 19, No. 1, 18—31).—The action of strychnine varies with the concn. used. It acts synergistically with digitalin, g-strophanthin, helleborin, rhodealin, and pentamethylenetetrazole. With adrenaline there is potentiation.
CH. ABS. (p)

Pharmacological investigations of yolk-sac vessels of the chick embryo. I—III. T. NAKANO (Folia Pharmacol. Japon., 1934, 19, No. 1, 102—120).—I. Caffeine, Ba, tetrahydro- β -naphthylamine, and eserine constricted, whereas cocaine, $NaNO_2$, and pilocarpine dilated, the vessels. The effects increased with age. Differences in action on veins, arteries, and capillaries are shown.

II. Quinine, optochin, cinchonine, eucupine, vuzin, quinidine, and cinchonidine are similarly compared.

III. Li dilated and NH_4^+ and Sr^{++} usually constricted vessels. Ca^{++} and K^+ always caused constriction. Mg^{++} constricted in small and dilated in large concns.
CH. ABS. (p)

Action of ephedrine quaternary halide compounds. C. PAK and B. E. READ (Chinese J. Physiol., 1935, 9, 1—16).—Methylephedrine methiodide and bromide, $OH\cdot CHPh\cdot CHMe\cdot NMe_3X$, exert a weak stimulating effect on the sympathetic ganglion cells of pithed dogs and cats (about 1/40 of that of NMe_4I), a weak reversible atropine-like action, but no curare-like action. Large doses paralysed the ganglia of the autonomic nervous system.
W. O. K.

Pharmacological action of ephedine. K. K. CHEN, R. C. ANDERSON, I. J. FREIHAGE, and T. Q. CHOU (Chinese J. Physiol., 1935, 9, 17—20).—Ephedine, $C_8H_{18}O_3N_2$, m.p. 87° , lowers blood-pressure in cats, contracts isolated guinea-pig's uterus, and aug-

ments peristaltic movement of rabbit's isolated small intestine, sometimes preceded by a slight inhibition.

W. O. K.

Pharmacological action of fritimine. K. K. CHEN, C. L. ROSE, R. C. ANDERSON, and T. Q. CHOU (Chinese J. Physiol., 1935, 9, 21—26).—Fritimine, $C_{38}H_{62}O_3N_2$, m.p. 167°, lowers the blood-pressure in anaesthetised cats, temporarily depresses respiration, increases blood-sugar in rabbits, contracts the guinea-pig's uterus, and inhibits rabbit's isolated small intestine.

W. O. K.

Influence of some sympathetic depressant poisons as ergotoxine, thymoxyethyl-dimethylamine, and thymoxyethylallylamine on the excretion of sodium chloride and water by the kidneys. K. ARIMA (Folia Pharmacol. Japon., 1934, 19, No. 1, 26—43).—Ergotoxine in all dosages decreases the NaCl and H_2O excreted. Thymoxyethyl-dimethylamine (I) in moderate and -diallylamine (II) in small dosages produce similar effects. (I) in large or small and (II) in moderate dosages stimulate NaCl and H_2O excretion.

CH. ABS. (p)

Toxicity and sympathetic-inhibitory action of corynantheine. E. ROTHLIN and RAYMOND-HAMET (Arch. exp. Path. Pharm., 1935, 178, 305—307).—Corynanthine (I) and corynantheine (II) (A., 1933, 1313) possess the same adrenaline-inhibitory activity but the toxicity of (II) is twice that of (I), properties to be correlated with the difference of OMe in their constitution.

F. O. H.

Antagonism of drugs in iris epithelium cultures. I, II. K. SANJO (Folia Pharmacol. Japon., 1934, 19, No. 1, 54—63).—I. Convallamarin (I) acts antagonistically to certain drugs of the quinine group in their depressant action on cultures of iris epithelium. The antagonism resembles that between atropine and muscarine.

II. (I) is similarly antagonistic to sinomenine, parasinomenine, emetine, and cephaline.

CH. ABS. (p)

Pharmacology of a new aromatic guanidine derivative. II. Influence on organs of circulation. A. KURODA (Folia Pharmacol. Japon., 1934, 19, No. 1, 18—31).—The vasodilator action of 3:4-dihydroxybenzyl-, phenoxyethyl-, *p*-methoxybenzyl-, *p*-hydroxyphenyl-, and α -phenylethyl-guanidine is examined.

CH. ABS. (p)

Acidosis of guanidine intoxication. A. S. MINOT, K. DODD, and J. M. SAUNDERS (J. Clin. Invest., 1934, 13, 917—932).—The acidosis is due to increased production and defective metabolism of lactic acid. Alkalinising Na salts are dangerous because of the lowered effectiveness of Ca^{++} in hyperguanidinæmia. Combined with Ca medication, $NaHCO_3$ administration is satisfactory.

CH. ABS. (p)

Preparation of ergometrine. H. W. DUDLEY (Pharm. J., 1935, 134, 709).—Defatted powdered ergot is extracted with industrial EtOH (denatured with 5% MeOH) which has been made alkaline by the addition of conc. aq. NH_3 . The extract is conc. in a vac. to small vol., rendered slightly acid (dil. H_2SO_4), and concn. is continued until all the alcohol is removed. After separation from residual fat the aq. concentrate is made faintly alkaline

(Na_2CO_3), filtered, made strongly alkaline (Na_2CO_3), and extracted with $CHCl_3$. The $CHCl_3$ extract is conc. in vac., when crude ergometrine (this vol., 655) separates. The pure alkaloid, recrystallised from COMeEt, decomposes at 161—162°. Its solution in EtOH is dextrorotatory. Directions for making the cryst. H_2O -sol. hydrochloride are given. H. W. D.

Ergotocin. Active principle of ergot responsible for the oral effectiveness of some ergot preparations on human uteri.—See this vol., 872.

Active constituents of ergot. M. R. THOMPSON (J. Amer. Pharm. Assoc., 1935, 24, 24—38, 185—196).—There appears to be present in aq. extracts a new alkaloid which is more sol. in H_2O than is ergotoxine or ergotamine and also differs from these by the rapidity and extent of its action after oral administration (cf. Dudley and Moir, this vol., 655).

F. O. H.

Pharmacodynamic action of the benzylcholines. J. LAMBILLON (Compt. rend. Soc. Biol., 1935, 119, 317—318).—Compared with β -methylcholine the nicotine-like activity is increased and the muscarine-like activity decreased.

H. G. R.

Response of the leech to acetylcholine. C. F. A. PANTIN (Nature, 1935, 135, 875).—A sensitive test for acetylcholine is its power to contract the longitudinal muscle of the body-wall of *Hirudo medicinalis*.

L. S. T.

Circulatory-active (adrenaline-like) substances in liver extracts. F. GRABE, O. KRAYER, and K. SEELKOPF (Klin. Woch., 1934, 13, 1381—1383; Chem. Zentr., 1935, i, 106).—Minced liver is extracted with MeOH after exposure to the air for 24—100 hr., and the conc. extract pptd. with COMe₂, filtered, and the COMe₂ evaporated in vac. The pressor effect of this extract is due to tyramine (I), which can be isolated as the benzoate. (I) is also probably responsible for the pressor effect of commercial liver extract. The effect is absent from extract of fresh liver.

R. N. C.

Pressor substances from body-fluids of man in health and disease. I. H. PAGE (J. Exp. Med., 1935, 61, 67—96).—Extracts of human blood-plasma, ascitic and cerebrospinal fluids contain a powerful pressor substance (I) having the properties of an org. base. Plasma-colloids hold the (I) in a bound state. The amount of (I) is not increased in patients with hypertension of varied pathogenesis.

CH. ABS. (p)

Depressor extracts of human blood and the vascular action of extracts of rabbit and dog blood. I. H. PAGE (J. Exp. Med., 1935, 61, 87—102).—EtOH extracts of plasma from arterial or venous blood of rabbits differ from those of human plasma in possessing a depressor action. This action is not antagonised by atropinisation. Plasma extracts of dogs have no vascular effect. Ultrafiltrates of rabbit plasma are actively vasodepressor, but those of human and dog-plasma are without action. These effects resemble those of adenylic acid (I) rather than of histamine. Human plasma, ascitic and spinal fluids on keeping yield extracts having a depressor and a constrictive action on kidneys. Histamine, choline, and adenosine depress the level of blood-pressure >

they constrict the kidney-vol. (I) has the reverse action.

CH. ABS. (p)

Demonstration of the fourth depressor substance in human urine and blood. F. LANGE (Deut. Arch. klin. Med., 176, 1—13; Chem. Zentr., 1935, i, 262).—Extracts of blood and of urine that are adenosine- and histamine-free, injected in cats simultaneously with atropine to inhibit choline action, still provoke a fall of blood-pressure. The activities of blood extracts inversely \propto those of urine extracts from the same subjects. Both extracts from cases of hypertonia show respectively the min. and max. effects; urine extracts from normal subjects and arterio-sclerotics show moderate activity.

R. N. C.

Colloidal characteristics of the anaphylactic reaction *in vitro*. II. Variation of the proportion antigen-antibody. A. LUMIÈRE and P. MEYER (Bull. Soc. Chim. biol., 1935, 17, 219—226).—When to the serum of a sensitised rabbit is added an amount of antigen too small to lead to the formation of a visible ppt., there is an increase in viscosity representing an increase in the vol. of the protein particles.

P. W. C.

Biochemical properties of curro-saponin. C. A. SAGASTUME and L. P. PONCE (Rev. Fac. Cienc. quim., La Plata, 1934, 9, 29—34; cf. A., 1932, 647).—Solutions of curro-saponin kept in contact with animal charcoal completely lose their hæmolytic properties. A decrease in the acidity of the inactivated solutions was noted, but there was no diminution in the foam-producing properties.

F. A. A.

Pharmacology and therapeutics of "bromsalizol" (bromosaligenin). D. I. MACHT and F. DUNNING (J. Lab. Clin. Med., 1934, 20, 127—140).—The action on smooth muscle is examined.

CH. ABS. (p)

Pharmacology of camphoric acid derivatives: relationship between chemical constitution and pharmacodynamic action. II. Action on blood-pressure and respiration. Y. FUJIMOTO (Folia Pharmacol. Japon., 1934, 19, No. 1, 1—17).—The action of various compounds on blood-pressure and respiration in urethane-anæsthetised rabbits is related to their chemical constitution.

CH. ABS. (p)

Gametocidal action of plasmoguin. W. KIKUTH and F. SCHONHÖFER (Klin. Woch., 1934, 13, 875—876; Chem. Zentr., 1935, i, 266).—The work of Kritschewski and Pines (this vol., 395) is adversely criticised.

A. G. P.

Experimental intoxication by benzene vapour. Concentration of the poison in the blood and rate of disappearance. M. PÉRONNET (J. Pharm. Chim., 1935, [viii], 21, 503—513).—The amount of C_6H_6 in the blood of guinea-pigs put into a C_6H_6 -containing atm. is nearly \propto the time (up to 20 min.) spent by the animal in this atm. Symptoms of acute intoxication appear when the blood contains 2.60—2.80 mg. of C_6H_6 per 100 g. When the animal is removed into fresh air, the C_6H_6 disappears rapidly from the blood mainly by exhalation (nearly half of the C_6H_6 disappears in the first 5 min.). The urine of animals exposed to C_6H_6 vapour contains excess of PhOH,

although no excess could be detected in the blood. PhOH injected into a rabbit disappeared almost completely from the blood after 5 min. H. G. M.

Ammoniophanæresis in the course of experimental cantharidine nephritis in the dog. M. POLONOVSKI, G. BIZARD, and P. BOULANGER (Compt. rend. Soc. Biol., 1935, 119, 197—198).—Urinary NH_3 and urea fall after injection of cantharidine, the fall being less const. and less marked than in U nephritis. Ammoniophanæresis remains normal. R. N. C.

Toxic nephritis following exposure to carbon tetrachloride and smoke fumes. S. F. DUDLEY (J. Ind. Hyg., 1935, 17, 93—110).—Chronic CCl_4 poisoning is accompanied by grave renal disorders.

H. G. R.

Potassium ferrocyanide poisoning and injury to the kidneys. L. POPPER (Wien. klin. Woch., 1934, 47, 1119—1120; Chem. Zentr., 1935, i, 107).—The toxicity of $K_4Fe(CN)_6$ is due to $Fe(CN)_6^{4-}$ and not to the formation of HCN. Physiological effects on kidneys are described.

A. G. P.

Experimental hepatonephritis in rabbits. I. Modification of the formation of urea by uranium nitrate. II. Comparative values of blood-urea and -indoxyl. III. Comparative determination of the retention of nitrogen by blood and tissues in the rabbit. M. ECK and J. DESBORDES (Bull. Soc. Chim. biol., 1935, 17, 341—343, 344—347, 348—350).—I. Large doses (4—6 mg. U per kg.) cause death as quickly as do small doses (< 2 mg. per kg.) but the serum-urea at the time of death in the former case is decreased, due to hepatic lesions, whereas in the latter case it is increased above normal.

II. Determination of blood-indoxyl forms a better method of following U nephritis than blood-urea since the former vals. are not affected by the size of dose.

III. Normal variation vals. are given for the N_2 separable by NaOBr and for the total non-protein-N in the blood and in the $CCl_3 \cdot CO_2H$ filtrate of muscle of the rabbit.

P. W. C.

Possible influence of rare gases on physiology. F. S. ORCUTT and R. M. WATERS (Anesthesia and Analgesia, 1934, 13, 238—239).—Absence of He and A from an atm. rich in O_2 (90—98%) is not the cause of the intolerance of rats for such atm.

CH. ABS. (p)

Influence of ionised air on normal subjects. L. P. HERRINGTON (J. Clin. Invest., 1935, 14, 70—80).—Ionised air produced by passage over pressed MgO at 950° and filtered so that air may be of either polarity was without effect.

CH. ABS. (p)

Influence of variations of atmospheric ozone on the biological activity of solar radiation. R. LATARJET (Compt. rend., 1935, 200, 1437—1439).—A mathematical expression is developed governing the effect of the selective absorption of atm. O_3 on the relative intensity of the various solar radiations in the extreme ultra-violet.

H. W.

Blood picture, reproduction, and general condition during daily exposure to illuminating gas. I. R. WILLIAMS and E. SMITH (Amer. J. Physiol., 1935, 110, 611—615).—Hæmoglobin and the cell-

plasma ratio increase in rats exposed daily to air containing a sublethal % of illuminating gas.

R. N. C.

Analysis of the effects of carbon monoxide and of cyanides on the [animal] cell by means of vital stains. P. MAKAROV (*Protoplasma*, 1934, 20, 530—554; *Chem. Zentr.*, 1935, i, 252).—The action of CO on epithelial cells of frog intestine results in inhibition of O₂ respiration, cessation of granule formation, gelatinisation of the nucleus, reduction of oxidation-reduction indicators, disappearance of glycogen, and destruction of chondriosomes. HCN inhibits O₂ respiration and prevents the utilisation of intracellular energy, but in other respects its action differs from that of CO.

A. G. P.

Toxicology of hydrocyanic acid. P. R. ORELLA (*Rev. Fac. Cienc. quim., La Plata*, 1934, 9, 93—102).—Contrary to the findings of Sensi and Revello (A., 1926, 1058) HCN may be detected in the organs of animals killed by respiring HCN as well as in those of animals killed by ingestion of cyanides, and the production of HCN in viscera of normal animals, either by putrefactive changes or by the action of the reagents used, was not observed. Advantages of ammoniacal AgNO₃ as an absorbent for HCN are described.

F. A. A.

Chemo-toxicology of hydrocyanic acid. C. GERIN (*Boll. Chim. Farm.*, 1935, 74, 305—307).—Mustard oil (I) in large quantities protects human viscera from putrefaction. It does not form HCNS when distilled with excess Na₂CO₃ in a current of CO₂, but traces of HCN appear; in presence of (NH₄)₂S, (I) is transformed into HCNS. The presence of HCNS in putrefied viscera cannot therefore serve as an indication of HCN poisoning.

R. N. C.

Mottled [tooth] enamel. J. S. WALKER (*J. Amer. Dental Assoc.*, 1933, 1867—1871).—The presence of > 2.7 p.p.m. of F in H₂O causes mottling.

CH. ABS. (p)

Effect of organic dietary constituents on chronic fluorine toxicosis in the rat. P. H. PHILLIPS and E. B. HART (*J. Biol. Chem.*, 1935, 109, 657—663).—Ingestion of 78—84 mg. of F per kg. of body-wt. per day completely inhibits growth. A high-fat-low-carbohydrate diet with or without the addition of lactates, glycerol, or lactic acid does not alter the effect.

H. G. R.

Pulmonary lesions experimentally produced by introduction of aluminium oxide and of borosilicate glass. W. S. LEMON and G. M. HIGGINS (*Amer. Rev. Tuberc.*, 1934, 30, 548—560).—Lesions caused by Al₂O₃ or borosilicate were unlike those caused by SiO₂. Neither substance circulated in the blood-stream.

CH. ABS. (p)

Effect of calcium, strontium, and barium chloride on tissue oxidation. H. G. O. HOLCK (*Skand. Arch. Physiol.*, 1934, 70, 273—294).—CaCl₂ depresses the respiration of all tissues and has a stabilising effect on gastric muscle, after the first depressant action. SrCl₂ and BaCl₂ are equally depressant but < CaCl₂ except in cardiac muscle, where SrCl₂ is ineffective and BaCl₂ stimulates slightly. Hence the toxic effect of Ba salts seems not to be due

to interference with physiological oxidation. CaCl₂, BaCl₂, and SrCl₂ decrease the p_H to the same slight extent. KCl does not modify the depressant results obtained. The succinodihydrogenase system of horse muscle is not affected by CaCl₂ or Ca(NO₃)₂. The lactic-dihydrogenase system of rabbit and guinea-pig muscle shows depression with CaCl₂, less with BaCl₂, and least with SrCl₂.

NUTR. ABS. (m)

Toxicity and fixation of magnesium thiosulphate in the organism. R. E. CARRATALÁ and C. L. CARBONESCHI (*Semana méd.*, 1934, 41, II, 25—29; *Chem. Zentr.*, 1935, i, 107).—Use of MgS₂O₃ in HCN poisoning is examined. The characteristic effects of Mg⁺⁺ on the nervous system were observed after injection.

A. G. P.

(A) **Biology of the precipitating action of the mucus of Boro fish, *Pisoodonophis boro* (Ham. Buch.).** S. L. HORA. (B) **Chemistry of the action.** S. RAYCHAUDHURI and B. MAJUMDAR (*J. Proc. Asiatic Soc. Bengal*, 1934, 29, 271—274, 275—283).—(A) Coagulation of mud in estuary H₂O is attributed to the slime excreted by the Boro fish.

(B) The slime has p_H 5.0 (approx.) and coagulates Fe(OH)₃ sol and clay suspensions but not Au sols except in the presence of electrolytes. Colloidal particles of slime are positively charged but do not affect the charge on clay particles.

CH. ABS. (p)

Biological action of metals irradiated by means of a mercury-quartz lamp. J. M. GOLDBERG (*Acta med. skand.*, 1934, 83, 212—218; *Chem. Zentr.*, 1935, i, 265).—The oligodynamic (bactericidal) action of Ag, Cu, and Hg, after irradiation in NaCl or Ringer's solution, was > that of Au or Fe similarly treated. The solution after contact with the metals has a stimulant effect on the frog heart.

A. G. P.

Surface inactivation of catalase. L. A. ROSENBLUM (*J. Biol. Chem.*, 1935, 109, 635—642).—Catalase solution is inactivated in the presence of glass beads by adsorption on the surface. Catalase is also adsorbed out of solution without inactivation by quartz.

H. G. R.

Absorption spectra of melanins. G. FLORENCE, J. ENSELME, and M. POZZI (*Bull. Soc. Chim. biol.*, 1935, 17, 268—282).—Absorption curves are given for the melanins of horse sarcoma and *Vicia faba* and of their hydrolysis products and of the products obtained from tyrosine, tyramine, and adrenaline by the action of tyrosinase.

P. W. C.

Variation of the absorption spectra of tyrosine, tyramine, adrenaline, thyroxine, and di-iodo-tyrosine with the p_H of the medium. G. FLORENCE, J. ENSELME, and M. POZZI (*Bull. Soc. Chim. biol.*, 1935, 17, 283—289).—With tyrosine (I), the more alkaline is the medium, the greater is the absorption in the ultra-violet, whilst with tyramine, thyroxine, and adrenaline, the spectrum is not changed by variation in p_H and in all cases it resembles the spectrum of (I) in acid solution. Di-iodotyrosine at p_H 2 has a spectrum resembling that of (I) at p_H 7.4, but the absorption is slightly greater.

P. W. C.

Spectrographic study of the reaction of tyrosinase on tyrosine and related substances. G. FLORENCE, J. ENSELME, and M. POZZI (*Bull. Soc.*

Chim. biol., 1935, 17, 290—313).—Tyrosinase acts on tyrosine (I), tyramine, and adrenaline but not on di-iodotyrosine and thyroxine. The reaction with (I), when followed in terms of changes of absorption, can be divided into 2 phases, an increase in absorption (formation of red substance) followed by a decrease in absorption (pptn. of melanin). Only the first phase is obtained in the reaction adrenaline-tyrosinase and only the second with tyramine-tyrosinase.

P. W. C.

Determination of α -amylase. S. JOZSA and W. R. JOHNSTON (Ind. Eng. Chem. [Anal.], 1935, 7, 143—146).—Jozsa and Gore's method (cf. B., 1930, 389) is improved, and the α -amylase in fluids is measured in "liquefon" units (cf. this vol., 782). The technique involves neither a restricted range of concns. nor the use of empirical constns. (cf. A., 1933, 425).

J. L. D.

Enzymic transformation of phosphoglyceric acid into pyruvic acid by embryos of *Sorghum saccharatum*. C. ANTONIANI (Atti R. Accad. Lincei, 1935, [vi], 21, 192—195).—*Sorghum* embryos transform Na phosphoglycerate into AcCO_2H , the yield of the latter being 25—27% of the theoretical.

T. H. P.

Kinetics of the reversible reaction between hexosediphosphoric acid and dihydroxyacetone-phosphoric acid. O. MEYERHOF (Biochem. Z., 1935, 277, 77—96).—This thermodynamic equilibrium is influenced in the direction of synthesis by increase of concn. of enzyme, substrate, and by addition of ions and proteins. The action of ions is especially pronounced, 0.001M-Mg⁺⁺ causing considerable displacement of equilibrium. The requirements of the van t'Hoff isochore are obeyed in all cases. The initial velocity at different substrate concns. is not \propto to these but is the same for a given enzyme concn. The reaction in both directions appears to be unimol. and it must be assumed that it is determined by some unimol. intermediate reaction, probably the conversion of the Harden-Young ester into a labile hexosediphosphoric ester.

P. W. C.

Activation of pancreatic juice by calcium at different temperatures. M. GUILLAUMIE (Compt. rend. Soc. Biol., 1935, 119, 146—149).—The velocity of activation of pancreatic juice by Ca increases with temp. Tryptic activity increases less rapidly than curdling power at first, rising suddenly later to its max.

R. N. C.

Ultra-violet absorption spectrum of pepsin.—See this vol., 805.

Crystalline carboxypolypeptidase. M. L. ANSON (Science, 1935, 81, 467—468).—A cryst. H_2O -insol. protein which attacks chloroacetyltyrosine and pepsin digests even in presence of CH_2O has been isolated from ox pancreas. Recrystallisation frees the globulin from proteinase but does not change its carboxypolypeptidase activity.

L. S. T.

Influence of salts of different buffer mixtures on proteolytic and peptolytic processes. E. MASCHMANN and E. HELMERT (Biochem. Z., 1935, 277, 97—121).—The velocity of hydrolysis of gelatin and Witte's peptone in citrate, acetate, and veronal-

acetate-HCl buffer solutions by papain (with and without its impurity "X") in presence and absence of HCN, cysteine, reduced glutathione, ascorbic acid, $\text{K}_4\text{Fe}(\text{CN})_6$, hæmoglobin, papain impurity X-Fe, and other Fe salts is investigated. In general, the reaction proceeds more quickly in citrate than in the other buffer solutions but the difference decreases the older is the enzyme solution.

P. W. C.

Influence of various arsenical compounds on papain. E. MASCHMANN (Biochem. Z., 1935, 277, 139—147).—The influence of 8 ter- and 7 quinquevalent therapeutically important As compounds on the hydrolysis of gelatin by papain is investigated in citrate and acetate buffer solutions, the amounts of enzyme and substrate being varied. The different enzyme preps. and kinds of gelatin did not influence the result, but the type of buffer used had considerable effect. Thus arsenophenylglycine inhibited the hydrolysis in citrate, but accelerated in acetate, buffer.

P. W. C.

Stabilisation of carboxylase solutions. O. VON SCHOENEBECK (Biochem. Z., 1935, 277, 451).—Addendum to the author's earlier paper (with Neuberger) (this vol., 401). For stabilisation of enzymes, whereas previous workers treated the animal or vegetable tissue with anhyd. glycerol, the author in this case stabilises by adding glycerol (up to 50%) to the aq. maceration extract prepared in the usual way.

P. W. C.

Inactivation of zymase or carboxylase by diazomethane. F. AXMACHER (Klin. Woch., 1934, 13, 776; Chem. Zentr., 1935, i, 92).—Dried yeast ($\text{COME}_2\text{-Et}_2\text{O}$), treated with CH_2N_2 , was unable to ferment sugars or AcCO_2H . Top and bottom yeasts behaved similarly. Glucose fermentation was the most sensitive.

A. G. P.

Changes in metabolic products of pure culture yeasts on repeated propagation. E. SCHILD and R. WEBER (Woch. Brau., 1935, 52, 161—165).—Fermented worts obtained as a result of successive cultivations of the same yeast show small variations in composition; no regularities can be traced through these variations, although there appears to be a tendency for esters to diminish in amount. Ester formation is independent of NH_2 -acid fermentation, but depends on the character and physiological condition of the yeast.

I. A. P.

Discrepancies in the value of the aerobic reducing intensity of the yeast cell and starfish egg. L. V. BECK (Science, 1935, 81, 469—470).—Independently of whether a cytoplasmic p_H val. of 6.0 or the more probable val. of 7 be assumed, the aerobic reducing intensity of Fleischmann's yeast cells estimated from the reaction of penetrating oxidation-reduction indicators is more negative than the val. estimated from the reaction of the naturally-occurring oxidation-reduction system cytochrome-C.

L. S. T.

Behaviour of glycine-alcohol towards yeast shaken with oxygen. F. LIEBEN and S. MOLNAR (Biochem. Z., 1935, 277, 165—170).—The system NH_2 -acid-MeCHO on addition to yeast shaken with O_2 differs from the system NH_2 -acid-EtOH in that with the former, both components are utilised by the

yeast. The absorption of glycine is increased in the presence of both MeCHO and EtOH whereas the absorption of EtOH is inhibited by the presence of glycine. P. W. C.

Proteins of yeast (*Saccharomyces cerevisiae*). F. A. CSONKA (J. Biol. Chem., 1935, 109, 703—715).—The N, P, S, cystine (I), tryptophan, tyrosine, arginine, histidine (II), and lysine contents of the fractions of brewers' and bakers' yeasts obtained by treatment with Et₂O and successive extraction with H₂O, 10% aq. NaCl, and 0.2% aq. NaOH are given. Acid hydrolysis of yeast attacks (I) and (II). The amount of coagulable protein obtained from yeast changes with the duration of treatment with Et₂O, reaching a max. at about 20 hr. and then decreasing. W. McC.

Effect of ultra-violet irradiation on certain yeasts, particularly *Schizosaccharomyces octosporus*, Beijerinck. A. DELAFONT (Compt. rend. Soc. Biol., 1935, 119, 133—134). R. N. C.

Formation and distribution of bios. K. SUCHORUKOV, E. KLING, and D. KLIASCHKO (Compt. rend. Acad. Sci. U.R.S.S., 1935, 1, 524—531).—Light of short λ is necessary for bios formation, which is inhibited by NO₃' and enhanced by NH₃-N; glucose has no effect. Bios is liberated during the autolysis of proteins; plants enrich the soil with it, whence it is utilised by organisms which cannot effect its synthesis. P. G. M.

Relation between the phosphorus content of soil and the yield of mycelium of *Aspergillus niger*. A. SARTORY, R. SARTORY, J. MEYER, and F. ARNOLD (Compt. rend. Soc. Biol., 1935, 119, 304—306).—P₂O₅ in the mycelium of young cultures \propto that available, the assimilation decreasing in the adult cultures, proteolysis causing a loss of P from mycelium. Conditions are given for satisfactory operation of Niklas' method for determination of soil fertility. H. G. R.

Action of alkaloids on the invertase produced by *Aspergillus niger*. G. MEZZADROLI and A. AMATI (Atti R. Accad. Lincei, 1935, [vi], 21, 46—50).—Secretion of invertase by *A. niger* grown in sucrose-Raulin solution is enhanced by small amounts of quinine or strychnine, but retarded by caffeine. The activity of the ready-formed enzyme is depressed by all three compounds, most by strychnine. T. H. P.

Biochemistry of micro-organisms. XLV. Metabolic products of *Penicillium Charlesii*, G. Smith. IV. *l*- γ -Methyltetronic acid. Formation and structure of ramigenic and verticillic acids. P. W. CLUTTERBUCK, H. RAISTRICK, and F. REUTER (Biochem. J., 1935, 29, 1300—1309).—*l*- γ -Methyltetronic acid (I), C₅H₆O₃, is formed as a metabolism product when *P. Charlesii* is grown on a synthetic medium containing glucose and can be isolated through the Hg salt. This acid on keeping in solutions containing COMe₂ readily gives first isopropylidenebis- γ -methyltetronic acid, C₁₃H₁₆O₆, m.p. 172°, α_{5461} —39°, dibasic, and on longer keeping acetonylisopropylidenebis- γ -methyltetronic acid, C₁₉H₂₀O₆, m.p. 171°, identical with ramigenic acid (II) (Me₁ derivative, m.p. 199°). Verticillic acid (III),

C₂₆H₃₀O₁₁.H₂O, on mild hydrolysis gives 1 mol. of (II) and 2 mols. of (I). By using EtOH instead of COMe₂ for separation of the polysaccharide fraction, it was shown that carolic, carolinic, carlic, and carlosic acids, and (I) are true metabolism products, whilst the (II) and (III) of the earlier experiments (A., 1934, 452) must be regarded as artefacts arising from (I)+COMe₂. A new method for synthesis of (I) is described. P. W. C.

Physiology of *Rhizoctonia solani*, Kuhn. III. Susceptibility of different plants as determined by seedling infection. IV. Effect of a toxic substance produced by *R. solani*, when grown in liquid culture, on the growth of wheat, carrots, and turnips. W. NEWTON and N. MAYERS (Sci. Agric., 1935, 15, 393—398, 399—401).—III. The susceptibility of various plants grown in infested soil differed widely. Turnips and carrots produced stunted growth but no evidence of infection. Resistance of plants grown in inoculated agar culture differed from that in infected soil.

IV. A heat-stable toxin is secreted by *R. solani* during growth and is present in the mycelium. Sterilised extracts of old cultures of the organism are much more toxic to turnip and carrot than to wheat. A. G. P.

Aërobic respiration in *Spirostomum ambiguum* and the production of ammonia. H. SPECHT (J. Cell. Comp. Physiol., 1934, 5, 319—333).—Manometric measurement of respiration of *S. ambiguum* yields different vals. for O₂ consumption and CO₂ production according to the presence or absence of HCl in the respiration vessel. This is attributed to the production of NH₃ by the protozoan. A. G. P.

Decomposition of pentosans and pentoses by micro-organisms. L. M. HOROVITZ-VLASOVA and N. V. NOVOTELNOV (Zentr. Bakt. Par., 1935, 91, II, 468—481).—Ability to decompose pentosans is associated principally with fungi (*Aspergillus*, *Penicillium*, etc.). The pentoses formed are acted on by certain moulds, e.g., *Aspergillus*, with the formation of citric, oxalic, and other org. acids, and also by bacteria. Acid hydrolysates of cottonseed and sunflower husk are decomposed by *B. lactis aerogenes* forming lactic acid, AcOH, and CO₂, and by *B. esterificans* to yield, principally, PrCO₂H and CO₂. The general use of oil-seed press-cakes for the production of org. acids is discussed. A. G. P.

Cellulose-decomposing, sporing bacteria of the groups *Bacillus omelianski* and *B. macerans*. V. MEYER (Zentr. Bakt. Par., 1935, II, 92, 1—33).—An organism is isolated which, in protein-free media, decomposes cellulose (I) only when living in symbiosis with other organisms (notably *B. coli*). Addition of protein permits decomp. of (I) without symbiosis, and with production of HCO₂H, AcOH, CO₂, and H₂. The mechanism of the symbiosis is examined. A. G. P.

Assay of preparations of lactic acid bacteria. G. TIXIER and J. BECK (Bull. Soc. Chim. biol., 1935, 17, 252—267).—Methods for assessing the biological val. of pharmaceutical preps. of these organisms in

terms of bacteriological counts and lactic acid production are described. P. W. C.

Vitamin and nitrogenous food requirements of the true lactic acid bacteria. S. ORLA-JENSEN (Nature, 1935, 135, 915).—All the lactic acid bacteria, *Streptococci* as well as rod-shaped forms, require an alkali-stable substance related to bios for their growth. The rod forms require, in addition, lactoflavin and possibly another activator. The *Thermobacteria* show as narrow requirements as regards N food as do higher animals, but the *Streptobacteria* are satisfied with NH_4 salts and a trace of cysteine, whilst the *Streptococci* require only NH_4 salts as the source of N.

L. S. T.

Utilisation of the "complete" antigen by living *B. ærtrycke*. A. BOIVIN and L. MESROBEANU (Compt. rend. Soc. Biol., 1935, 119, 209—211).—The antigen is utilised by the *S* and *R* forms of *B. ærtrycke* when it forms the sole source of nutrition. The fatty acid fraction is apparently utilised more readily than the polysaccharide fraction. The antigen probably serves as a reserve carbohydrate supply for the bacteria.

R. N. C.

Respiration and fermentation of pathogenic bacteria. IV. Oxygen respiration and hydrogen peroxide production of pneumococcus. A. FUJITA and T. KODAMA (Biochem. Z., 1935, 277, 17—31).—The optimal p_{H} for the respiration of pneumococcus (which does not contain the oxidation enzyme) is 7.1 and the influence of ions (especially of cations) is very pronounced, addition of K^+ , Ca^{++} , and especially of Mg^{++} effecting considerable increase. NH_2OH ($10^{-4}M$) completely inhibits the action of catalase but has no effect on the respiration of pneumococcus. The ratio of O_2 used to H_2O_2 formed is the same for all substrates, 80% of the used O_2 being converted into H_2O_2 . H_2O_2 reacts with AcCO_2H , AcCHO , and $\text{CO}(\text{CH}_2\cdot\text{OH})_2$. The greater is the virulence of the organism, the greater is the production of H_2O_2 . During respiration of pneumococcus, hæmoglobin is converted into methæmoglobin. Decrease of respiration by H_2O_2 is inhibited by addition of AcCO_2H or catalase.

P. W. C.

Nitrifying bacteria in activated Paris mud. H. WINOGRADSKY (Compt. rend., 1935, 200, 1886—1888).—Three groups of nitrifying bacteria are described.

R. S. C.

Pigment formation by bacteria. C. A. SAGASTUME and A. A. SOLARI (Rev. Fac. Cienc. quim., La Plata, 1934, 9, 1—5).—The addition of certain sugars, or Fe^{+++} , to the media favours the production of a red pigment (extractable by EtOH) by *Rhodococcus roseus*.

F. A. A.

Pigment of *Bacillus violaceus*. I. Production, extraction, and purification of violacein. W. C. TOBIE (J. Bact., 1935, 29, 223—227).—Growth and pigmentation of *B. violaceus* is increased by passage of O_2 through the culture. The amount of pigment obtained is markedly influenced by the quality of the peptone used in the medium. The isolation of violacein is described.

A. G. P.

Species of *Salmonella* producing a water-soluble pigment. M. W. DESKOWITZ and L. BUCHBINDER (J. Bact., 1935, 29, 293—298).—The organism (probably a variant of *S. enteritidis*) produced a yellow pigment most readily in media containing certain brands of peptone.

A. G. P.

Decomposition of salts of organic acids by bacteria of the genus *Salmonella*. A. A. HAJNA (J. Bact., 1935, 29, 253—258).—Nearly all members of this genus utilise N as NH_4 salts, P as PO_4^{---} , and C as org. acids. Mg salts favour growth. Ability to utilise particular acids varied with species and with strains of individual species. Mucic acid was decomposed in nearly all cases.

A. G. P.

Culture of *B. tuberculosis* and BCG in different evolutionary states (granular, filamentous, and acid-resisting and non-acid-resisting bacilli) by means of lysates obtained by repeated freezing. E. GRASSET (Compt. rend. Soc. Biol., 1935, 119, 261—265).—By submitting living *B. tuberculosis* and BCG to repeated freezing, products of microbial lysis are obtained from which the various evolutionary forms may be developed.

H. G. R.

Chemical nature of the lipid hapten from tubercle bacilli killed by heat. M. A. MACHEBŒUF, G. LÉVY, and M. FAURE (Compt. rend., 1935, 200, 1547—1549; cf. A., 1934, 564, 929).—Phosphoaminolipins have no hapten activity. Active material contains P but no N, is sol. in CHCl_3 , insol. in COMe_2 , and slightly sol. in MeOH, and loses its activity rapidly in alkaline and slowly in acid (p_{H} 3.0) media.

A. G. P.

Oxytropy and oxytrophic organisms. A. Lvov (Compt. rend. Soc. Biol., 1935, 119, 87—90).—The term "oxytrophic" is applied to organisms requiring other org. compounds besides org. N compounds for growth.

R. N. C.

Determination of lipins in micro-organisms. O. TURPEINEN (Suomen Kem., 1935, 8, B, 17—18).—The true lipin content of *Geotrichoides* cannot be obtained merely by extraction with solvents, because of the mechanical structure of the material. Extraction is facilitated by previous treatment with hot 5*N*-NaOH or -HCl, after which the presence of fats cannot be demonstrated histologically in the sample.

J. L. D.

Balance of nitrogen determinable by the Kjeldahl method in aerobic cultures of micro-organisms. III. Rôle of ammonia. M. LEMOIGNE and R. DESVEAUX (Bull. Soc. Chim. biol., 1935, 17, 210—218).—The loss of N occurring in cultures of micro-organisms during ageing is due to oxidation of NH_3 to N_2 .

P. W. C.

Purification of vaccine lymph by X-rays. B. S. LEVIN (Compt. rend., 1935, 200, 1441—1443).—By use of a Cr anticathode vaccine lymph can be freed by X-rays from bacteria without sensibly affecting its activity.

H. W.

Action of ether, chloroform, sodium fluoride, phenol, and saponin on the virus of infectious anæmia. L. BALOZET (Compt. rend. Soc. Biol., 1935, 119, 162—165).—The virus is destroyed rapidly by 1% of saponin, and slightly attacked by 0.1% of

PhOH, higher concns. of which also destroy it rapidly. It is not affected by Et_2O , CHCl_3 , or NaF .

R. N. C.

Oxidation-reduction phenomenon of methylene-blue in transmissible lysis. G. PETROVANO (Compt. rend. Soc. Biol., 1935, 119, 218—219).—The transformation undergone by *B. coli* in transmissible lysis is not oxido-reductive. The lytic principle alone is chemically inactive and incapable of fixing free O_2 .

R. N. C.

Photo-sensitisation of a streptococcus. D. BROCC-ROUSSEU (Compt. rend. Soc. Biol., 1935, 119, 272—273).—The antiseptic action of sulphamidochrysoidine hydrochloride is markedly increased by sunlight.

H. G. R.

Bactericidal action of azochloroamide (N-dichloroazodicarbonamide). F. C. SCHEMELKES and E. S. HORNING (J. Bact., 1935, 29, 323—331).—Azochloroamide is more effective in the presence of org. matter (e.g. serum) than other Cl compounds examined. Its action is restricted by actively reducing substances, e.g., hæmoglobin.

A. G. P.

Bactericidal properties of sodium formaldesulphoxylate in vivo. I. M. RABINOWITZ and A. C. CORCORAN, J. A. DAVIDSON, and L. J. RHEA (Canad. Med. Assoc. J., 1934, 31, 534—535).—Satisfactory treatment of Hg poisoning is recorded.

CH. ABS. (p)

Biological properties of carvacrol. D. GARDNER and M. L. CASELLI (Compt. rend., 1935, 200, 1430—1432).—The bactericidal action of carvacrol (I) towards *Staphylococcus aureus* is very much more pronounced than that of thymol or menthol. The Na derivative (II) of (I) is more active than the $\text{N}(\text{C}_2\text{H}_4\text{-OH})_3$ compound, particularly in aq. solution. The action of (I) towards Kedrewski's paratuberculosis bacillus, of (I) and (II) towards *B. coli*, and the toxic power of (I) have been investigated.

H. W.

Effect of various therapeutic agents, especially of the caffeine group, on bacterial agglutination. K. WATANABE (Tôhoku J. Exp. Med., 1934, 24, 111—117).—The agglutination of *Eberthella typhosa* by the corresponding rabbit antiserum was unaffected by quinine, salicylic acid, "Thyroprotein," "Pituglandol," cocaine, pilocarpine, atropine, and nicotine but was inhibited by caffeine- NaOBz and theobromine- Na salicylate or $-\text{NaOAc}$.

CH. ABS. (p)

Physiology of parathyroid glands. VII. Responses of normal human kidneys and blood to intravenous parathyroid extract. R. ELLSWORTH and J. E. HOWARD (Bull. Johns Hopkins Hosp., 1934, 55, 296—308; cf. A., 1933, 320).—Intravenous injection of parathormone caused an immediate increase in urinary PO_4''' and p_{H} , an increase in Cl' , and, occasionally, a diuresis. Urea clearance was unchanged. The inorg. P of the plasma decreased somewhat and serum-Ca showed variable changes. The hormone has a fundamental influence on P metabolism.

CH. ABS. (p)

Alterations in liver-glycogen following thyroid, iodine, and glucose feeding. W. D. FRAZIER and H. FRIEMAN (Surgery, Gynæcol., Obstet., 1935, 60, 27—29).—Addition of thyroid extract to a productive

diet for guinea-pigs results in a depletion of liver-glycogen which is not prevented by administration of I or glucose.

CH. ABS. (p)

Effect of thyroid and thyroxine on the concentration of creatine in the heart, muscle, liver, and testes of the albino rat. M. BODANSKY (J. Biol. Chem., 1935, 109, 615—622).—After feeding of thyroid or thyroxine, cardiac hypertrophy and diminution of total creatine (I) by 20—50% was observed, death from heart failure being probably related to the lowering of phosphocreatine. (I) in muscle may be reduced by 50% depending on the duration of the symptoms. There was a slight increase in (I) of the testes, but no change in the liver.

H. G. R.

Effect of alkali on the absorption of a peptide of thyroxine from the gastro-intestinal tract. W. O. THOMPSON, P. K. THOMPSON, and L. F. N. DICKIE (J. Clin. Invest., 1934, 13, 933—947).—The peptide, containing I 48% with N:I ratio 0.48—1.0, had little effect on basal metabolism when administered by mouth in aq. suspension, but when dissolved in dil. aq. NaOH was as effective as Na thyroxine.

CH. ABS. (p)

Effect of thyroidectomy and thyroxine on the response of the denervated heart to injected and secreted adrenaline. M. E. MCK. SAWYER and M. G. BROWN (Amer. J. Physiol., 1935, 110, 620—635).—The response of the denervated heart of the cat to injected and secreted adrenaline is lowered by thyroidectomy and restored by sufficient thyroxine to restore metabolism to its normal level.

R. N. C.

Adrenaline content of the blood and variations in blood-sugar. F. MEYTHALER and K. WOSSIDLO (Arch. exp. Path. Pharm., 1935, 178, 320—329).—The diminution in blood-sugar (I) in men due to insulin is accompanied by an increase in the adrenaline (II) content of the peripheral blood before the "crit. point" [(I)=0.07—0.08%] is reached. Even during the post-hyperglycæmic fall in (I) (i.e., with vals. up to > 0.3%) following injection of glucose, the blood-(II) is > normal.

F. O. H.

Protective action of adrenaline. F. MEYTHALER (Arch. exp. Path. Pharm., 1935, 178, 330—332).—The so-called "emergency function" of adrenaline in conditions such as hypoglycæmia, asphyxia, shock, etc. is discussed and the conception of a definite "crit. point" of the blood-sugar is criticised (cf. preceding abstract and this vol., 901).

F. O. H.

Adrenaline and vagal tonus. II. A. CROCETTA (Boll. Soc. ital. Biol. sperim., 1933, 8, 1714—1717).—Vagotomy in new-born puppies does not produce adrenalinæmia. Asphyxia or bleeding provokes a discharge of adrenaline as in adult dogs.

R. N. C.

What part of the melanophore system in *Fundulus* is acted on by adrenaline? G. H. PARKER (J. Cell. Comp. Physiol., 1934, 5, 311—318).—Adrenaline causes an accumulation of pigment in the melanophores of *Fundulus* by direct action on the colour cells and not by nerve stimulus.

A. G. P.

Influence of oxidation-reduction systems on adrenaline action. K. TERAI (Folia Pharmacol.

Japon., 1934, 19, No. 1, 79—89).—Adrenaline action on various organs of mouse, rabbit, and toad is prevented by benzoquinone and scarcely affected by quinol. CH. ABS. (p)

Cholagogue action of secretin and derivatives. J. LA BARRE and R. GOFFIN (Compt. rend. Soc. Biol., 1935, 119, 311—313).—Secretin and excretin but not incretin augment the secretion of bile, probably due to a direct stimulation of the liver. H. G. R.

Crystalline insulin. VI. Influence on liver-glycogen. M. BÜRGER and H. KOHL. **VII. Influence on "residual carbon" and lactic acid of the blood.** M. BÜRGER, F. HORN, and V. RUPPERT (Arch. exp. Path. Pharm., 1935, 178, 269—281, 282—294).—VI. Intraperitoneal injection of 1 c.c. of physiological aq. NaCl into narcotised, fasting dogs diminishes liver-glycogen (I) by 17% within 6 hr. and injection of insulin (II) (0.02—0.03 mg. per kg.) under parallel conditions, by 55%. The depletion of (I) increases the difference between the blood-sugar levels of jugular vein and liver capillaries, storage of carbohydrate occurring in the muscles.

VII. Injection of (II) (0.02 mg. per kg.) into normal dogs produces a rapid fall of approx. 0.15% in the "residual C" of the blood due more to disappearance of fat than of sugar. A similar phenomenon occurs with diabetics with doses of 0.010—0.015 mg. per kg.; with 0.0025 mg. per kg. the sugar-C falls but "residual C" and, more especially, the fat-C increase. With small or large doses of (II), the blood-lactic acid increases to an extent dependent on dose and fall in blood-sugar. F. O. H.

Fall in blood-sugar in men after intravenous administration of insulin. F. MEYTHALER and E. KLEINEIDAM (Arch. exp. Path. Pharm., 1935, 178, 315—319).—Determinations at 1—2-min. intervals indicate that the blood-sugar (I) does not diminish steadily but gives a zig-zag curve. A parallelism between this curve and that of the pulse rate indicates an intermittent compensatory release of adrenaline (due to a sympathetic nervous mechanism); a definite "crit. point" of adrenaline release does not occur (cf. Cannon *et al.*, Amer. J. Physiol., 1924, 69, 48). F. O. H.

Secondary action of insulin on hypercholesterolaemic rabbits. A. I. LEWIN (Arch. exp. Path. Pharm., 1935, 178, 308—314).—Simultaneous enteral administration of cholesterol (I) to rabbits has no influence on the hypoglycaemic symptoms produced by insulin. With cholesterolaemia due to feeding of (I), however, the symptoms do not appear, although the normal fall in blood-sugar occurs: with such animals, withdrawal of blood favours the reappearance of the symptoms. F. O. H.

Peripheral action of insulin in normal animals. N. B. LAUGHTON and A. B. MACALLUM (Biochem. J., 1935, 29, 1257—1262).—The max. tolerated doses (M.T.D.) of certain inhibitors to different stages in the metabolism of glucose are given for rabbits and the effects of insulin (I) in antagonising their effects observed. The M.T.D. of KCN, urethane, and NaF produce hyperglycaemia which temporarily neutralises the action of 1 rabbit unit of (I) per 2 kg. body-wt.

The M.T.D. of $\text{CH}_2\text{I}\cdot\text{CO}_2\text{H}$ only delays the effects of (I). (I) exerts no antagonistic action to hyperglycaemia produced in these ways; however it inhibits that produced by adrenaline and hence it is concluded that this is not due to a mobilisation of liver-glycogen but to the sp. action in the respiratory cycle and intermediate stages of glucose metabolism. (I) exerts its max. effect on the reaction between AcCO_2H and glycerophosphoric acid. H. D.

Effect of bacteria on insulin. M. SAHYUN and P. BEARD (J. Lab. Clin. Med., 1934, 20, 160—164).—The activity of insulin is destroyed by *Proteus vulgaris*, but is not affected by *E. coli*. CH. ABS. (p)

Influence of adrenaline, pituitrin, and ephetonin on the absorption of insulin. V. CLAUSEN (Diss., Copenhagen, 1934, 144 pp.).—When adrenaline (I) was combined with insulin (II) [0.1—0.2 ml. of (I) 1:1000 to 5 ml. of (II)=200 international units] the rate of absorption of (II) was retarded by the local action of (I); the immediate effect on blood-sugar (III) was therefore < and the later effect > that of (II) alone. With a normal or moderately high fasting (III), injection of (II) and (I), given at the same time as food, gave an improved (III) curve, but if the fasting (III) was high, the injection had to precede a meal by 1—2 hr. to give good results. In the treatment of diabetes (5 cases) good results were got in 3 that showed a normal fasting (III) with (II), and were liable to (II) convulsions. In 2 cases with high fasting (III), sugar tolerance was improved by combined (II) and (I) treatment. Pituitrin had a similar effect, but ephetonin had none. NUTR. ABS. (b)

Relation of the pituitary gland to the action of insulin and adrenaline. O. COPE and H. P. MARKS (J. Physiol., 1934, 83, 157—176).—The response of the adrenals to insulin hypoglycaemia in the dog after removal of the pituitary is normal, but the liberated adrenaline (I) does not restore the blood-sugar (II) to normal, although the liver contains ample reserve of glycogen (III). The elevation of (II) by (I) is also diminished. These changes are not reversed by administration of thyroid. Conversely, injection of pituitary extract increases resistance to insulin and response to (I), which effects are not prevented by thyroidectomy. This suggests the presence in the pituitary of a principle rendering liver-(III) susceptible to the mobilising action of (I). R. N. C.

Effect of a chronic enrichment of the organism with insulin on the steadiness of the thyroid secretion. V. S. SEMNITZKI and A. L. KOMENDANTOVA (Virchow's Archiv, 1934, 293, 448—457; Chem. Zentr., 1935, i, 103).—Repeated daily injections of insulin over a period of 20—45 days in rabbits causes a lowering of the thyroid function, considered to be the result of increased carbohydrate assimilation and reduction of the protein exchange controlled by the thyroid. R. N. C.

Effects of thyro-parathyroidectomy and carbohydrate intake on the action of anterior pituitary extracts. O. H. GAEBLER (Amer. J. Physiol., 1935, 110, 584—592).—Antuitrin-G (I) produces large calorogenic responses in thyro-parathyroidectomised

dogs which cannot be explained as toxic effects. The effect on N storage is \times in normal dogs. H₂O storage followed by diuresis occurs through the action of (I). Fat oxidation is increased during the post-absorptive periods of the two days following (I) injection, whether the carbohydrate (II) intake is moderate or high, and also when (II) equiv. to the rise in metabolism is added to the diet at the time of injection, but not when the (II) added is equiv. to twice the rise. R. N. C.

Separation of a thyrotropic from the gonadotropic substances of the pituitary. R. O. GREEP (Amer. J. Physiol., 1935, 110, 692—699).—The thyrotropic substance is pptd. from the pituitary extract with BzOH. It is destroyed by heat together with the gonadotropic substances, and is not present in extracts of placenta, or urine or serum of pregnancy. R. N. C.

Effect of extracts of posterior pituitary on liver-glycogen. P. GÖMÖRI and J. CSOMAY (Magyar Orvosi Arch., 1934, 35, 277—281).—Oxytocin (orasthin) and vasopressin (tonephin), injected into rats, produced an approx. equal decrease in liver-glycogen which was not, in either case, due to histamine. NUTR. ABS. (b)

Effect of the pressor principle of the posterior lobe of the pituitary body on the liver-fat after the feeding of choline chloride. B. MUKERJI and H. B. VAN DYKE (Chinese J. Physiol., 1935, 9, 69—75).—Oral administration of choline chloride (0.2—0.5 g. per kg. body-wt. *per diem*) to rabbits did not prevent the acute increase in liver-fat following a single large dose of pitressin. W. O. K.

Relation of the posterior lobe of the pituitary gland to anæmia and to blood formation. E. C. DODDS and R. L. NOBLE (Nature, 1935, 135, 788).—Rabbits injected subcutaneously with 150 mg. of COMe₂-picric acid extract of the lobe or with 40 c.c. of standard B.P. pituitary extract develop a severe macrocytic anæmia. A marked leucocytosis is often associated. A reticulocyte response commences soon after the appearance of the anæmia. The results suggest the possibility that the control of blood destruction by the reticulo-endothelial system may reside in the posterior lobe of the pituitary gland. L. S. T.

Posterior lobe of the pituitary gland: its relationship to the stomach and to the blood picture. E. C. DODDS, G. M. HILLS, R. L. NOBLE, and P. C. WILLIAMS (Lancet, 1935, 228, 1099—1100).—Chronic gastric ulcers in the acid-bearing area of the stomach are produced by the subcutaneous injection in rabbits of standard B.P. pituitary extract or of the COMe₂-picric acid extract of the lobe. Injection of the extract appears to produce a temporary inhibition of HCl secretion so that the stomach does not react to histamine stimulus. Extracts prepared from spleen, liver, testes, pancreas, thyroid, etc. have no action on the blood or stomach picture. L. S. T.

Relation of the pituitary, hypothalamus, and the autonomic nervous system to carbohydrate metabolism. L. DAVIS (Ann. Surg., 1934, 100, 654—666).—Hyperglycæmia and glycosuria do not

follow pancreatectomy in the cat which has bilateral hypothalamic lesions situated in the tuber cinereum. Stimulation of the superior cervical and stellate ganglia in the cat causes hyperglycæmia and glycosuria, but not after bilateral symmetrical lesions of the pons or section of the splanchnic nerves. The probable relationship of this part of the brain to pancreatic diabetes is discussed. NUTR. ABS. (b)

Effects of pituitary implants and extracts on the genital system of the lizard. L. T. EVANS (Science, 1935, 81, 468—469).—The morphological changes accompanying the injection of human pregnancy urine extract and sheep pituitary extract in male and female lizards are described. Metabolism, general activity, and moulting are also increased. L. S. T.

Sex hormones and pituitary growth. P. ENGEL (Klin. Woch., 1934, 13, 1540—1541; Chem. Zentr., 1935, i, 102).—Injection of sex hormones simultaneously with pituitary extract in rats does not inhibit the action of the growth hormone. R. N. C.

Synthesis of folliculin in female [rats] with A-avitaminosis. B. A. KUDRJASHOV (Arch. exp. Path. Pharm., 1935, 178, 295—304).—With severe A-avitaminosis, the œstrous cycle is not markedly changed, whilst administration of gonadotropic pituitary prep. (prolan) induces œstrus. Hence A-avitaminosis has no effect on the production of folliculin by the ovaries or on the action of prolan. F. O. H.

œstrin content of pregnancy urine and placenta of the chimpanzee. E. ALLEN, A. W. DIDDLE, and J. H. ELDER (Amer. J. Physiol., 1935, 110, 593—595).—Both œstrone and œstriol appear in the urine of chimpanzees at various stages of pregnancy, and in the placenta at full term. R. N. C.

Influence of œstrin on the pituitary-gonad complex of the immature female rat. C. E. LANE (Amer. J. Physiol., 1935, 110, 681—685).—œstrin at first stimulates the pituitary to increased gonadotropic hormone secretion. The liberation of the follicle-stimulating hormone is then inhibited. Formation of the luteinising hormone or of a similarly-acting substance from the pituitary is greatly increased. R. N. C.

Hormones of the corpus luteum. H. PÉNAU and H. SÉDIGNET (J. Pharm. Chim., 1935, [viii], 21, 485—495).—The lipin-sol. hormone of the corpus luteum may be assayed by determining the min. quantity required to produce a certain action on the uterus of the immature rabbit following administration of folliculin. W. O. K.

Vitamins: their specific and non-specific actions. P. KARRER (Bull. Soc. chim., 1935, [v], 2, 917—937).—A lecture.

Utilisation of energy-producing nutriment and protein in white and yellow corn and in diets deficient in vitamin-A, -D, and -B₂. W. W. BRAMAN, A. BLACK, O. G. KAHLLENBERG, Le R. VORIS, R. W. SWIFT, and E. B. FORBES (J. Agric. Res., 1935, 50, 1—37).—Yellow corn contains more vitamin-A than does white corn, whilst the latter is

superior in digestibility and food energy. Rats fed on a vitamin-*D*-deficient diet are inferior to those on a complete diet as regards appetite, gain of fat and energy, and elimination of C in the urine. Deficiency of vitamin-*B*₂ does not affect the digestibility of protein, but it depresses fat and protein synthesis and energy storage; it also increases the C:N ratio in the urine. P. G. M.

Possibility of local vitamin deficiency. S. BALACHOVSKI (Presse méd., 1934, 42, 1404—1407).—Colloidal carotene in the form of the crude unsaponifiable fraction of carrot lipins, applied locally, relieved superficial eye lesions, gingivitis, etc.

CH. ABS. (*p*)

Lactic bacilli as a possible source of vitamin-*B*. R. LECOQ and H. VILLETTE (Compt. rend. Soc. Biol., 1935, 119, 274—275).—*B. bulgaricus* in a diet containing 66% of sucrose increases the vitamin-*B* requirements of the pigeon. H. G. R.

Lactic bacilli and alimentary unbalance. R. LECOQ (Compt. rend. Soc. Biol., 1935, 119, 276—277; cf. preceding abstract).—Pigeons receiving *B. bulgaricus* in a diet low in sugar develop symptoms of polyneuritis similar to those observed with lactose. H. G. R.

Flavin balance in animals. F. VIVANCO (Naturwiss., 1935, 23, 306).—With normal rats the excretion of flavin (I) in the faeces is approx. twice that in the urine, the total being $3-5 \times 10^{-6}$ g. per rat daily. With *B*₂-avitaminosis for 4—6 days, the liver, kidney, and heart have only 30% of the normal (I) content whilst after 14 days the urine is (I)-free and growth ceases; even at death, however, the organs contain approx. one third the normal content of (I). Ingestion of (I) produces growth prior to replenishment of reserve depôts. F. O. H.

Vitamin-*C* content of Chinese foods and drugs. Y. F. CHI and B. E. READ (Chinese J. Physiol., 1935, 9, 47—61).—A large no. of Chinese fruits, vegetables, and medicinal herbs have been examined. W. O. K.

Biological synthesis of ascorbic acid. B. C. GUHA and A. R. GHOSH (Nature, 1935, 135, 871; cf. this vol., 416).—The liver-tissues of the ox, cat, and fowl do not convert mannose (I) into ascorbic acid (II) *in vitro*. Intravenous and subcutaneous injection of (I) in rats increases the (II) content in all tissues investigated. Intravenous injection of glucose (III) increases the (II) content of the adrenal gland. Embryonic guinea-pig tissue at an early stage of development, and ovarian tissue of the pregnant guinea-pig and of the adult non-pregnant monkey can also convert (I) into (II) at pH 7.4 in a phosphate-buffered Ringer-Locke solution at 37°. Replacement of (I) by (III) does not lead to an appreciable synthesis of (II). Although (III) is the ultimate precursor of (II), it has probably to pass through an intermediate stage of (I) or some (I)-like configuration. L. S. T.

Determination of ascorbic acid by titration. E. W. MCHENRY and M. L. GRAHAM (Nature, 1935, 135, 871—872).—The increased ascorbic acid (I) titration val. against phenol-indophenol obtained after heating various foodstuffs is probably due to the liberation

of combined (I) from an ester. Hence simple extraction and titration of certain plant tissues measures only free (I). An amount of reversibly-oxidised (I) may also escape measurement. Ox adrenal tissue contains little combined (I) and none of the reversibly-oxidised acid. Acid fruits contain only free (I).

L. S. T.

Sensitive drop reaction for ascorbic acid. H. TAUBER (Mikrochem., 1935, 17, 111—112).—Plant or animal tissue is macerated with 8% AcOH, and a drop of the liquid is applied to $K_3Fe(CN)_6$ on filter-paper. < 0.003 mg. of ascorbic acid (I) reduces $K_3Fe(CN)_6$ to $K_4Fe(CN)_6$, giving a blue colour on adding a drop of aq. $Fe_2(SO_4)_3$. Large amounts of cysteine, glutathione, and pyrogallol interfere, as do sugars after hydrolysis. The oxidised form of (I) may be reduced with H_2S before testing. J. S. A.

Removal of sterols from material containing vitamin-*D*. S. NATELSON and A. E. SOBEL (J. Biol. Chem., 1935, 109, 687—694; cf. A., 1934, 1099).—PhOH, borneol, cholesterol (I), and ergosterol (II) yield K salts of sulphates insol. in Et_2O and light petroleum whereas vitamin-*D* (III) (*e.g.*, in cod-liver oil), calciferol, irradiated (I) and (II) do not. K ergosteryl sulphate when irradiated dry with or without subsequent boiling with H_2O acquires no anti-rachitic activity but does if it is first boiled with H_2O . Sterols are separated from (III) by conversion into K salts of sulphates, the mixture being then extracted with light petroleum which dissolves (III). W. McC.

Change of activity of crystalline vitamin-*D* and its quantitative spectrographic determination. L. FUCHS and J. VAN NIEKERK (Biochem. Z., 1935, 277, 32—38).—Cryst. vitamin-*D* on long keeping in air in the dark suffers a partial decomp., becoming yellowish in colour, the absorption in the ultra-violet simultaneously decreasing and the prep. no more being completely sol. in C_6H_6 . After such keeping, the vitamin-*D* content calc. from the absorption spectrum approximates closely to that obtained from animal experiments. All standard preps. of the vitamin require therefore standardisation from time to time by the absorption method. P. W. C.

Irradiation of ergosterol. I.—See this vol., 857.

Vitamin-*D* injury in fowls. O. SEIFRIED and E. HEDEGGER (Tierärztl. Rundsch., 1933, 39, 172; Bied. Zentr., 1934, A, 5, 194).—Excessive feeding of vitamin-*D* to hens results in abnormal Ca storage and a condition corresponding to hypervitaminosis-*D* in mammals. Hens are the less sensitive. Deficiency of -*D* also leads to excessive Ca storage.

A. G. P.

Antihæmorrhagic vitamin of the chick. H. DAM (Biochem. J., 1935, 29, 1273—1285; cf. A., 1934, 1271).—A factor preventing hæmorrhage in the chick (vitamin-*K*) is found in hog-liver fat, hen's egg yolk, hemp seed, and vegetables, occurring in the easily sol. non-sterol fraction of the non-saponifiable residue. Vitamin-*A*, -*D*, and -*E* are ineffective in preventing hæmorrhage. The factor is not destroyed by heating at 100° for 12 hr. The statement of McFarlane (A., 1931, 659) that caseinogen prevents hæmorrhage is disputed. H. D.

Reversibility of the vernalisation process. M. F. GAVRILOVA (Compt. rend. Acad. Sci. U.R.S.S., 1935, 1, 561—563).—Vernalisation in the cotton plant, as indicated by a change in p_{H} of the isoelectric point from 6.0 to 5.6, takes place in 10—15 days. The process is reversible if the time is prolonged.

P. G. M.

Seasonal changes in the composition of the pecan during fruit development. C. J. B. THOR and C. L. SMITH (J. Agric. Res., 1935, 50, 97—121).—In the period between blossoming and August (Texas), the growth of the pecan is characterised by the formation of structural matter. During the subsequent filling of the kernels, materials contributing to the formation of oil, and probably of protein, are derived from sources outside the fruit. Accumulation of sugars, occurring later, is due to translocation from the husk.

A. G. P.

Physiology of apple varieties. A. H. FINCH (Plant Physiol., 1935, 10, 49—72).—The starch (I) and total carbohydrate (II) contents, (I):N ratio, and (II):N ratio in terminal shoots of apples were highest in fruitful shoots of biennial-bearing trees, next highest in regularly but shyly-bearing trees, and lowest in unfruitful trees. Terminal growth, accumulation of (I), and formation of xylem began earlier in more fruitful trees. Summer wood formation in the xylem is associated with (II) accumulation. A relatively large no. of parenchymatous cells and a low fibre:parenchyma ratio in the xylem coincided with a high (II)-low N type of composition. Fewer cells and high ratio are associated with low (II) and high N in the shoot. The composition of terminal shoots in individual varieties may serve as an index of the cultural requirements of the trees.

A. G. P.

Synthesis of tropinone, ψ -pelletierine, lobelamine, and related alkaloids under physiological conditions.—See this vol., 873.

Growth, organic nitrogen fractions, and buffer capacity in relation to hardness of plants. S. T. DEXTER (Plant Physiol., 1935, 10, 149—158).—Winter wheat plants of high N contents did not harden when exposed to a temp. of 2° in darkness. Low N-high carbohydrate (I) plants of winter wheat, winter rye, winter barley, winter oats, and cabbage hardened well under these conditions. Leaves of cabbage having low (I) and high N although not hardening at 2° became more alkaline and had better buffer capacity both before and after exposure than did corresponding plants having high (I) and low N. Hardening in darkness was more effective at a const. low temp. than at alternating temp. Under the latter conditions (2—20°) plants accumulated more sol. N and less sugar than when maintained at 2°. Low-temp. storage, irrespective of the hardening process, induces an increase in sol. N, a decrease in respiratory rate (unrelated to sugar changes or enzymic activity), and, usually, an increase in sugars.

A. G. P.

Osmotic quantities of plant cells in given phases. A. URSPRUNG (Plant Physiol., 1935, 10, 115—133).—The appropriate use of terms is discussed.

A. G. P.

Rôle of sugar in the osmotic value of wheat. W. H. FUCHS (Planta, 1935, 23, 340—348).—The osmotic activity of sugars in wheat seedlings is examined in relation to winter hardening.

A. G. P.

Linkage between output of electrical energy by polar tissues and [plant] cell oxidation. H. F. ROSENE and E. J. LUND (Plant Physiol., 1935, 10, 27—47).—Direct relationships are established between the [O₂] of the atm. in contact with roots of *Allium cepa* and the regional and total potential gradient in the root tissue.

A. G. P.

Respiration of barley plants. I. Determination of carbohydrates in leaves. II. Carbohydrate concentration and carbon dioxide production in starving leaves. E. W. YEMM (Proc. Roy. Soc., 1935, B, 117, 483—504, 504—525).—I. Aq. solutions containing glucose, fructose, sucrose, and maltose are analysed by use of the iodometric and Hagedorn-Jensen methods before and after hydrolysis with (a) H₂SO₄, (b) invertase. The presence of non-sugar substances in plant leaf extracts vitiates results and corrections must be made by means of control tests after removal of all sugars by yeast fermentation. Non-sugars affect the iodometric results > the Hagedorn-Jensen method. Starch is determined by means of taka-diaxase, a similar test for non-sugars being applied.

II. Production of CO₂ by barley leaves in the initial stages of starvation is > accounted for by the loss of carbohydrates. Subsequently non-carbohydrate material (probably protein) also undergoes oxidation. The rate of decomp. of furanose sugars in the leaf is > that of pyranose types.

A. G. P.

Esterification of phosphate in the respiratory breakdown of sugar in higher plants. M. S. RAO (Nature, 1935, 135, 909—910).—Evidence that in the breakdown of sugar by fermenting peas combination of the sugar with H₃PO₄ is a necessary step, is presented.

L. S. T.

Temperature-absorption characteristics during germination in seeds of differing structure and biochemical composition under varying concentrations of oxygen and water supply. B. N. SINGH and R. K. TANDON (Proc. Indian Acad. Sci., 1935, 1, B, 496—518).—Absorption of H₂O by seeds is influenced by temp., aëration, and H₂O supply simultaneously, but to extents which differ in intensity and direction according to seed type (starchy, proteinaceous, or oily).

A. G. P.

Carbon dioxide balance [in plants] at higher light intensities. E. S. MILLER and G. O. BURR (Plant Physiol., 1935, 10, 93—114).—Many potted plants in a closed system reduce the [CO₂] of their atm. to 0.01 vol.-% and maintain this in light intensities of about 2000 f.c. At high temp. (36°) the CO₂ balance of some plants rises above this val. At more moderate temp. the balance is independent of temp. CO₂ balance is controlled by the concn. of dissolved CO₂ and not by the total CO₂ (free and HCO₃[']). Plants growing in CO₂ are not in energy balance since the R.Q. may not be unity. Liberation of CO₂ by succulents and xerophytes is caused by high temp. rather than by light.

A. G. P.

Assimilation of carbon dioxide by leaves in different regions of the spectrum. E. K. GABRIELSEN (*Planta*, 1935, 23, 474—478).—The assimilatory activity of *Sinapis* leaves is highest in the red-orange region of the spectrum and decreases steadily towards the violet. The % utilisation of light energy is < that of *Chlorella*. A. G. P.

Effect of carbon dioxide on the p_H and certain nitrogen fractions of the sugar-beet plant. J. M. FIFE and V. L. FRAMPTON (*J. Biol. Chem.*, 1925, 109, 643—655).—When the plant is subjected to an increased concn. of CO_2 , p_H of the juice is reversibly increased. The reactions are not local, do not depend on the partial pressure of CO_2 , but are caused by an increase in NH_3 from fission of acid amides. H. G. R.

Relationship between nitrogen fertilisation and chlorophyll content in pineapple plants. R. K. TAM and O. C. MAGISTAD (*Plant Physiol.*, 1935, 10, 159—168).—In nearly all cases, increased applications of N fertiliser resulted in an increased concn. of total chlorophyll in the leaves. A. G. P.

Fluorescence spectra of chlorophyll-*a* and -*b* in ether solution. F. P. ZSCHELE, jun. (*Protoplasma*, 1935, 22, 513—517).—Apparatus and technique are described. A. G. P.

Effect of orange juice on the growth of *Laminaria* gametophytes. P. W. CARTER (*Nature*, 1935, 135, 958—959).—The addition of orange juice to sea- H_2O stimulates the formation of filamentous gametophytes and also the production of sexual organs of *L. saccharina*, Lamour. L. S. T.

Growth-stimulating and -inhibiting action of dyes on plants. J. SELLEI (*Arch. Pharm.*, 1935, 273, 285—288).—Although very dil. solutions of various dyes greatly increase the growth of various plants (control given H_2O only), more conc. solutions exert a strong growth-retarding influence. Such growth-stimulation is related to the photochemical action of dyes which can sensitise the plant to light, even when the soil is deficient in nutritive salts. J. W. B.

Germination hormone in *Gramineae*. N. CHOLODNY (*Planta*, 1935, 23, 289—312).—A growth-promoting substance (I) occurs in the starchy tissue of the endosperm of maize, oats, etc. during the early stages of germination. Formation of (I) probably begins immediately after the first absorption of H_2O by the endosperm, and proceeds more rapidly than in any other plant organ. It occurs in seeds which have lost, naturally or artificially, their germinative power, and is probably due to enzyme activity. Production of (I) is related to starch hydrolysis. (I) formed in the endosperm is rapidly absorbed by the developing embryo. Physiological responses of root-tips and coleoptiles to (I) are similar to those to auxin. A. G. P.

Activation of cambial growth by pure hormones. R. SNOW (*Nature*, 1935, 135, 876; cf. this vol., 418).—Strong cambial growth can be activated in young decapitated sunflower seedlings by solutions of pure auxin-*a* and of pure β -indolylacetic acid at concns. of 1 or 2 in 10^6 . L. S. T.

Lichen substances. LI. Occurrence of norstictic acid in *Parmelia acetabulum*, Ach. Y. ASAHINA and F. FUZIKAWA (*Ber.*, 1935, 68, [B], 946—947).—The acid present in *P. acetabulum* Ach. from Europe is identified as norstictic acid, which (not salizic acid) is found in *Stereocaulon salacinum*. H. W.

Constituents of roots of Ch'ai Hu (*Bupleurum falcatum*, L.). Y. CHI and C. MA (*J. Chinese Chem. Soc.*, 1935, 3, 78—85).—Steam-distillation of the EtOH-sol. portion of the roots gives a volatile essential oil, b.p. 130—157°/2 mm., whilst oleic, linoleic, palmitic, stearic, and lignoceric acids together with glucose, saponin, and an alcohol (*bupleurumol*), $C_{37}H_{64}O_2$, m.p. 163—164° (*acetate*, m.p. 174—175°), are found in the non-volatile fraction. F. N. W.

Constituents of European *Datura stramonium* cultivated in China. T. Q. CHOU (*Chinese J. Physiol.*, 1935, 9, 77—82).—From the stem and leaves hyoscyine, hyoscyamine, and atropine were isolated and also two neutral compounds, *datugen*, $C_{13}H_{20}O_2$, m.p. 295°, $[\alpha]_D +41.6^\circ$ in $CHCl_3$, and *datugenin*, $C_{16}H_{22}O_5$, m.p. 265°, $[\alpha]_D +75^\circ$ in $CHCl_3$. W. O. K.

Occurrence of anabasine in *Nicotiana glauca*, R. Grah. (Solanaceae). C. R. SMITH (*J. Amer. Chem. Soc.*, 1935, 57, 959—960).—The roots contain NH_3 , C_5H_5N , and 1% of anabasine. R. S. C.

Microchemical test for protein-grains in plant-cells. R. H. DASTUR and U. K. KANITKAR (*Current Sci.*, 1935, 3, 432).—Sections of plant-tissue are treated with 2 c.c. of 0.5% aq. Na β -naphthaquinone-sulphonate, 1 c.c. of 1% Na_2CO_3 , and 4 drops of 1% phenolphthalein for 30 hr. and then transferred to a mixture of AcOH (50%) and NaOAc (5%), washed for $\frac{1}{2}$ min., treated with 4% aq. $Na_2S_2O_3$ for 5 min., washed, dehydrated, and mounted in glycerol. This method detects proteins and NH_2 -acids. A reagent containing 0.2 g. of *o*-benzoquinone in 20 c.c. of 95% EtOH mixed with 1 c.c. of 1% aq. Na_2CO_3 specifically stains proteins. W. O. K.

Isolation and distribution of nitrogen in dilute alkali-soluble proteins of healthy Valencia and Washington navel oranges. W. B. SINCLAIR, E. T. BARTHOLOMEW, and R. D. NEDVIDEK (*J. Agric. Res.*, 1935, 50, 173—180).—Small differences are found in the total N and in the NH_3 fraction of the proteins of the two varieties. In both cases the NaOH-sol. proteins have relatively high proportions of basic and amide-N. A. G. P.

Determination of the nitrogenous fractions in vegetative tissue of the peach. O. W. DAVIDSON and J. W. SHIVE (*Plant Physiol.*, 1935, 10, 73—92).—Dormant or slowly growing peach stems yielded no HCN when treated by Robinson's method (A., 1929, 1345). Appreciable amounts were obtained from rapidly growing stems. Hydrolysis of cyanogenetic glucosides by enzymes reaches a max. at p_H 5.5—5.7. Decomp. by boiling with H_2SO_4 is never complete. In Sessions and Shive's method for determining NH_3 -N (A., 1929, 960), glucoside-N may be partly or wholly converted into NH_3 during aeration with NaOH. This conversion is prevented by addition of sol. Fe salts to the peach extract. Recovery of NH_3 by the

Sessions-Shive method at room temp. is $>$ that by vac. distillation at 60° in presence of borax. If emulsin in peach tissue is destroyed quickly, no loss of N occurs during drying of stem material. In roots the loss is small. A. G. P.

Determination of amino-nitrogen in plant extracts. N. W. STUART (Plant Physiol., 1935, 10, 135—148).—High vals. for $\text{NH}_2\text{-N}$ by the Van Slyke method are attributed to gas liberated by reaction of acid derivatives of phenols (e.g., tannins) or of substances sol. in 80% EtOH and in H_2O (pigments, lipins, etc.) with the HNO_2 . Distillation of the material with solid CaO under reduced pressure gives more satisfactory results. A. G. P.

Determination of ammonia- and amide-nitrogen in plant-tissue. G. W. PUCHER, H. B. VICKERY, and C. S. LEAVENWORTH (Ind. Eng. Chem. [Anal.], 1935, 7, 152—156).—The dried tissue (drying conditions described) with $\text{NaOH-Na}_2\text{B}_4\text{O}_7$ at 40° and p_{H} 6.5 in a vac. yields NH_3 which is a measure of the NH_2 salt-N, and is determined nephelometrically ($\pm 3\%$) with Nessler's reagent. Glutamine affects the determination to some extent, but not allantoin, adenine, or asparagine. A previously hydrolysed sample (cf. A., 1931, 537) treated as above affords a measure of the amide-N. J. L. D.

Bitter principles of the Colombo root.—See this vol., 864.

Phlobaphens. I. Acid phlobaphen of the Spanish (edible) chestnut. E. MÜLLER and J. ZELLNER (Biochem. Z., 1935, 277, 383—393).—From the tannin extract of the chestnut, conditions are given for the pptn. of a phlobaphen (I) of const. composition corresponding with a min. empirical formula $\text{C}_{27}\text{H}_{20}\text{O}_{16}$. (I) on treatment with Ac_2O gives a Ac_2 derivative, together with a compound, $\text{C}_{18}\text{H}_{10}\text{O}_{10}$, resembling diacetyllagic acid, and on oxidation with H_2O_2 in alkaline solution gives a product, $\text{C}_{14}\text{H}_6\text{O}_8 \cdot 2\text{H}_2\text{O}$, decomp. 400° [Ac derivative, m.p. $310\text{--}315^\circ$ (decomp.)]; *phenylhydrazone*, $\text{C}_{14}\text{H}_6\text{O}_{10} \cdot \text{C}_6\text{H}_5\text{N}_2$, which resembles but is not identical with ellagic acid. Reduction of (I) by Zn dust gives anthracene and C_{10}H_8 but no fluorene, whilst KOH fusion gives protocatechuic and succinic acids and pyrogallol. P. W. C.

Biochemistry of Salix. V. Relationship of salipurposide to naringoside and isohesperidoside. VI. Salix nigricans, Sm. VII. Salix repens, L. J. RABATÉ (Bull. Soc. Chim. biol., 1935, 17, 314—318, 319—327, 328—340).—V. Salipurpol is identical with naringetol. Naringoside is identical with isohesperidoside and differs from salipurposide only by the presence of a mol. of rhamnose.

VI. The leaves of *S. nigricans* contain *salicoside*, m.p. 202° , $[\alpha]_{\text{D}} -62.29^\circ$, and the bark *piceoside*, m.p. 195° , $[\alpha]_{\text{D}} -87.26^\circ$. The branches while very young contain only salicoside, after 1 year contain 1/3 salicoside and 2/3 piceoside, and later only contain piceoside. The leaves contain *salinigriflavonolioside*, m.p. 292° , $[\alpha]_{\text{D}} -9.5^\circ$ in $\text{C}_6\text{H}_5\text{N}$, of which the aglucone after alkaline fusion gives protocatechuic acid.

VII. The formula attributed to salireposide, a

glucoside from the bark of *S. repens*, by Wattiez (A., 1931, 1100) is criticised, salirepol, m.p. 106° , the prosthetic group of the debenzoylated glucoside, being shown to be hydroxysaligenol. P. W. C.

Biochemistry of the peach tree. Persica vulgaris, L. Persicoside. C. CHAUAUX and J. RABATÉ (J. Pharm. Chim., 1935, [viii], 21, 495—503, and Compt. rend., 1935, 200, 1689—1691).—*Persicoside* (I), $\text{C}_{22}\text{H}_{24}\text{O}_{11}$, m.p. $258\text{--}260^\circ$ (depending on the mode of determining it), $[\alpha]_{\text{D}} -112.8^\circ$ in EtOH, is obtained by extraction of the bark of peach trees with hot EtOH. No naringenin nor any of the glucoside reported by Karigone *et al.* (cf. J. Pharm. Soc. Japan, 1929, 49, 97, 937) was detected. (I) is hydrolysed by dil. H_2SO_4 and by emulsin to glucose and hesperitin (II), m.p. 228° , which on alkaline fusion gives phloroglucinol and hesperetic acid and is identical with the substance obtained by hydrolysis of hesperidoside. The flavanone structure of (II) is confirmed. H. G. M.

Sacharides of camomile flowers. II. Biochemical examination of the organs of the fresh plant. C. BÉGUIN (Pharm. Acta Helv., 1934, 9, 140—143; Chem. Zentr., 1935, i, 270; cf. A., 1933, 544).—Only the flowers contain the heteroside previously described. The assimilation products are found mainly in the leaf-bearing stems. H. J. E.

Spectrophotometry in the ultra-violet and its application to biological analysis. A. CHEVALLIER (Bull. Soc. Chim. biol., 1935, 17, 530—547).—A lecture.

Ammonium picrate for preliminary fixation in intra-vital staining. A. V. LEONTOVITSCH (J. Physiol. U.S.S.R., 1934, 17, 430—432).—Suitable NH_4 picrate is prepared by heating 230 g. of picric acid, 1750 c.c. of H_2O , and 130 c.c. of 25% aq. NH_3 under reflux for 1 hr., and air-drying the cryst. product separating on cooling. R. T.

Enzymic histochemistry. XIV. Micro-determination of chlorine in tissues. K. LINDERSTRÖM-LANG, A. H. PALMER, and H. HOLTER (Z. physiol. Chem., 1935, 231, 236—230, and Compt. rend. Trav. Lab. Carlsberg, 1935, 21, No. 1, 5 pp.; cf. A., 1934, 1260).—After ashing, the tissue-Cl is determined by electrometric titration. J. H. B.

Volumetric determination of chlorine in biological fluids rich in lipins. B. DREVON (Bull. Soc. Chim. biol., 1935, 17, 136—155).—By using the method of Sundermann and Williams (A., 1931, 974) loss of Cl' due to the presence of lipins is avoided. A. L.

Method for preparing biological materials for phosphorus determinations. H. W. GERRITZ (Ind. Eng. Chem. [Anal.], 1935, 7, 116—118).—Urine is digested with hot conc. $\text{H}_2\text{SO}_4\text{-HClO}_4$ in < 0.5 hr. to give a clear solution in which P is determined as accurately as with the $\text{H}_2\text{SO}_4\text{-HNO}_3$ ashing technique. J. L. D.

Micro- and submicro-determination of iron. J. LAVOLLAY (Bull. Soc. Chim. biol., 1935, 17, 432—438).—Fe in biological liquids may be determined by pptn. with 8-hydroxyquinoline at p_{H} 5.0. A. L.