BRITISH CHEMICAL ABSTRACTS

A.—PURE CHEMISTRY

SEPTEMBER, 1932.

General, Physical, and Inorganic Chemistry.

Existence of a Boltzmann distribution in the band levels of H₂ excited by electronic collision. L. S. ORNSTEIN and A. A. KRUITHOF (Z. Physik, 1932, 76, 780-781). A. B. D. C.

Peculiar phenomena of the electrodeless ring discharge through hydrogen in a long tube. B. ARAKATSU and K. KIMURA (Mem. Fac. Sci. Agric. Taihoku, 1932, 5, 15-23).-The nature of the glow, as pressure is reduced, is described and discussed. N. M. B.

Distribution of intensity in $N_2 \alpha$ - and NO β bands. F. CAVALLONI (Z. Physik, 1932, 76, 527-534).—N₂ α -bands were investigated between 6700 and 5300 Å., and NO β-bands between 4900 and 2700 Å. A. B. D. C.

New forbidden absorption band system of the oxygen molecule. G. HERZBERG (Naturwiss., 1932, 20, 577).—A new absorption band system of O_2 , consisting of eight bands converging rapidly, lies between 2400 and 2600 Å. The origin of the bands is discussed and it is suggested that they are of a type W. R. A. hitherto unknown.

Spectra of incompletely bound molecules (polarisation molecules) K_2 , Na_2 , Cs_2 , and broadening of absorption lines. H. KUHN (Z. Physik, 1932, **76**, 782-792).—Absorption bands due to polarisation mols. accompany the principal series due to alkali-metal vapours of high density.

A. B. D. C.

Extension of "Summensätze" for alkalis and an application to the Stark effect. J. G. KIRKwood (Physikal. Z., 1932, 33, 521-525).-Mathe-W. R. A. matical.

Mean lives of the lowest metastable states in neutral oxygen, and intensities of lines arising therefrom. A. F. STEVENSON (Nature, 1932, 130, 131). L. S. T.

Mg IV and Al V spectra in the extreme ultraviolet. J. Söderqvist (Z. Physik, 1932, 76, 756– 759). A. B. D. C.

Fused silica etalons in the study of hyperfine structure. B. VENKATESACHAR and L. SIBAIYA (J. Sci. Instr., 1932, 9, 216–218).—Faint satellites of Hg I 5461 at -0.154 Å., and of Hg I 5770 at -0.173, -0.213, and -0.257 Å., are recorded. C. W. G.

Intensity measurements in the argon spectrum. T. BARENDS (Physica, 1931, 11, 275-281; Chem. Zentr., 1932, i, 635). L. S. T.

Fluorescence of a jet of zinc atoms. P. SOLEIL-LELET (Compt. rend., 1932, 195, 372-373; cf. this vol., 439). C. A. S.

Polarisation of fluorescence bands of cadmium vapour. L. Sosnowski (Compt. rend., 1932, 195, $22\bar{4}$ -226). C. A. S.

Intensities in fluorescent spectrum of iodine. L. L. AGARBICEANU (Compt. rend., 1932, 195, 123-125; cf. this vol., 668).—In the series excited by λ 5461 the terms +2 and -4 have been observed. The wave-lengths of -4, -2, and +2 are respectively 5223, 5339, and 5585 Å. (cf. A., 1922, ii, 178).

C. A. S.

Lines of tungsten and rhenium appearing in the spectrum of the electric furnace. A. S. KING (Astrophys. J., 1932, 75, 379-385).-75 lines for W and 19 for Re in the range 2800-6700 Å. are recorded. The Re lines show hyperfine structure. L. S. T.

Effects of temperature and nitrogen pressure on the afterglow of mercury resonance radiation. E. W. SAMSON (Physical Rev., 1932, [ii], 40, 940– 963).—The decay rate of the λ 2537 afterglow from an optically excited quartz cell containing low-pressure Hg vapour, for a N₂ pressure range of 0.5—100 mm. at three temps., gave a very rapid increase of the decay coeff. with rise of temp. at high pressures.

N. M. B.

Hyperfine structure and the polarisation of mercury resonance radiation. A. C. G. MITCHELL (Physical Rev., 1932, [ii], 40, 964-973; cf. Larrick, this vol., 315).-Mathematical. N. M. B.

Absorption of the resonance line λ 2537 in mercury vapour. H. MAGLIANO (Z. Physik, 1932, 76, 793-798).-Inconsistencies in recorded vals. of the absorption coeff. of this line are due to different methods of evaluation; 5.78 cm.⁻¹ is a lower limit for the coeff. at 20°. A. B. D. C.

Fluorescent excitation of Hg by the resonance frequency and by lower frequencies. IV. (LORD) RAYLEIGH (Proc. Roy. Soc., 1932, A, 137, 101-116). -In a moving current of vapour the resonance luminosity behaves differently from the other com-ponents of the fluorescence. The visual luminosity contains $2^{3}P_{0}$ and $2^{3}P_{2}$ metastable atoms, whilst the resonance luminosity contains only $2^{3}P_{1}$ atoms. The complete line spectrum of Hg is present when excitation is by the resonance line only, and the spectrum thus excited is dominated, like the band spectrum, by the motion of the vapour stream. L. L. B.

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Hyperfine structure of certain Hg I lines in the electrodeless discharge. T. S. SUBBARAYA and T. G. S. IYENGAR (Proc. Roy. Soc., 1932, A, 137, 216-229).—The structure of the 4916 Å. line of Hg I is found to agree with that previously given by Venkatesachar and Sibaiya (this vol., 104). On the basis of this structure the splitting of the $6^{1}P_{1}$ level has been determined and the structures of a no. of lines have been obtained. The regularities found by Schüler and Keyston (*ibid.*, 2) regarding the equality of the total separations for the isotopes 199 and 201 and the relatively inverted positions of their fine levels are confirmed. L. L. B.

New light source for excitation of resonance radiation in metal vapours, particularly in mercury. F. G. HOUTERMANS (Z. Physik, 1932, 76, 474–480). A. B. D. C.

Hyperfine structure of lead spectrum. II. K. MURAKAWA (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1932, 18, 245—248; cf. this vol., 104).—An extension of previous measurements proves the existence of Pb²¹⁰. J. W. S.

Exciting atomic jets by high-frequency electromagnetic discharge. A. BOGROS and F. ESCLAN-GON (Compt. rend., 1932, 195, 368—370).—The method, which is specially suitable for investigating hyperfine structure, is a combination of the at. jet (cf. A., 1926, 874; this vol., 454) and the electrodeless discharge (cf. this vol., 245). C. A. S.

Calibration of a normal lamp with a line spectrum. L. S. ORNSTEIN and H. C. BURGER (Z. Physik, 1932, 76, 777-779). A. B. D. C.

Spectral energy distribution of the highcurrent vacuum tube. J. A. ANDERSON (Astrophys. J., 1932, 75, 394-406).—With a c.d. >10,000 amp, per sq. cm. a continuous spectrum appears independent of the nature of the electrode or residual gas. L. S. T.

Atomic lines in the sun-spot spectrum. C. E. MOORE (Astrophys. J., 1932, 75, 222–273, 298–336). —Lines of Lu⁺ have been identified. The composition of the atm. above sun-spots has been quantitatively investigated. L. S. T.

Relative intensities of multiplet transitions in complex spectra. C. W. UFFORD (Physical Rev., 1932, [ii], 40, 974—979).—Mathematical. N. M. B.

General formula for absorption transitions. V. POSEJPAL (Compt. rend., 1932, 195, 36–39; cf. A., 1931, 665).—Assuming that a photon penetrates into an atom only as far as the level corresponding with its quantum, $h\nu$, and that only a photon of which the trajectory reaches the energy level which it cannot pass can on collision transfer all its energy to the peripheral electrons, a new formula for the absorption transition is deduced. C. A. S.

Filter difference method of exciting intense monochromatic X-rays. H. KÜSTNER (Z. Physik, 1932, 77, 52—59).—An improvement of an earlier method (A., 1931, 993) gives the $\alpha\alpha'$ -doublet of great purity. A. B. D. C.

Intensity measurements in the continuous X-ray spectrum. J. Böggild (Z. Physik, 1932, 77,

100—103).—An ionisation chamber which measures intensities between 1.4 and 0.6 Å, is described. A. B. D. C.

Spectrography of X-rays by transmission of a non-canalised beam across a curved crystal. (MLLE.) Y. CAUCHOIS (J. Phys. Radium, 1932, [vii], 3, 320—336).—A detailed account of work already noted (this vol., 246).

Forces of linkings in the lattice and X-ray spectrum. R. GLOCKER (Naturwiss., 1932, 20, 536-539).

Theory of X-ray absorption in molecular gases. H. J. GROENWOLD (Z. Physik, 1932, 76, 766—767).— Identity of the nuclei of diat. mols. gives rise to no peculiarity in the fine structure of X-ray absorption edges. A. B. D. C.

Theory of X-ray absorption in molecular gases. H. PETERSEN (Z. Physik, 1932, 76, 768—776; cf. Kronig, this vol., 553).—The position of fine structure in absorption edges gives an estimate of inter-at. distances. A. B. D. C.

Scattering of X-rays by chlorine. H. RICHTER (Physikal. Z., 1932, 33, 587–588).—The scattering of X-rays by Cl_2 using $Cu-K\alpha$ and $Mo-K\alpha$ radiation has been determined; the results agree more closely with vals. calc. according to Hartree's than according to Thomas and Fermi's method. W. R. A.

Scattering of X-rays by gases and crystals. Y. H. Woo (Physical Rev., 1932, [ii], 41, 21-23; cf. this vol., 441).—The Raman-Compton-Jauncey formula deduced classically for scattering by an atom is in agreement with the wave-mechanical result.

N. M. B.

Non-diagram lines of $K\alpha$ radiation of aluminium. E. CARLSSON (Z. Physik, 1932, 76, 471-473). —Two weak lines α_7 and α_8 have been observed in the spectrum of Al, and α_9 has been observed from Al₂O₃. Displacement of the lines α_1 to α_6 by chemical combination was also observed. A. B. D. C.

Partial absorption of X-rays. H. HULUBEI (Compt. rend., 1932, 195, 231-233). C. A. S.

Partial absorption in the soft X-ray region. F. C. CHALKLIN and L. R. CHALKLIN (Compt. rend., 1932, 195, 374—376).—The line $K\alpha$ of C present in soft X-ray spectra obtained with the vac. spectrograph (due to grease etc.) is always accompanied by a very diffuse line of wave-length 51 Å., corresponding with 242 electron volts or $35 < K\alpha$ of C. This is attributed to expulsion of an electron from the L level by a quantum of radiation $K\alpha$, which thus loses part of its energy. C. A. S.

X-Ray absorption coefficients in the range 0.3—2.0 Å. L. H. MARTIN and K. C. LANG (Proc. Roy. Soc., 1932, A, 137, 199—216).—An ionisation balance method and a photographic method for the measurement of X-ray absorption coeffs. are described. Absorption coeffs. have been measured for Fe, Ni, Cu, and Zn over the range 0.3—2.0 Å., and for Mo, Pd, Ag, and Sn over shorter ranges. For Fe, Ni, Cu, Zn, Pd, and Ag the K jump equals E_K/E_{L_1} . L. L. B.

Disappearance of hydrogen in the presence of potassium or lithium ion sources. C. H. KUNS-

MAN and R. A. NELSON (Physical Rev., 1932, [ii], 40, 936-939).—The rate of clean-up of H was observed on K and spodumene glass surfaces, sources of K and Li ions, respectively. The effect can be explained by a reaction on or within the hot glass, probably the formation of $H_{2}O$ vapour. N. M. B.

Lower sensitivity limit of technical potassium cells and their adaptation to the photo-electric measurement of α -preparations. G. A. TEVES (Ann. Physik, 1932, [v], 14, 57-79).-The determination of weak photo-electric currents can be carried out by increasing the sensitivity of the electrometer and decreasing the dark effect. Intensities of 10^{-10} erg per cm.² sec. in the spectral range 440-540 mµ may be determined. The linear dependence of photoelectric current on incident radiation is not rigid for these weak currents. The use of photo-electric cells for measurement of a-preps. is independent of the observer, and is more accurate than the scintillation method. Registration of a single α -particle is not possible with the apparatus described. A. J. M.

Ionisation and excitation by ion collision. W. WEIZEL and O. BEECK (Z. Physik, 1932, 76, 250– 257).—Ionisation of inert gases by positive alkali ions sets in suddenly at high potentials (100–500 volts). The mechanism suggested is an Auger effect, *i.e.*, a radiationless transition of energy from the excited ion to the inert gas atom. Ions are necessary only to give the required high relative velocities.

A. B. D. C.

Excitation of inert gases by collision with inert gas ions. W. WEIZEL (Z. Physik, 1932, 76, 258— 259).—The results of Günther-Schulze and Keller (A., 1931, 1348) are explained on the hypothesis of the preceding abstract. A. B. D. C.

Excitation function of helium. J. H. LEES (Proc. Roy. Soc., 1932, A, 137, 173—186).—An accurate method for measuring the excitation functions of He is described. Measurements of the variation of light intensity with electron current and with He pressure have been made. L. L. B.

Excitation processes in helium. J. H. LEES and H. W. B. SKINNER (Proc. Roy. Soc., 1932, A, 137, 186—198).—Theoretical. The phenomenon of spreading outside the electron beam is examined in detail, and a rough qual. picture is given of the excitation process in He. L. B.

Structure of thin crystal layers. F. KIRCHNER (Z. Physik, 1932, 76, 576—596).—Electron diffraction was used to study the form of thin cryst. layers of CdI₂, Bi, Au, Ag, Tl, Pb, Se, Sb, Te, As, CdCl₂, Hg₂Cl₂, ZnCl₂, PbCl₂, HgBr₂, HgI₂, Hg₂I₂, Sb₂O₃, NH₄Cl, MgO, Zn, Cd, and MoO₃. The layers were obtained by evaporation and condensation, and variation of the structure with rate of evaporation and layer thickness was studied. A. B. D. C.

Rectilinear propagation and diffraction of electrons. H. DE LASZLO and V. E. COSSLETT (Nature, 1932, 130, 59-60).—Experiments which show that electron beams obey the simple laws of geometrical optics are described. L. S. T. Diffraction of electrons by single crystals: paraffin and saturated fatty acids. J. J. TRILLAT and T. VON HIRSCH (Compt. rend., 1932, 195, 215— 217).—The diffraction effects obtained on passing electrons through films of paraffin and stearic acid confirm current views on structure, the unit cell of paraffin being a rhombic prism with a 7.30, b 4.84 Å.; that of stearic acid a monoclinic prism with (for the α modification) a 9.15, b 4.85 Å., for β a 5.46, b 7.30. Once a cell with a 7.30, b 5.02 Å. was observed, which may be the γ form (cf. A., 1926, 1083). C. A. S.

Elastic and inelastic electron scattering in hydrogen. A. L. HUGHES and J. H. MCMILLEN (Physical Rev., 1932, [ii], 41, 39–48; cf. this vol., 442).—Energy and angular distribution of electrons scattered by H_2 mols. was investigated. N. M. B.

Scatering of electrons by mercury. W. HENNEBERG (Naturwiss., 1932, 20, 561-562). W. R. A.

Electron diffraction and the inner potential of metals. A. BÜHL (Naturwiss., 1932, 20, 577-578).—Theoretical (cf. this vol., 554). W. R. A.

Electron diffraction and photo-electric effect for alkali metal surfaces. I. Experimental. W. KLUGE and E. RUPP (Z. Physik, 1932, 77, 82—99).— The spectral photo-electric effect is used to determine the purity of the metal; the surface can be cooled to liquid air temp. A. B. D. C.

Secondary electron emission from a nickel surface produced by positive ions of mercury. R. M. CHAUDHRI (Proc. Camb. Phil. Soc., 1932, 28, 349—355).—When a beam of positive Hg ions produced from an arc in Hg vapour is fired at a Ni surface, electrons are emitted. For a fresh untreated Ni target the emission is about 1.5% for ion energies 600 volts, and rises to 15-20% at 2000 volts. Degassing of the target at a red heat or continued bombardment with Hg ions leads to a decrease in the emission. J. W. S.

Motion of electrons in the field of excited helium. J. McDougall (Proc. Camb. Phil. Soc., 1932, 28, 341-348). J. W. S.

High-velocity positive ions. II. Disintegration of elements by high-velocity protons. J. D. COCKCROFT and E. T. S. WALTON (Proc. Roy. Soc., 1932, A, 137, 229—242).—Experiments are described showing that protons having energies above 150,000 volts are capable of disintegrating the elements Li, Be, B, C, O, F, Na, Al, K, Ca, Fe, Co, Ni, Cr, Ag, Pb, and U. The disintegration of Li has been studied in detail, and it is estimated that for a thick layer of Li, the no. of disintegrations for a voltage of 250 kv. is I per 10⁹ protons, and for 500 kv. is 10 per 10⁹ protons. Li, B, and F give the largest emission of particles, the emission varying similarly with rise of voltage. These elements are all of the 4n+3 type, and it is supposed that the addition of a captured proton leads to the formation of a new α -particle inside the nucleus.

L. L. B.

Optical study of the reflexion of hydrogen canal rays by solid bodies. E. HOROVITZ (Physikal. Z., 1932, 33, 579—582). W. R. A. Recombination of ions in air at low pressures. E. LENZ (Z. Physik, 1932, 76, 660–678).—The coeff. of recombination of ions in air, determined between the pressures 20 and 760 mm.; is proportional to the pressure, and has the val. 1.7×10^{-6} cm.³/sec.⁻¹ at 760 mm. A. B. D. C.

Law of interaction of ions. C. PUTILOV (Z. Physik, 1932, 76, 814—825).—The effective repulsion of ions in the Mie-Born formula (Ann. Physik, 1903, 11, 657) depends both on the "architecture" of the electronic shell and on the no. of electrons in the shell. The law for the second factor is that the effective repulsion is proportional to the product of the electrons around the cation and those around the anion.

A. B. D. C.

[Measurement of ionic mobility.] M. LAPORTE (Physikal. Z., 1932, 33, 547—548).—A reply to Stetter (this vol., 442). W. R. A.

Gaede's streaming experiment. P. CLAUSING (Ann. Physik, 1932, [v], 14, 134—138).—The results of Gaede's experiment (*ibid.*, 1913, [iv], 41, 289) on the streaming of H₂ through a slit can be made to agree with both the theory of frictional streaming and that of mol. streaming if a different slit width is assumed.

A. J. M.

Molecular flow. P. CLAUSING (Ann. Physik, 1932, [v], 14, 129-133).—Mathematical. A. J. M.

Ramsauer effect for symmetrical diatomic molecules. H. C. STIER (Z. Physik, 1932, 76, 439–470).—Theoretical. The cross-section of the mol. is related to the proper functions, with their m and l vals., for individual electrons. A. B. D. C.

Inclusion of the rare earths in the periodic table. F. M. SCHEMJAKIN (J. Gen. Chem. Russ., 1932, 2, 62—64).—The rare-earth elements are arranged in two periods, on the assumption that the no. of sub-groups increases to 4 in groups III to VII, and to 8 in group VIII. R. T.

Pauli's principle and the structure of the atomic nucleus. III. E. N. GAPON (J. Gen. Chem. Russ., 1932, 2, 97–102).—A classification of the elements is given, based on their at. structure, from which it follows that the isotope Ge^{78} should exist, as well as $Te^{126, 128, \text{ and } 130}$. and the isobars Ge^{78} -Se⁷⁸-Kr⁷⁸, Zr⁹⁶-Mo⁹⁶-Ru⁹⁶, and Sn¹²⁴-Te¹²⁴- Xe¹²⁴. R. T.

Structure of atomic nuclei. I. W. HEISEN-BERG (Z. Physik, 1932, 77, 1–11).—Exchange and Coulomb energies are calc. for nuclear systems consisting only of protons and neutrons. The results agree with experiment; in particular, the He nucleus represents a closed shell, and an equal no. of protons and neutrons gives a min. exchange energy. β -Ray disintegration can also be explained. A. B. D. C.

Nature of the potential barrier of the nitrogen nucleus. E. C. POLLARD (Proc. Leeds Phil. Soc., 1932, 2, 324—330).—From measurements of the relationship between the range of α -particles and the no. of protons ejected from N₂, it is concluded that the manner of entry of an α -particle into a N nucleus is over the top of the potential barrier, and not by resonance at a "virtual" level of energy. The calc. height of the barrier is not inconsistent with Gamow's hypothesis that the vol. of a nucleus is proportional to the no. of α -particles it contains. J. W. S.

Nuclear structure. J. H. BARTLETT, jun. (Nature, 1932, 130, 165).—Regularities for elements of low mass are pointed out and a possible principle for building up these elements is suggested. For the lighter elements protons and neutrons, and not α -particles, are regarded as the elementary constituents. L. S. T.

Physico-chemical study of the rare-earth sulphates. II. Theoretical conclusions. B. BRAUNER and E. ŠVAGR (Coll. Czech. Chem. Comm., 1932, 4, 239—246).—A discussion of published data (this vol., 470) and further work. The rare earths may be put in the periodic table without the usual discontinuity, Sm and Tu being in group I, Eu and Yb in group II, La, Gd, and Lu in group III, etc.; the difference between successive elements is much less than in other parts of the table. D. R. D.

Constitution and spin of atomic nuclei. F. PERRIN (Compt. rend., 1932, 195, 236-237; cf. this vol., 442, 556, 790).—A discussion. C. A. S.

Relative abundance of hydrogen isotopes in natural hydrogen. C. A. BRADLEY, jun., and H. C. UREY (Physical Rev., 1932, [ii], 40, 889—890; cf. this vol., 554).—Spectroscopic investigation showed no appreciable variation of abundance of H² in samples from various sources. N. M. B.

Concentration of the H² isotope of hydrogen by the fractional electrolysis of water. E. W. WASHBURN and H. C. UREY (Proc. Nat. Acad. Sci., 1932, 18, 496—498).—Spectroscopic examination of H₂ and O₂ from residual H₂O from commercial cells operating for 2 and 3 years showed a marked increase in abundance of H² relative to H¹. N. M. B.

Search for isotopes of hydrogen and helium. W. BLEAKNEY (Physical Rev., 1932, [ii], 41, 32–38; cf. this vol., 788; Urey, *ibid.*, 554).—Mass-spectrographic investigation indicates an abundance ratio $H^2/H^1=1/30,000\pm20\%$ in ordinary electrolytic H₂. He³ and He⁵ were not found, indicating an abundance ratio<1/50,000. N. M. B.

Mass spectra of helium and oxygen. F. W. ASTON (Nature, 1932, 130, 21-22).—The line of He⁺⁺ has been observed. He-O₂ mixtures give stronger O lines than does pure O₂; line 32 is 268 times as intense as line 34, which is 4.2 times as intense as line 33. These are only approx. minima, since the presence of S (from grease) enhances lines 34 and 33. L. S. T.

At. wts. in 1931. E. MOLES (Anal. Fis. Quím., 1932, 30, 460-476).—A criticism of the international table of at. wts. for 1931. The work of Batuecas indicates 14.008 as the most probable at. wt. of N, whilst that of Maass and Cooper on the densities of CO_2 and SO_2 has been recale. to allow for the effects of adsorption. The determinations of the at. wt. of F carried out by Moles and Batuecas indicate that the true val. is >19.00. Data for Kr and Xe not considered in the official report are noted. The val. given for I, viz., 126.932, appears too high in view of the work of Honigschmid and Striebel and of Aston;

it should be 126.92, approx. Birge's work supports the val. of 1100:1 for the ratio $O^{16}:O^{18}$.

H. F. G.

Methyl fluoride [and at. wt. of fluorine.] T. BATUECAS (J. Chim. phys., 1932, 29, 269–279).—A reply to criticism (cf. A., 1931, 1207). E. S. H.

Constitution of tantalum and niobium. F. W. ASTON (Nature, 1932, 130, 130).—Mass-spectrum analysis of the fluorides show that Ta and Nb are essentially simple. Ta gives a strong line at 181 with a diminishing series 200, 219, . . . due to TaF, TaF₂, . . . No other isotope could be detected. The estimated packing fraction, approx. -4, gives an at. wt. $180\cdot89\pm0\cdot07$. Nb gives a single line at 93 and fluorides at 102, 121, . . . A large negative val., approx. -8, for the packing fraction appears to be probable, giving an at. wt. $92\cdot90\pm0\cdot05$. The present vals. for the at. wts., $181\cdot4$ and $93\cdot3$, are too high. L. S. T.

Radioactivity. O. ERBACHER and K. PHILIPP (Naturwiss., 1932, 20, 586-589).—A summary. W. R. A.

Half-life period of protoactinium. A. VON GROSSE (Naturwiss., 1932, 20, 505).—The half-val. period of Pa was estimated as 32,000 years $\pm 10\%$ from determinations on pure Pa₂O₅ worked up from residues of Ra ores. W. R. A.

[Half-life period of protoactinium.] O. HAHN (Naturwiss., 1932, 20, 505—506).—Criticism (cf. preceding abstract). W. R. A.

Concentration of slow neutrons in the atmosphere. P. B. MOON (Nature, 1932, 130, 57-58). L. S. T.

New evidence for the neutron. (MME.) I. CURIE and F. JOLIOT (Nature, 1932, 130, 57; cf. this vol., 555).—Rays emitted by Li under bombardment by α -particles from Po have a penetrating power in Pb less than that of the γ -rays of Po and are more readily absorbed by paraffin than by Pb, showing that they cannot be electronic or electromagnetic in nature. These rays are different from known radiations and are probably neutrons. The protons ejected from Be form 2 groups. This suggests that there are also 2 groups of neutrons, not necessarily homogeneous; one group has a range of 28 cm. in air and an energy of 4.5×10^6 electron volts, whilst the other has a range of 70 cm. with energy 7.8×10^6 electron volts. The neutrons and photons from Be may be emitted simultaneously: $Be^9 + \alpha = C^{12} + n + h_{\nu}$. L. S. T.

Neutrons from boron excited by radon. M. DE BROGLIE and L. LEPRINCE-RINGUET (Compt. rend., 1932, 195, 88—89).—Neutrons emitted by B under the influence of Rn traverse Pb much more readily than paraffin, being scarcely at all absorbed by 5 cm. of Pb, whereas they are about half absorbed by 5 cm. of Cu or Al. This transparency of Pb is perhaps due to its re-emission of neutrons. C. A. S.

Emission of slow neutrons by the action of α -particles on beryllium. P. AUGER (Compt. rend., 1932, 195, 234—236; cf. this vol., 443, 672).—The paths of protons ejected on passing the neutrons produced from Be by α -particles from Po into a Wilson expansion chamber containing moist H₂ have

been analysed without and with a diffuser. The results indicate great diffusion of neutrons by collision with the atoms of Cu without substantial loss of energy, resulting in a concn. in the cavity forming the chamber. More than half the protons have energies <300 kv.-electrons, and many <100. These results indicate that many of the neutrons are slow.

C. A. S. Influence of atomic groupings of radioelements on the liberation of emanation. (MLLE.) C. CHAMIÉ (J. Chim. phys., 1932, 29, 242—247).—To explain the influence of volatile substances on the rate of evolution of emanation it is suggested that occluded atoms retain some of the latter.

C. W. G.

Magnetic spectrum of α -particles from radium. S. ROSENBLUM (Compt. rend., 1932, **195**, 317–319).– Using as source RaCO₃ the following velocities (×10⁹ cm. per sec.), based on 1.698 for α -Ra-A (cf. this vol., 671), have been determined : α -Ra 1.517, α_1 -Ra 1.48₈, α -Rn 1.623. The energy difference $\alpha - \alpha_1$ -Ra (185 electron kv.) agrees well with previous results (cf. A., 1925, ii, 9). C. A. S.

Absorption measurements and the continuous spectrum of β -rays. J. A. CHALMERS (Proc. Camb. Phil. Soc., 1932, 28, 319—327).—The observed "kinks" in the absorption-thickness of absorber curve for heterogeneous β -radiation from any radioactive source (cf. A., 1929, 1124; 1930, 1085) are discussed theoretically. J. W. S.

Energy problems in the continuous spectra of β -rays. J. A. CHALMERS (Proc. Camb. Phil. Soc., 1932, 28, 328—337).—Possible reasons why the β -rays from any sp. radioactive disintegration are emitted with a wide range of energies, whereas either the corresponding α -rays have equal velocities or their velocities are grouped, are discussed. J. W. S.

Photo-electric effect of L_{II} and L_{III} electrons for γ -rays. T. MUTO (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1932, **18**, 249–298).—Mathematical.

J. W. S.

 γ -Radiation excited in boron and beryllium. H. BECKER and W. BOTHE (Z. Physik, 1932, 76, 421-438).— γ -Radiation emitted by Be and B under α -ray bombardment is almost uniformly distributed, and has an energy of 5×10^6 volts. The probability of excitation plotted against α -ray energy has a min., which lies at 3×10^6 volts for B. A. B. D. C.

Ionisation of air by γ -rays as a function of pressure and collecting field. I. S. BOWEN (Physical Rev., 1932, [ii], 41, 24—31). N. M. B.

Secondary effects of penetrating corpuscular radiation. B. Rossi (Atti R. Accad. Lincei, 1932, [vi], 15, 734-741).—The penetrating power of the secondary radiation and the behaviour of Pb and Fe screens have been studied. H. F. G.

Anomalous absorption of penetrating radiation. B. Rossi and B. CRINÒ (Atti R. Accad. Lincei, 1932, [vi], 15, 741-746). H. F. G.

Atom factors. W. EHRENBERG and K. SCHÄFER (Physikal. Z., 1932, 33, 575-576).—An addendum (cf. this vol., 316). W. R. A. Recombination of hydrogen atoms. G. E. KLIBALL (J. Amer. Chem. Soc., 1932, 54, 2396–2398).—A possible mechanism for the recombination of H atoms (cf. this vol., 449) is the collision of an H atom with a H_2 mol. to form a quasi-mol. which then collides with another H atom to form two H_2 mols. M. McM. (c)

Gravitation considered as neutral magnetism due to motion of all matter in time. A. P. MATHEWS (J. Physical Chem., 1932, 36, 1738—1743).

Equivalent chemical linkings formed by s, p, and *d* eigenfunctions. R. HULTGREN (Physical Rev., 1932, [ii], 40, 891-907).—Mathematical.

N. M. B.

Space quantisation of atoms on impact. H. KUHN and O. OLDENBERG (Physical Rev., 1932, [ii], 41, 72-78).—Certain diffuse band max. in the spectra of Hg vapour with A or Kr are interpreted.

N. M. B.

Interconversion factors for numbers in energetic and related units. C. H. D. CLARK (Phil. Mag., 1932, [vii], 14, 291–297).—Factors connecting the different units for charge, e.m.f., and those involving e, m, h, N, J, and $v\lambda$ are tabulated and discussed. N. M. B.

New form of a polarisation prism transparent in the ultra-violet. C. LEISS (Z. Physik, 1932, 76, 851-852).—A polarisation prism transparent to 0.185μ is described. A. B. D. C.

Absorption spectra of solid bodies. R. PEIERLS (Ann. Physik, 1932, [v], 13, 905—952; cf. this vol., 673).—A more complete theoretical discussion of the theory put forward previously. J. W. S.

Absorptive power of black and white substances used for radiation measurements. III. Ε. HASCHÉ (Ann. Physik, 1932, [v], 14, 342-352; cf. A., 1931, 405).—The absorptive power of Ångström's pyrgeometer was investigated in the range 0.6—50 μ. A. J. M.

Band spectra of zirconium oxide. L. W. JOHNSON (Phil. Mag., 1932, [vii], 14, 286–291; cf. Lowater, this vol., 211).—Wave-lengths, frequencies, and vibrational analysis for the region $\lambda\lambda 4000$ —7000 are tabulated. N. M. B.

Predissociation spectra of triatomic molecules. J. FRANCK, H. SPONER, and E. TELLER (Z. physikal. Chem., 1932, B, 18, 88—101).—The principles followed in interpreting the predissociation spectra of diat. mols. require amplification when applied to the spectra of polyat. mols., to take into account the more complex nuclear vibrations and the fact that polyat. products of decomp. contain vibrational and rotational energy, whereas for monat. products of decomp. only electron excitation energy need be considered. The predissociation spectra of SO₂ and NO₂ are examined. Energy data show the dissociation of SO₂ into SO and O to be impossible at 2800 Å., so that the supposed predissociation in this region is merely a pressure effect (cf. A., 1930, 1383). The energy val. for the predissociation limit at 1950 Å. exceeds the energy required thermally for dissociation into SO and O by about 13 kg.-cal., which must be divided between translational and vibrational energy. R. C.

Absorption of ozone between λ 3050 and 3400 Å. N. T. ZE and C. S. PIAW (Compt. rend., 1932, 195, 309—311).—The coeffs. of absorption for 236 wave-lengths within the above limits are tabulated. C. A. S.

Absorption of water in visible region. B. LANGE and C. SCHUSTERIUS (Z. physikal. Chem., 1932, 160, 468).—Corrections (cf. this vol., 557). R. C.

Absorption and fluorescence spectra in mercury halide vapours. I. HgI_2 . K. WIELAND (Z. Physik, 1932, 76, 801—813).—Investigation of these spectra to 1500 Å. showed that HgI_2 dissociates into an excited HgI mol. and unexcited I, whence HgI_2 is an atom-mol. A. B. D. C.

Splitting of absorption spectra by lowering of temperature. W. KASPEROWICZ (Z. Physik, 1932, 76, 481–482).—The ultra-violet absorption spectra of C_6H_6 , $C_{10}H_8$, anthracene, and phenanthrene were investigated at temp. between 0° and -190° . Bands beyond 270 mµ were displaced towards longer wavelengths, whilst those below this wave-length remained undisplaced as the temp. was lowered. A. B. D. C.

Ultra-violet spectrum of indene. L. SCHWARTZ (Arch. Phys. biol. Chim.-Phys. Corps Organisés, 1931, 9, 131—133; Chem. Zentr., 1931, ii, 643).—Indene in C_0H_{14} shows absorption bands at 2800, 2700, 2625, 2560, 2500, 2420 (2340?), and 2200 Å.; Beer's law holds. L. S. T.

Fluorescence of formaldehyde. Conditions for excitation and vibrational analysis. G. HERZBERG and K. FRANZ (Z. Physik, 1932, 76, 720—728).— Fluorescence, excited in the vapour of CH_2O by means of a C arc, gave two ground state vibrational frequencies 1713 and 1023 cm.⁻¹, the former due to the C–O vibration and the latter to the transverse vibration of the H atoms. A. B. D. C.

Ultra-violet absorption of methyl halides. A. HENRICI (Z. Physik, 1932, 77, 35—51).—The line and continuous absorption spectra in the far ultra-violet were investigated for the Me halides, excepting CI_4 and the fluorides. A. B. D. C.

Influence of substituent groups on the visible and ultra-violet absorption spectra of aminoacids and related substances. G. A. ANSLOW and M. L. FOSTER (J. Biol. Chem., 1932, 97, 37-46; cf. A., 1931, 718).—Absorption spectra are recorded from 6000 to 1850 Å. for cystine (I), cysteine (II), alanine, aspartic (III), glutamic (IV), succinic (V), and butyric acids in HCl solution. With (I) there is a band at 2510 Å. (cf. A., 1931, 1211) which is believed to be due to dissociation into (II) and its chloride. Similar bands for (III), (IV), and (V) are ascribed to weakening of the α - β C linking. A. A. L.

Infra-red bands in the aurora. J. KAPLAN (Nature, 1932, 130, 60-61). L. S. T.

Spectrographic observations of infra-red lines in the auroral spectrum. H. HAMADA (Nature, 1932, 130, 26). L. S. T. Infra-red characteristic frequencies of the alkali halide crystals. M. BORN (Z. Physik, 1932, 76, 559—560).—Barnes' results (this vol., 675) are in agreement with the characteristic frequencies calc. for the alkali halide crystals by Born and Brody (Z. Physik, 1932, 11, 327). A. B. D. C.

Effect of dilution and temperature on infra-red absorption bands: molecular associations. R. FREYMANN (Compt. rend., 1932, 195, 39-41).--Experiment does not confirm that electrolytic dissociation is the explanation of the variations with concn. and temp. (cf. this vol., 6) in intensity of the OH bands in BuOH etc. solutions. This is caused by dissociation of associated mols. (cf. this vol., 445). C. A. S.

Vibration spectra [of formaldehyde and acetone]. R. TITEICA (Compt. rend., 1932, 195, 307-309).—The absorptions of CH_2O to $6\cdot 2\mu$ and of $COMe_2$ to $7\cdot 20\mu$ have been measured and the fundamental frequencies numbering 6 and 10, respectively, determined, in good agreement with the Raman lines and previous results (cf. A., 1925, ii, 627, 1025; this vol., 558). C. A. S.

Raman effect with gaseous ammonia. E. AMALDI and G. PLACZEK (Naturwiss., 1932, 20, 521).— A reinvestigation of the rotation Raman spectrum of gaseous NH₃ at 3 atm., excited by the 2537 Å. Hg line, shows the existence of weak $\Delta J = \pm 1$ lines, as well as the stronger $\Delta J = \pm 2$ lines. The moment of inertia calc. (2.78×10⁻⁴⁰) is in agreement with previous vals. The following Raman frequencies are also reported : 3334.2; 933.8 and 964.3; 1922 (weak); and 2210 and 2270 cm.⁻¹ (very weak). J. W. S.

Fine structure of Raman bands. II. Raman spectrum of aqueous solutions of ammonia. A. LANGSETH (Z. Physik, 1932, 77, 60–71).—The NH₃ mol. is little distorted by dissolution in H₂O, and the moments of inertia of the mol. are 1.4 (about the symmetry axis) and 2.8 ($\times 10^{-40}$ g.-cm.²). The Raman band investigated was that at 3300 cm.⁻¹

A. B. D. C.

Smekal-Raman spectra of SiHCl₂, CHFCl₂, and CF₂Cl₂. C. A. BRADLEY, jun. (Physical Rev., 1932, [ii], 40, 908—913).—Data and classifications are recorded; 6, 8, and 9 frequency displacements, respectively, were observed. N. M. B.

Raman spectrum of nitrous oxide. A. LANG-SETH and J. R. NIELSEN (Nature, 1932, 130, 92-93). -N₂O at 30 atm. gave strong shifts at 1286.5 and 2223.2 cm.⁻¹; 6 weak shifts are also recorded.

L. S. T.

Raman effect in aqueous solutions of nitrates. P. GRASSMANN (Naturwiss., 1932, 20, 560—561).— $Cu(NO_3)_2$ and $Cd(NO_3)_2$ are unique among nitrates in giving two Raman displacements near 720 cm.⁻¹ The relative intensities of these two displacements depends on the $[NO_3']$ in the solution. W. R. A.

Raman effect and free rotation. K. W. F. KOHLRAUSCH (Z. physikal. Chem., 1932, B, 18, 61— 72).—By comparison of Raman spectra the valency frequencies of the radical R in the alkyl halides, RX, and those of the linking C·X have been identified. The C·X valency frequency appears double only with a mol. in which free rotation permits the assumption of different configurations. The effect of temp. on the relative intensity of two Raman lines of $C_2H_4Cl_2$ indicates that there are two mol. forms of this compound. R. C.

cis-trans-Isomerism in ethylenic hydrocarbons CHMe:CHR. M. BOURGUEL, (MLLE.) B. GRÉDY, and L. PIAUX (Compt. rend., 1932, 195, 129—131; cf. this vol., 676).—The Raman frequencies of three sets of lines of the cis- and trans-isomerides of Δ^{β} pentene, Δ^{β} -octene, and α -phenyl- Δ^{α} -propene, and of cis- Δ^{β} -nonene and cis-cyclohexyl- Δ^{β} -hexene (cf. A., 1928, 150) show characteristic differences between the two isomerides (cf. this vol., 706). The chief frequency of the cis-open-chain hydrocarbons is almost identical with that of cyclohexene, and that of the transisomeride near to that of trimethylene, in accordance with the usual stereochemical theory. C. A. S.

Determination of intensity of Raman lines. G. ELLENBERGER (Ann. Physik, 1932, [v], 14, 221— 240).—A spectrophotometric method was used to determine the variation of intensity with frequency of Raman lines from CCl₄, CH₂Cl₂, C₆H₆, C₂H₂Cl₄, and AcOH. Deviation from the theoretical law is the greater the larger is the frequency displacement of the Raman line. A. J. M.

Raman spectra and isomerism of rhodinol and citronellol. (MLLE.) B. GRÉDY (Compt. rend., 1932, 195, 313—314; cf. this vol., 676).—From a comparison of the Raman lines near 1600 cm.⁻¹ of β -methyl- Δ^{α} -octene 1647, β -methyl- Δ^{β} -octene 1677, γ -methyl- Δ^{γ} -nonene 1670, β -ethyl- Δ^{α} -octene 1646, and γ -methyl- Δ^{β} -nonene 1672, with those of commercial citronellol, 1677 strong, 1645 very weak, and rhodinol, wide line at 1675 separating on fractionation into two at 1673 and 1677, it is concluded that citronellol is almost pure $\beta\zeta$ -dimethyl- Δ^{β} -octen-0-ol (I), with about 1% of $\beta\zeta$ -dimethyl- Δ^{α} -octen-0-ol, whilst rhodinol consists of a mixture of (I) with a small amount of alcohols with chains ending in •CH•CMe:CHMe and •CH•CHMe•CH:CH₂, (cf. A., 1928, 1113, 1138).

C. A. S.

[Raman effect and] conjugated double linkings. M. BOURGUEL (Compt. rend., 1932, 195, 311—312; see above).—Comparison of the chief Raman frequencies for 12 compounds containing conjugated double linkings—in some cases benzenic—with the frequencies deduced from the nearest simple ethylenic compound shows some differences of about 50 cm.⁻¹ The following results are new : isoprene 1640; styrene 1601, 1636; cis- α -phenyl- Δ^{α} -propene 1599, 1642; trans- α -phenyl- Δ^{α} -propene 1599, 1664; acraldehyde 1618, 1692; trans-crotonaldehyde 1642, 1690; trans-cinnamaldehyde 1600, 1629, 1676; CPhiCH 1601, 2111; CPhiCMe 1599, 2213, 2223. C. A. S.

Raman effect in terpenes. II. Terpenic alcohols and ketones and other substances closely related to the terpenes. G. B. BONINO and P. CELLA (Mem. R. Accad. d'Italia, 1932, 3, 5-41).—The Raman spectra of the following compounds have been measured : pulegone, carvenone, carvone, β -thujone, menthone, fenchone, terpineol, eucalyptol, citral, citronellal, citronellol, linalool, and geraniol. The Raman lines are classified into those due to CH_2 , C.C, and C.O groups. In addition, the origin of four lines below about 900 cm.⁻¹, characteristic of the terpene nucleus, is discussed. O. J. W.

Light scattering in relation to molecular structure; new data for depolarisation in 39 gases. S. PARTHASARATHY (Indian J. Physics, 1932, 7, 139—157).—Visual light-scattering measurements have been made, using sunlight. A shows 0.56% and He 3% depolarisation. In compounds of the type RX₄, the anisotropy decreases with increasing size of the X atom, and increases with increasing size of the R atom. Positive groups lower, and negative radicals increase, the depolarisation. In the paraffin series the val. increases slowly as far as C_3H_8 and then remains const. The depolarisation increases progressively in the series C_2H_6 , C_2H_4 , C_2H_2 , and HCl, HBr, HI. Cl-substituted derivatives of CH₄ show a max. val. at CH₂Cl₂. The val. for COS is less than for CO₂ or CS₂; CO and NO show much smaller depolarisations than CO₂ and N₂O, respectively.

J. W. S.

Raman effect. XV, XVI. Raman spectra of organic substances (cis-trans-isomerism). A. DADIEU, A. PONGRATZ, and K. W. F. KOHLRAUSCH. XVII. Energy distribution in the mechanical model of a triatomic molecule. M. RADAKOVIC. XVIII. Raman spectra of organic substances. Poly-substituted benzenes. I. A. DADIEU, A. PONGRATZ, and K. W. F. KOHLRAUSCH (Monatsh., 1932, **60**, 205-220, 221-238, 239-252, 253-269; cf. A., 1931, 998).—XV. The Raman spectra of series of cis- and trans-isomerides of the type CHX:CHY have been investigated, and are discussed with reference to the structures of these isomerides. The C:O group can show a resonance frequency either at 1650 or at 1720 cm.⁻¹ The frequency 1840 cm.⁻¹ observed with maleic but not with fumaric esters is explained as due to the presence of a small proportion of dihydroxylactone form in the former.

XVI. The Raman spectra of cis- and trans-CHBr:CHBr, cis- and trans-CHPh:CHPh, CH_2Ph_2 , $(\cdot CH_2Ph)_2$, and CPh:CPh have been investigated, and are discussed in relation to previous data.

XVII. Mathematical.

XVIII. The Raman spectra of the six isomerides of $C_6H_3Me_2$ ·OH and of $C_6H_3Me_2$ ·NH₂ have been investigated and the results are discussed. J. W. S.

Polarisation of light-scattering. I. S. VEN-KATESWARAN (Phil. Mag., 1932, [vii,] 14, 258—270).— An analysis of the polarisation of the radiation of unaltered frequency separated from the Raman radiations for C_6H_6 , CS_2 , PhMe, CCl_4 , and PCl_3 supports the theory of the spinning photon. N. M. B.

Structure sensitivity of ultra-violet colouring and excitation of rock-salt crystals. H. J. SCHRÖDER (Z. Physik, 1932, 76, 608-627).—The optical properties of rock-salt are dependent on the tempering and the extent of plastic deformation of the crystal. A. B. D. C.

Additive colouring of alkali halide crystals. II. Evidence of ultramicroscopic diffusion. E. REXER (Z. Physik, 1932, 76, 735-755; cf. A., 1931, 998).—At high temp. (approx. 600°) Na diffuses along imperfections in NaCl crystals in the disperse phase. Spectral distribution of colouring in Li, Na, K, Ca, Sr, and Ba halide crystals showed that the cation is the source of the colouring. A. B. D. C.

Nature of blue rock-salt. H. LIERMANN and E. REXER (Naturwiss., 1932, 20, 561).—A continuation of previous work (cf. preceding abstract).

W. R. A.

Spectra of the excited absorption of Lenard phosphors. R. KÜHNER (Ann. Physik, 1932, [v], 13, 873—904).—The spectra of CaS-Cu, SrS-Cu, CaS-Pb, SrS-Pb, and CaS-Mn phosphors all show a more rapid increase of intensity with rise of temp. in the short-wave than in the long-wave region. The ultra-violet excitation decreases with increasing metal content, and the smaller is the latter the further does the band max. lie towards the ultra-violet region. Laws of spectra of phosphors are discussed.

J. W. S. **New photo-electric phenomenon.** Q. Majo-RANA (Compt. rend., 1932, 195, 226—228).—When light from a Hg or incandescence lamp falls intermittently (period 500—600 per sec.) on a film 20— 100 μ thick of Ag, Au, Pt, or Sn supported on glass, and a current is passed along the film which also traverses the primary of a transformer, sounds are heard in a telephone in the secondary circuit. This is due to variation in resistance of the film by 10⁻⁴ to 10⁻⁵ of its amount caused by the incident light. Films of Al or Zn are inactive. C. A. S.

Unidirectional layer photo-effect. F. WAIBEL and W. SCHOTTKY (Physikal. Z., 1932, 33, 583—585). — Cu_2O plates which have no unidirectional layer exhibit less than 1/10,000 of the spontaneous photoeffect of plates which have a unidirectional layer. The part of the unidirectional layer photo-stream which depends on voltage (inner photo-effect) disappears when the contact surface has no unidirectional properties. W. R. A.

Rôle of dyes in photo-electric phenomena. (MLLE.) C. STORA (J. Chim. phys., 1932, 29, 168– 183).—Electrodes of Pt, Au, Cd, C, Cu, Hg, and Zn in the CuO and Cu₂O photo-electric cells in contact with electrolytes exhibit no photo-electric effect, but if immersed in H₂O, EtOH, or collodion solutions of dyes, an adsorbed layer is formed on their surfaces which functions photo-electrically. W. R. A.

Crystal and unidirectional layer photo-electric effects. W. BULIAN and H. SCHREIBER (Naturwiss., 1932, 20, 506; cf. Scharf and Weinbaum, this vol., 560).—Discussion of the theories of the mechanism of the Cu₂O photo-electric cell. W. R. A.

Electrical and optical properties of semiconductors. V. Determination of electrical conductivity of powders. A. VOLKL (Ann. Physik, 1932, [v], 14, 193—215).—A method of studying the electrical conductivity of semi-conductors in the form of powders is described. It is tested on Cu₂O (an electronic conductor) and on AgCl (an electrolytic conductor). A. J. M.

Electrical and optical properties of semiconductors. VI. Conductivity determinations with powders. P. GUILLERY (Ann. Physik, 1932, [v], 14, 216—220).—The method described by Volkl (see preceding abstract) was used to determine the electrical conductivity of a no. of powders, and the results were compared with those obtained by the pastille method. The latter is not a satisfactory method. A. J. M.

Influence of temperature and field strength on the electrical conductivity of amber. F. SEIDL (Z. Physik, 1932, 76, 565-575). A. B. D. C.

Structure of the naphthalene nucleus. N. NUKADA (Nia Kem., 1932, 5, 41-46).—Vals. for dipole moments for $1-C_{10}H_7X$, $2-C_{10}H_7X$, and PhX, respectively, are : X=NO₂, $3\cdot88$, —, $3\cdot96$; F, $1\cdot42$, $1\cdot49$ $1\cdot45$; Cl $1\cdot50$, $1\cdot57$, $1\cdot56$; Br, $1\cdot48$, $1\cdot69$, $1\cdot49$. Hence 1-C is more aromatic than 2-C. The dipole moments of $1: 4-C_{10}H_6Cl_2$ and $1: 5-C_{10}H_6F_2$ are zero; C-Cl and C-F are equal in moment but opposite in direction. Other dipole moments are: $1: 5-C_{10}H_6Br\cdotNO_2$ $2\cdot495$, $2: 8-C_{10}H_6Cl_2$ $2\cdot58$, $1: 5-C_{10}H_6Br\cdotNO_2$ $2\cdot495$, $2: 8-C_{10}H_6Cl_2$ $2\cdot58$, $1: 5-C_{10}H_6(NO_2)_2$ $0\cdot6$, $1: 2-C_{10}H_6BrF$ $2\cdot34$, $1: 2-C_{10}H_6BrI$ $1\cdot80$, $1: 8-C_{10}H_6(NO_2)_2$ $7\cdot1$ (unit 10^{18}). $C_{10}H_8$, but not $2: 6-C_{10}H_6Cl_2$, has a central symmetric structure. CH. ABS.

Anomalous conductivity of pure liquids for continuous currents. H. GARRIGUE (J. Phys. Radium, 1932, [vii], 3, 248—263).—A more detailed account of work already noted (this vol., 23).

Free rotation and dipole moments of formamide, ethylene chlorohydrin, ethylene glycol, ethylenediamine, and ethyl succinate. C. T. ZAHN (Physikal. Z., 1932, 33, 525-530).—These mols. were found to be too complicated for the satisfactory deduction of their constitution from consideration of their observed dipole moments and their "axes of free rotation." The moments of all these compounds are independent of temp. W. R. A.

Relation between optical and dielectric properties. Ionic polarisation in solids. J. ERRERA and H. KETELAAR (J. Phys. Radium, 1932, [vii], 3, 239—247).—A study of the refractive indices and dielectric consts. of the alkaline-earth fluorides and of the two oxides of Ti shows that the fact discovered for the alkali halides crystallising in the cubic system, viz., that that part of the sp. inductive capacity which is due to vibration of ions is dependent on the diameter of the ions and their deformability, is a general rule. An experimental method is described for the determination of the dielectric consts. of powdered substances, for which this quantity is greater than that of a liquid used for comparison. A. J. M.

Dielectric constant of liquid and solid nitrobenzene. A. PIEKARA (Nature, 1932, 130, 93).— Measurements of the electric polarisation of PhNO₂ in C_6H_{14} show no change in the electric moment or polarising power of the PhNO₂ mol. between -4° and 30°. Density- and dielectric const.-temp. curves show no inflexions at 9.6° (cf. A., 1931, 899). A sharp fall in the dielectric const. occurs at the f.p. (5.66°) or at any lower temp. when supercooled. L. S. T.

Electric moment and molecular structure. VIII. Complex dipoles and long-chain molecules. C. P. SMYTH and W. S. WALLS (J. Amer.

Chem. Soc., 1932, 54, 2261—2270).—The moments of several polymethylene bromides and similar mols. containing 2, 3, or 4 dipoles have been measured. Dipoles not far apart on a C chain so affect the positions of one another as to diminish the resultant moment of the mol. The free rotation about the C·C linkings gives a variety of forms to long-chain mols., some being excluded because of high mutual potential energies of the dipoles, but a more satisfactory explanation is given by the supposition of an extended zig-zag structure of the C chain with complete freedom of rotation only at the ends. A mathematical derivation of the moments is given. Some older data are revised. H. F. J. (c)

Dielectric constants of a number of potassium salts and alkali halides. G. STEULMANN (Z. Physik, 1932, 77, 114—116).—Dielectric consts. were measured for KClO₄, KCN, KCNS, KBrO₃, KIO₃, K₃PO₄, K₂HPO₄, KH₂PO₄, KH₂AsO₄, KCl, KBr, KI, K₂CO₃, KNO₃, KClO₃, LiBr, LiI, NaBr, and NaI.

A. B. D. C.

Dispersion of polar liquids for radio-frequencies. P. GIRARD and P. ABADIE (Compt. rend., 1932, 195, 119-121, 217-219).-Debye's equation connecting the statical and optical dielectric consts. with ε' and ε'' , the real and imaginary parts of the generalised dielectric const., has been tested, the results being compared with calc. curves relating z' and $\varepsilon''/\varepsilon'$ at 20° to wave-lengths of 5—600 cm. for (the figures are respectively viscosity, radius, $a \times 10^8$ cm., of the mol. assumed spherical, and ratio of the vol. of a mol. deduced from a to that deduced from the kinetic theory): Pr^aOH 0.025, 2.2, 1.5; Pr^βOH 0.025, 2.1, 1.9; Bu^aOH 0.029, 2.5, 1.3; Bu^BOH 0.037, 2.5, 1.4; n-amyl alcohol 0.040, 2.7, 1.3; isoamyl alcohol 0.046, 2.6, 1.4; s-dichlorohydrin 0.085, 1.3, 16; as-dichlorohydrin 0.12, 1.2, 18.5; glycol 0.20, 0.60, 93; glycerol 4, 0.36, 530. Results for ε' agree with theory, but the ratio $\varepsilon''/\varepsilon'$ is generally low. The disagreement between the vals. calc. by the two methods indicates the necessity of taking into consideration the mol. configuration before the theory can be deemed satisfactory (cf. A., 1929, 380). C. A. S.

Absolute measurements of the high-frequency conductivity of liquids for 3 m. wave-length. H. SCHAEFER (Z. Physik, 1932, 77, 117–122).—Aq. solutions of K_2SO_4 and NaCl showed no appreciable increase in conductivity with increase in frequency, but colloidal org. solutions showed as much as 100%increase. A. B. D. C.

Effect of intramolecular vibrations on optical activity relations of absorption bands. W. KUHN and H. L. LEHMANN (Z. physikal. Chem., 1932, B, 18, 32—48; cf. A., 1931, 1209).—The absorption, rotation, and circular dichroism of a 2% hexane solution of β -octyl nitrite have been measured. A strong absorption band at 2300 Å. makes practically no contribution to the rotation, but a weak band at 3650 Å. exhibits anomalous rotation and circular dichroism. This latter band consists of several narrower bands, within which the anisotropy factor, g, rises to a max. at the centre and falls to zero at the edges. The absorption is largely located in four of the small bands, which are analogous in the mode of variation of g on passing from one edge to the other and the max. val. attained, showing that the optical activity relations of an absorption band depend chiefly on the electron transition and are almost independent of nuclear vibrations within the mol. The details of the activity relations of a substance may be discovered by measurements of either rotation or circular dichroism, but the latter is the more sensitive. R. C.

Magnetic rotatory power of aqueous solution of cerous chloride and the thermal variation thereof. (MLLE.) J. PERNET (Compt. rend., 1932, 195, 376—378; cf. this vol., 794).—For dil. solutions the sp. magnetic rotatory power, G, is positive and varies as $1/(T-\Theta)$, where T is the abs. temp., and Θ approx. const.=48°. For conc. solutions $\tau=0.196$, G=0 at 22.6°; for more conc. solutions it is negative. For $\tau=0.375$ GT is const. and $\Theta=0$, becoming negative for higher concn. C. A. S.

Anomalous dispersion of magnetic birefringence. R. LUCAS and M. SCHWOB (Compt. rend., 1932, 194, 2296—2299).—In solution in CCl_4 , cyclohexane, HCO_2H , and H_2SO_4 , r- and d-camphor show anomalous dispersion of magnetic birefringence, disagreeing with Havelock's formula, and dependent on the concn. and nature of the solvent (cf. A., 1928, 816; this vol., 320). C. A. S.

[Stresses in] unions of [different kinds of] glass: dilatation of glass: compensator for [measuring] birefringence. P. TARBÉS (Compt. rend., 1932, 195, 222-224). C. A. S.

Lorentz double refraction in the regular system. E. U. CONDON and F. SEITZ (J. Opt. Soc. Amer., 1932, 22, 393-401).—Double refraction predicted by the higher approximations for crystals which are optically isotropic in the classical theory, and the optical properties of the cubic system, are discussed. N. M. B.

Attendant phenomena in electro-optical Kerr effect in high-frequency fields. H. HOYER and L. PUNGS (Physikal. Z., 1932, 33, 531-534).—The striation effects observed by Sirkar and by Cotton and Mouton in Kerr fields, especially of high frequency, as well as the appearance of the additional double refraction of the Kerr cell, are explained by a heat effect arising from the dielectric loss.

W. R. A.

New optical properties produced in liquids by high-frequency sound waves. P. BIQUARD and R. LUCAS (Compt. rend., 1932, 195, 121-123; cf. this vol., 799).—Light passed through excited quartz showed six or seven spectra each side of the central fringe, the quartz being the seat of stationary elastic waves. When the high-frequency waves to which a liquid is subjected are not less than 0.5 mm., and still more if greater than the width of the pencil of light, no diffraction spectra appear, but merely general spreading. This effect increases with the amplitude of the waves, length of path, and compressibility of the liquid, and is due to the influence of the varying pressure on the refractive index. C. A. S.

Diamagnetism in evidence of ionisation potential of radon. S. C. BISWAS (J. Indian Chem. Soc., 1932, 9, 233–236).—Diamagnetic susceptibility of groups of elements having similar outer electronic shells varies with ionisation potential. Comparison of the sp. susceptibilities of the inert gases suggests that the ionisation potential of Rn is > that of Xe (11.5 volts). E. S. H.

Influence of light on paramagnetic susceptibility. C. J. GORTER (Nature, 1932, 130, 60).—The diminution of magnetic susceptibility previously observed (A., 1931, 670) is confirmed; it is due to temp. rise. L. S. T.

Magnetic properties of magnetite crystals at low temperature. C. H. LI (Physical Rev., 1932, [ii], 40, 1002—1012).—The magnetic properties changed abruptly at -160° , the temp. at which the sp. heat increases suddenly to a max. X-Ray photographs at room and liquid air temp. show no change in the distribution of the points of diffraction.

N. M. B.

Magnetic susceptibility of samarium sulphate. F. H. SPEDDING (J. Amer. Chem. Soc., 1932, 54, 2593-2597).—The discrepancies between the calc. and observed vals. of the susceptibility, χ , of Sm^{TT} are ascribed to the presence of electronic isomerides of undetermined configurations. If on exciting a rareearth ion a 4f electron jumps through the 5s5p completed shells to a 5d5f or 5g orbit and the basic level of Sm^{TT} is ${}^{6}\mathrm{H}_{5/2}$ calculations for Sm₂(SO₄)₃,8H₂O give vals. of χ agreeing closely with the observed vals. up to 150° abs. At higher temp. other terms probably become effective. The electronic configuration of the excited isomeride is described. W. W. S. (c)

Ferromagnetism and related problems of the theory of electrons. P. S. EPSTEIN (Physical Rev., 1932, [ii], 41, 91–109).—Mathematical. N. M. B.

Interpretation of the Curie-Weiss law. C. J. GORTER (Physikal. Z., 1932, 33, 546-547).—The relative merits of three possible interpretations of the Curie-Weiss law $[\chi=C_2/(T-\Theta)]$ are discussed.

W. R. A.

Ferromagnetism and electrical properties. V. Thermomagnetic effect in a longitudinal magnetic field in nickel and iron. H. BROILI (Ann. Physik, 1932, [v], 14, 259-272).—The e.m.f. produced at the ends of a ferromagnetic wire down which there is a given temp. gradient when it is magnetised is investigated. It remains const. if the temp. difference is const. and the wire is saturated, and also if the magnetisation is const., the lower tempis const., and the upper temp. is above the Curie point. A. J. M.

Gyromagnetic ratio and the magnetic moment of paramagnetic salts. E. C. STONER (Proc. Leeds Phil. Soc., 1932, 2, 309—318).—Experimental data for the magnetic moments (p vals.) of ions with 19 to 27 electrons are collected, together with the gyromagnetic ratios (g) for salts containing these ions. The p and g vals. are calc. for ideal limiting cases corresponding with close coupling of the spin (s) and orbital moment (l) vectors, with independent s and l, and with suppression of the l moment. The g vals. are in good accord with the interpretation previously given of the p vals.

J. W. S.

Possibility of a thermal effect accompanying sudden changes in the magneton numbers in cupric chloride and nickel sulphate. D. S. KOTHARI (Proc. Camb. Phil. Soc., 1932, 28, 338—340). —If there is any sudden change in the magneton no. p with change of temp. it should be accompanied by a thermal effect. No effect corresponding with a temp. change as great as 0.1° could be detected with either CuCl₂ or NiSO₄,7H₂O; hence either the change in magneton nos. must be spread over a temp. range or the difference in energy levels between the two vals. of p must be <2 and 14 cm.⁻¹, respectively.

J. W. S.

Influence of variations of the molecular field on the magnetic properties of substances. L. NÉEL (Ann. Physique, 1932, [x], 18, 5—105).—A theory of the mol. field is developed leading to an interpretation of the difference between the para- and ferro-magnetic Curie points, the abnormal increase in sp. heat of ferromagnetics above the Curie point, magnetisation and hysteresis curves, the const. paramagnetism, magnetic moment, and mol. field of metals, and the variation of susceptibility with temp. Experimental data for β -Fe, Fe–Sn, Fe–Si, Co–Pt, and Ni–Pd are recorded. N. M. B.

Permeability of vacuum and Chipart's theorems. J. CAYREL (Compt. rend., 1932, 195, 366-368). C. A. S.

Interaction of lattice vibrations and free electrons in metals. H. JONES (Proc. Camb. Phil. Soc., 1932, 28, 367–385). J. W. S.

Tetrahedral field of action of atoms. II. Nature of secondary valencies. R. REINICKE (Ann. Guébhard-Séverine, 1931, 7, 174—202; cf. this vol., 563).—Crystal structures of the type BN, graphite, diamond, ZnS, and AlN are discussed and illustrated in detail. N. M. B.

Analogies of carbon and germanium. A. TCHAKIRIAN (Bull. Soc. chim., 1932, [iv], 51, 846— 853).—A review. E. S. H.

E. S. H.

Spectroscopy and valency. I. The periodic groups of atoms and ions. C. H. D. CLARK (Proc. Leeds Phil. Soc., 1932, 2, 336—346).—The relationship between valency and the symmetry of the resultant electron spins of atoms is discussed. Transitional elements tend to build up d electrons with increasing at. no. more rapidly than the symmetry rule requires as the centres and ends of the groups are reached. This is often associated with high resultant spin and large valencies in the first half of the groups and low resultant spins in the second half of the electron groups. Ions of transitional elements conform to no configurations represented by the ground states of other atoms. J. W. S.

Quantum theory contribution to the problem of aromatic and unsaturated compounds. III. E. HÜCKEL (Z. Physik, 1932, 76, 628-648).—The method previously described (A., 1931, 1000, 1356) is applied to $C_{10}H_8$, anthracene, phenanthrene, Ph_2 , and unsaturated ring systems of the form C_nH_{n+2} . The symmetry of the various states is determined, and evaluation of the resonance energies gives the least energy of excitation. Only the condensed ring systems and Ph₂ have closed electron groups, and the binding energy per electron is almost equal to that for C_6H_6 ; the least energy of excitation gives a measure of the ease with which these systems form additive compounds with an alkali metal, and the resulting order is anthracene, $C_{10}H_8$ (conjugated double linking), Ph₂, C_6H_6 . A. B. D. C.

Valency fields of ammoniates. G. BECK (Z. anorg. Chem., 1932, 206, 416-424; cf. A., 1929, 1219).-The total kinetic energy of the valency electrons in a compound is cale. from the expression $QV_a/(V_a-V_e)=i+Q$, where Q is the heat of formation, V_a the mol. vol. of the compound, and V_e the corresponding vol. before reaction. The necessary data have been determined for a no. of compounds. To form an ionised compound the kinetic energy of the valency electrons must exceed 117 kg.-cal. in the case of the ammoniates of univalent metals; otherwise a mol. space lattice is formed instead of an ionic lattice. In bivalent metals ionised ammoniates are formed when the energy exceeds 234 kg.-cal. This condition is reached in the tetrammines of Be and Pd and the hexammines of other metals; lower ammines have a mol. lattice. Tervalent metals require a total electronic energy of 351 kg.-cal., which is reached in the hexammines. The Cr pentammines do not reach this crit. val., but the energy suffices for two-stage ionisation. Four types of ammoniates are distinguished: (1) those formed from strong electrolytes, in which the valency field has reached its max. val.; (2) those formed from compounds which are originally feebly ionised (e.g., Al, Be); these are decomposed by acids; (3) ammoniates in which the valency of the cation complex is a linear function of the no. of neutral mols.; these include the ammoniates of Au, Cr, Co, Pd, Rh, Ir, and Pt, and they are not decomposed by acids; (4) ammoniates of compounds with very weak valency fields (e.g., PCl₅, BCl₃, and $SnCl_4$; these are decomposed by H_2O . E. S. H.

Relations between b.p. and chemical constitution. III. Association in liquid and vapour states. K. BILLG (Svensk Kem. Tidskr., 1932, 44, 169—172).—In hydrocarbons C_aH_{2n+2} , the % of polymols. in the vapour phase increases with increasing mol. wt.; in the liquid phase it diminishes. Both in this series and in the noble gases the interval between the crit. temp. and the b.p. increases with increasing mol. wt., but the crit. pressure rises in the latter series, whereas it falls in the former. Comparison of the above temp. interval with the crit. pressure is a guide to association in the vapour phase. A. G.

Additivity of the energies of normal covalent linkings. L. PAULING and D. M. YOST (Proc. Nat. Acad. Sci., 1932, 18, 414—416).—Empirical evidence for H_2 , the halogens, the H halides, the halogen halides, and the mols. KNa and LiH indicates that the energies are additive. The relatively ionic or covalent character of the linkings is discussed.

N. M. B.

BIB,

Relation between the atomic arrangement in certain compounds, groups, and molecules and the number of valency electrons. W. H. ZACHA-RIASEN (Physical Rev., 1932, [ii], 40, 914—916).— Rules for the displacement of the atom A from the centre of the polyhedron formed by the surrounding atoms X in compounds of the type $(A_m X_n)^{-p}$ are given. The total no. of valency electrons per stoicheiometric mol. or group is v=8n+2m. Interpretations in terms of ionic theory and the theory of electron pair linkings are discussed. N. M. B.

Complex salts containing co-ordinated atoms or groups of various kinds. Complexes with co-ordination number 6. I. Salts

 $(\mathbf{NH}_4)_2[\mathbf{VF}_5(\mathbf{H}_2\mathbf{O})]; \mathbf{Rb}_2[\mathbf{VF}_5(\mathbf{H}_2\mathbf{O})];$

T1₂[CrF₅(H₂O)]. R. PIRANI (Gazzetta, 1932, 62, 380–387).—The above three compounds (*Rb* and *Tl* compounds are new) crystallise in the cubic system with the space-groups T_{a}^{a} , O^{3} , O_{b}^{5} . The vals. of *a*, *v*, and *d*, respectively, for the three compounds are: (NH₄) 8.42 ± 0.01 Å., 596.9×10^{-24} c.c., 2.45; (Rb) 8.42 ± 0.01 , 596.9×10^{-24} , 3.52; (Tl) 8.41 ± 0.005 , 594.5×10^{-24} , 6.39. The H₂O group occupies a position in the lattice equiv. to that of the F⁻ ions.

0. J. W.

Possible form of electronic binding in crystal surfaces. I. TAMM (Z. Physik, 1932, 76, 849—850). —An electron moving in a periodic potential may effectively form a linking in a one- or two-dimensional crystal. A. B. D. C.

Electronic structures of polyatomic molecules and valency. II. General considerations. R. S. MULLIKEN (Physical Rev., 1932, [ii], 41, 49–71; cf. this vol., 562).—A consideration of present-day views of electronic structures of mols., sharing of electrons, and mol. orbitals. N. M. B.

Constitution of pyrosulphates, pyrosulphuric acid and its monohydrate. P. BAUMGARTEN (Z. anorg. Chem., 1932, 207, 111—112; cf. A., 1931, 921). —Polemical against Hantzsch (this vol., 572).

J. W. S.

Space chemistry. I. Low-boiling fluorides. O. RUFF, F. EBERT, and W. MENZEL (Z. anorg. Chem., 1932, 207, 46-60).—From the mol. vols. of volatile fluorides in the liquid and gaseous states the at. radii in these mols. have been calc. The results are discussed with reference to previous vals. J. W. S.

Electronic structure of the normal nitrous oxide molecule. L. PAULING (Proc. Nat. Acad. Sci., 1932, 18, 498–499; cf. this vol., 562).—Possible vals. of the moment of inertia and corresponding structure are discussed. N. M. B.

Distribution of electrons in carborundum. J. HENGSTENBERG and J. GARRIDO (Anal. Fís. Quím., 1932, 30, 409—415).—Mathematical. The application of Fourier analysis to the determination of the charge distribution within a lattice having no centre of symmetry is discussed. The observed electronic distribution in the 001 plane of carborundum is in close agreement with that calc. on the assumption of a lattice composed of neutral atoms. H. F. G.

Determination of the energy levels of molecules from kinetic data. E. N. GAPON (J. Gen. Chem. Russ., 1931, 1, 1177—1178).—The energy levels of mols. may be deduced from the energies of activation in those cases in which the mol. is capable of reacting in more than one direction. R. T.

Calculation of electron distribution in a diatomic molecule by the method of Thomas and Fermi. F. HUND (Z. Physik, 1932, 77, 12–25).— The potential due to a diat. mol. can be represented as the sum of two potentials due to spherical distributions of charge. A. B. D. C.

Molecular and atomic volumes. XLI. Density of crystalline hydrogen fluoride and of crystalline fluorides at low temperatures. L. LE BOUCHER, W. FISCHER, and W. BILTZ (Z. anorg. Chem., 1932, 207, 61–72).—The densities of HF, BF₃, CF₄, SiF₄, GeF₄, SF₆, SeF₆, and TeF₆ in the cryst. state at low temp., and in the liquid state at the m.p. and b.p., have been measured and the corresponding zero vols. calc. The results are discussed with reference to data for the other halogen compounds (cf. this vol., 322). J. W. S.

Molecular volume and density at absolute zero. Calculation of the volume correction, b, in van der Waals' equation. (MISS) G. L. CHABORSKI (Bul. Chim. Soc. Române Stiinte, 1929, 31, 53—66, 119—132).—From the density and val. of b at any temp., the mol. vol. at 0° abs. can be calc. Data are given for 38 simple org. liquids, Hg, H₂O, Br₂, PCl₃. AsCl₃, POCl₃, SiCl₄, TiCl₄, and SnCl₄, and compared with published data. Conversely, from the density at any temp. and the mol. vol. at 0° abs., b can be calc. For any one substance, b is approx. a linear function of temp. Hence, from the above data, b can be calc. for any temp. Data are given for Cl₂, Br₂, O₂, N₂, Hg, NH₃, SO₂, PCl₃, POCl₃, AsCl₃, SiCl₄, TiCl₄, SnCl₄, and 79 org. compounds. D. R. D.

Radiometric forces in low-pressure gases. G. SPIWAK (Z. Physik, 1932, 77, 123-125).---Variation of radiometric force with plate separation was used to determine boundary effects in a Knudsen manometer; for large plate separations the force is inversely proportional to the square of the separation. A. B. D. C.

Curved-crystal monochromator for powder X-ray photography. (MLLE.) Y. CAUCHOIS (Compt. rend., 1932, 195, 228–231; cf. this vol., 146, 553). C. A. S.

Intensity of reflexion of X-rays by perfect crystals. G. W. BRINDLEY (Proc. Leeds Phil. Soc., 1932, 2, 271—279).—Ewald's theory of reflexion of X-rays based on the theory of optical dispersion leads to divergent results when applied to the intensity of reflexion of X-rays from highly perfect diamond crystals where the angle of reflexion is $>45^{\circ}$. If the at. structure factor, neglected in Ewald's theory, is taken into account (after slight correction for zero point energy), the theoretical predictions agree with observation for all angles of reflexion. A. J. M.

Refraction of X-rays by perfect crystals. G.W. BRINDLEY (Proc. Leeds Phil. Soc., 1932, 2, 319—323). —Introduction of the at. scattering factor into Ewald's theory of X-ray reflexion leads to vals. of the variation of the intensity of reflexion with angle which agree better with experimental data (cf. preceding abstract). J. W. S.

Bloch's integral equation in the electronic theory of metals. J. WINTER (Compt. rend., 1932, 195, 33-34; cf. A., 1929, 247; 1930, 141).

C. A. S.

Evidence of mosaic crystals in copper and platinum. F. W. CONSTANT (J. Elisha Mitchell Sci. Soc., 1932, 47, 25). CH. ABS.

Structure of products of action of alkali metals on graphite. A. SCHLEEDE and M. WELLMANN (Z. physikal. Chem., 1932, B, 18, 1–28).—The brown substance formed by the action of K on graphite (cf. A., 1929, 410) has a layer lattice, K planes alternating with the basal planes of the graphite. When the metal planes are complete the composition corresponds with the formula C_8K . By removal of alternate K planes by heating at a higher temp. a black substance is formed in which every two graphite planes are followed by a K plane; the composition is $C_{16}K$. The brown and black products formed by Rb and Cs are similar to the above. The formation of all these substances is explained by adsorption in stoicheiometric proportions by the individual C surfaces of the layers of graphite. R. C.

Formation of layer lattices. H. ARNFELT (Arkiv Mat., Astron., och Fysik, 1932, 23, B, No. 2, 1—6).— During the process of graphitisation of coke, X-ray interference lines appear successively as broad diffuse bands which gradually sharpen into lines. Similar behaviour is observed in the cases of MoS_2 , CdI_2 , SnS_2 , Ni(OH)₂, and BN. In each case the amorphous substances crystallise into a layer lattice, accelerated greatly by foreign substances. J. W. S.

X-Ray investigation of the rôle of crystal water in zeolite. B. LENGYEL (Z. Physik, 1932, 77, 133-138).—The H₂O in zeolite is not bound to the lattice. A. B. D. C.

Rhenium trioxide. III. Crystal structure. K. MEISEL (Z. anorg. Chem., 1932, 207, 121–128).— ReO₃ has a cubic structure with 1 mol. in the unit cell, the lattice being analogous to that of WO₃. $a_w=3.734$ ± 0.006 Å., $d_R=7.43\pm0.04$. The radius of the O²⁻ ion is 1.32 Å. and that of the Re⁶⁺ ion 0.55 Å.

Crystal structure of rhombic ammonium nitrate. C. D. WEST (J. Amer. Chem. Soc., 1932, 54, 2256—2260).—The space-group is V_{h}^{13} . The NO₃ groups are probably triangles of side 2.10 Å., with their planes parallel to b. The double refraction is probably due to an arrangement of NO₃ groups in layers in the *ac* plane. L. W. (c)

Crystal structure of ammonium hexabromoselenate. L. SIEG (Z. anorg. Chem., 1932, 207, 93– 96).—(NH₄)₂SeBr₆ crystallises in the face-centred O^3 or O_a^3 system, with 4 mols. in the unit cell. The structure is similar to that of K₂PtCl₆. Each Se atom is surrounded by 8 Br ions, the distance Se–Br being $2 \cdot 51 - 2 \cdot 63$ Å. Hence the radius of the Se⁴⁺ ion is $0 \cdot 55 - 0 \cdot 67$ Å. J. W. S.

Crystal lattice of germanous sulphide, GeS. W. H. ZACHARIASEN (Physical Rev., 1932, [ii], 40, 917-922).—Dimensions of unit cell, a 4·29+0·01, b 10.42 ± 0.03 , c 3.64 ± 0.01 Å.; 4 mols. per unit cell; d_{calc.} 4.24; space-group V_h^{16} . Crystals are orthorhombic bipyramidal. The Ge atom, surrounded by distorted octahedra formed by S atoms, is displaced towards one of the octahedral faces. The distances Ge—S are 2.58 for three of the S atoms, and for the other three 2.97 Å. Min. distance between S atoms is 3.55 Å. N. M. B.

Crystal lattice of potassium pyrosulphite, $K_2S_2O_5$, and the structure of the pyrosulphite group. W. H. ZACHARIASEN (Physical Rev., 1932, [ii], 40, 923—935).—a 6.95, b 6.19, c 7.55 Å., β 102° 41', d_{ente} 2.31, 2 mols. per monoclinic unit cell; spacegroup C_{2h}^2 . Parameter vals. for 16 degrees of freedom were determined. The K atoms are surrounded by 9 or 7 O atoms at average distances, respectively, of 3.01 and 2.78 Å. The distance S—S is 2.18, and the average S—O 1.46 Å. N. M. B.

Structure and symmetry relationships of complex cyanides of the potassium ferricyanide type. G. NAGELSCHMIDT (Veröff. Kaiser Wilhelm-Inst. Silikatforsch., 1931, 4, 27–56; Chem. Zentr., 1932, i, 629).—a, b, c, and N (no. of mols. per unit cell,) respectively, are : K₃Fe(CN)₆ 13·42, 10·40, 8·38, 4; K₃Cr(CN)₆ 13·55, 10·60, 8·6, 4; K₃Mn(CN)₆ 13·56, 10·60, 8·5, 4; K₃Ir(CN)₆ 13·70, 10·53, 8·34, 4: Cs₃Fe(CN)₆ 11·8, 10·1, 7·0, 2. The space-groups of the cyanide and the positions of the heavy metal atoms have also been determined; symmetry relationships are discussed. L. S. T.

Lattice constants of the spinels MgAl₂O₄ and ZnAl₂O₄. V. M. GOLDSCHMIDT (Z. physikal. Chem., 1932, B, 18, 29—31).—Polemical against Clark (this vol., 798). R. C.

Confirmation of the space-group of epsomite. W. H. BARNES and R. G. HUNTER (Nature, 1932, 130, 96).—X-Ray data for epsomite give a_0 11.94, b_0 12.03, c_0 6.86(5), with 4 mols. per unit cell; space-group Q^4 (cf. A., 1927, 297). L. S. T.

Existence of high-temperature form of cristobalite at room temperature, and crystallinity of opal. J. W. GREIG (J. Amer. Chem. Soc., 1932, 54, 2846—2849).—The failure of small cristobalite crystals embedded in a medium to invert when cooled through the inversion temp. is a more probable explanation of the existence of the high-temp. modification of cristobalite in opals (cf. this vol., 451) than the crystallisation of the high-temp. form at temp. at which the low-temp. form is more stable.

C. J. W. (c)

Inversion of cristobalite. R. B. SOSMAN (J. Amer. Chem. Soc., 1932, 54, 3015—3016).—Experiments on quenching free cristobalite from a temp. above its high-low inversion point have always shown inversion without delay. C. J. W. (c)

Cristobalite structures. II. Low-cristobalite. T. F. W. BARTH (Amer. J. Sci., 1932, [v]. 24, 97—110).—Interfacial angles corresponded with those of a cubic crystal, but no cubic arrangement was found which accounted for the observed (X-ray) intensities. In selecting possible tetragonal or orthorhombic arrangements it was assumed that the structure consisted of the usual Si \cdot O chains with direc-

J. W. S.

tions in space nearly the same as in high-cristobalite. A suitable orthorhombic arrangement is the spacegroup $p 2_1 2_1 2_1 \dots (V^4)$. $a:b:c=1.00:1.00:1.00 \dots 0.01$; length of the unit (pseudo) cube of 8 mols. SiO₂ 7.00 Å., d_{calc} 2.30. (Cf. this vol., 564.) A. G.

Crystal structure of stephanite. R. SALVIA (Anal. Fis. Quím., 1932, 30, 416—420).—Stephanite, Ag₅SbS₄, has a 7.85 \pm 0.02, b 12.48 \pm 0.02, c 8.58 \pm 0.02 Å.; 4 mols. in the unit cell; space-group $V_h^{\rm H}$. H. F. G.

Large-scale crystalline structure in certain glasses of exceptional composition. (LORD) RAY-LEIGH (Proc. Roy. Soc., 1932, A, 137, 55–61).—The doubly refracting structure of a quasi-cryst. nature formerly observed in pure Si glass has now been found also in highly siliceous glasses down to 80% Si content, and in phosphatic glasses such as "corex" and boracic glasses such as fused Na₂B₄O₇ and fused B₂O₃. L. L. B.

Occurrence and properties of crystalline alumina in silicate melts. H. B. BARLETT (J. Amer. Ceram. Soc., 1932, 15, 361–364).—The cryst. habits of α - and β -Al₂O₃ are described together with those of a new form, ζ -Al₂O₃ (d 3.6, n 1.736, unit cube, probably face-centred, 7.90 Å.) occurring in melts containing Li₂O. J. A. S.

Spacing of non-polar molecules in crystal lattices. Atomic domain of hydrogen. New feature of structure of benzene ring. E. MACK, jun. (J. Amer. Chem. Soc., 1932, 54, 2141–2165).— The radius of the at. domain of H in a crystal, *i.e.*, half the average distance between H nuclei, is found empirically to be 1.29 Å. It is suggested that the C_6H_6 ring is flat, like that of graphite, and that the unsaturation is manifested as "bulges" or "domes," perpendicular to each face. A stereochemical theory of the structure of C_6H_6 , C_6Me_6 , anthracene, and $C_{10}H_8$ is advanced. L. W. (c)

[Crystal] structure of quinhydrone. O. R. Foz and J. PALACIOS (Anal. Fís. Quím., 1932, 30, 421— 425).—Quinhydrone forms monoclinic crystals having a 3.85, b 6.04, c 10.9 Å.; d_{calc} 1.416; 1 mol. in the unit cell; space-group C_{2h}^{s} . In the cryst. state the symmetrical mols. are linked into a chain structure by means of H atoms. H. F. G.

X-Ray study of mannitol, dulcitol, and mannose. T. C. MARWICK (Nature, 1932, 130, 96).— A correction (cf. A., 1931, 897). L. S. T.

Layer-chain structures of thallium dialkyl halides. H. M. POWELL and D. M. CROWFOOT (Nature, 1932, 130, 131-132).—Crystal structures of compounds TIR_2X have been studied. The TI dimethyl halides are tetragonal; others are orthorhombic, pseudo-tetragonal, and all show the NaCI type of structure. Layers of TIX parallel to the *ab* plane are spaced out at distances dependent on the length of the alkyl chains which are attached to the TI ions perpendicularly to these layers. *a* and *b* are practically independent of the alkyl group and vary between 4.29 Å. (chloride) and 4.76 Å. (iodide). These spacings agree with other indications that the chains in these compounds do not rotate. L. S. T. Crystallography of sucrose. II. III. G. VAVRINECZ (Magyar Chem. Fol., 1931, 37, 145– 157; Chem. Zentr., 1932, i, 1362, 1362–1363; cf. A., 1928, 110).—II. A statistical study and classification into 3 types.

III. Morphological properties of sucrose crystallised from solvents such as H_2O , EtOH, MeOH, EtOAc, moist COMe₂, etc. are given. Sucrose is insol. in C_6H_6 , PhMe, CS₂, CCl₄, CHCl₃, PhNO₂, dry COMe₂, PhBr, MeOAc, petroleum, and turpentine.

L. S. T. [X-Ray] structure of highly nitrated cellulose nitrate films. DESMAROUX and MATHIEU (Compt. rend., 1932, 195, 242—243; cf. this vol., 798).—Comparison of films formed from solutions of the same concn. of cellulose nitrate heated at 130° for 12 hr. in H_2O with films from the same cellulose nitrate not so treated shows that crystallinity is decreased by autoclaving. The changes, and the great decrease in viscosity, indicate that the effect of autoclaving is to break up the elementary threads of glucose residues. C. A. S.

Intumescence as a cause of the characteristic lack of sharpness of the Röntgen spectrum of cellulose acetate. I. J. R. KATZ and A. WEIDIN-GER (Rec. trav. chim., 1932, 51, 847—852).—Cellulose acetate I, prepared from ramie fibre by acetylating with Ac_2O in C_6H_6 and a trace of H_2SO_4 , gives a sharp X-ray spectrum. The sharpness is destroyed on washing with H_2O . It is suggested that C_6H_6 , Ac_2O , or AcOH mols. form part of the lattice; on their removal, the regularity of the structure is destroyed. D. R. D.

Structure sensitiveness of magnetism in metals. F. W. CONSTANT and F. E. LOWANCE (J. Elisha Mitchell Sci. Soc., 1932, 47, 24-25).—Changes in magnetic susceptibility of Cu, Ag, Bi, and Pt when subjected to cold working are recorded. CH. ABS.

Piezo-electric experiments using the method of Giebe and Schiebe. A. HETTICH and H. STEIN-METZ (Z. Physik, 1932, 76, 688—706).—The presence or absence of piezo-electric properties in many compounds was determined by the method of Giebe and Schiebe (*ibid.*, 1925, 33, 760). A. B. D. C.

Hall effect in bismuth crystals. H. VERLEGER (Z. Physik, 1932, 76, 760–765).—The Hall effect was measured in a single crystal of Bi. A. B. D. C.

Magnetic properties of thin metal layers. W. ELENBAAS (Z. Physik, 1932, 76, 829–848).—The magnetic properties of Fe and Ni layers of thickness 0.2—20 μ were studied before and after tempering; the magnetic curves show evidence of fibre structure. A. B. D. C.

Effect of gases on Barkhausen oscillations. H. RINDFLEISCH (Ann. Physik, 1932, [v], 14, 273– 298).—The effect of He and Ne is studied. A. J. M.

Mechanism of plasticity. N. SELJAKOV (Z. Physik, 1932, 76, 535-536).—Stereoscopic photographs of NaCl compressed by 8-10% indicated that the deformed crystal is of the monoclinic type.

A. B. D. C.

Polymorphism of long-chain saturated monobasic acids. Influence of temperature. J. THI- BAUD and F. D. LA TOUR (J. Chim. phys., 1932, 29, 153-167).—The fatty acids crystallise in stratified layers giving single crystals of two types, α and β ; β crystals change to the α type at the transition temp., but the inverse transformation was not obtained. The transition temp. for C₁₂H₂₁O₂, C₁₄H₂₈O₂, C₁₆H₃₂O₂, C₁₈H₃₆O₂, and C₂₇H₅₄O₂ lie between 6° and 80°. α Crystals of palmitic acid and β crystals of stearic acid were examined by physical methods.

W. R. A. Germanium. XXXIX. Polymorphism of germanium dioxide. A. W. LAUBENGAYER and D. S. MORTON (J. Amer. Chem. Soc., 1932, 54, 2303— 2320).—The sol. and insol. modifications are enantiotropic, the transition temp. being $1033\pm10^{\circ}$. The stable m. p. of the sol. form is $1116\pm4^{\circ}$, and the metastable m.p. of the insol. form $1086\pm5^{\circ}$.

M. McM. (c)

Non-existence of two modifications in liquid nitrobenzene and carbon disulphide. E. MURA-KAMI (Bull. Chem. Soc. Japan, 1932, 7, 216—221).— The heating curve of PhNO₂ from 8.25° to 10.25° , the change of d from 7° to 11° and of n from 8.25° to 19.3° , and the heating curve of CS₂ from -100° to -85° are continuous, and the liquid is homogeneous throughout. These liquids do not give two modifications (cf. this vol., 329). R. S. C.

Temperature variations of the density and mol. wt. of molten bismuth. A. JOUNIAUX (Bull. Soc. chim., 1932, [iv], 51, 677-681).—The following relationship between sp. vol. v_i and temp. t has been deduced from d measurements of molten Bi at 420-1100°: v_i =0·1011+128×10⁻⁷(t-420). Cryoscopic data for solutions of Bi in Co, Ni, Cu, Ag, Mg, Te, Zn, and Pb are also given. Data for d, surface tension, v.-p. and f.-p. lowering indicate that the mol. wt. of Bi below 420° diminishes as the temp. rises; between 420° and 1400° it equals the at. wt., and above 1400° the mol. wt. increases up to 1500°, goes through a max., and decreases until it is again equal to the at. wt. at about 2100°. M. S. B.

Method for determining the velocity of sound in solids. W. T. RICHARDS (Science, 1932, 76, 36— 37). L. S. T.

Heat conductivity, Wiedemann-Franz-Lorenz number, and thermo-electric force of single crystals of mercury. H. REDDEMANN (Ann. Physik, 1932, [v], 14, 139—163).—The prep. of single crystals of Hg, together with the above determinations, is described. A. J. M.

Electrical and heat conductivity of zinc and cadmium crystals. E. GOENS and E. GRÜNEISEN (Ann. Physik, 1932, [v], 14, 164—180).—Both Zn and Cd show increase in heat conductivity as the temp. is lowered in the two principal crystal directions. The Wiedemann-Franz-Lorenz ratio was determined.

A. J. M.

Measurements with the aid of liquid helium. XIX. Investigations of the alloy series leadthallium and lead-bismuth in relation to superconductivity. W. MEISSNER, H. FRANZ, and H. WESTERHOFF (Ann. Physik, 1932, [v], 13, 967-984). —The conductivities of these alloys at temp. of 1.520° abs. have been investigated. The superconductivity temp. of Pb–Tl alloys are similar to those found with other systems. By extrapolation of the data for Pb–Tl mixed crystals, the val. for β -Tl is calc. and found to be considerably lower than that for α -Tl. The superconductivity curve for Pb–Bi alloys corresponds with the phase diagram deduced from X-ray measurements by Solomon and Jones (A., 1931, 676). The elevation of the superconductivity temp. by addition of Bi probably arises from the fact that the latter is cubic or hexagonal in solution, not rhombohedral as in the pure state. J. W. S.

Mechanism of superconductivity. J. DORFMAN (Nature, 1932, 130, 166—167).—A discussion.

L. S. T.

Superconductivity of argon and neon. A. GÜNTHER-SCHULZE and F. KELLER (Naturwiss., 1932, 20, 592).—The gradient in A and Ne is very small and may probably arise from impurities.

W. R. A.

Agreement of the ordinary with the thermodynamic scale of temperature. W. HEUSE and J. OTTO (Ann. Physik, 1932, [v], 14, 181–184).—The scales were compared between 0° and -183° . The ordinary scale is slightly higher than the thermodynamic in this range, the max. deviation being 0.04° at about -80° . A. J. M.

Gas thermometer determinations of some fixed points below 0° with pressure and resistance thermometers. II. W. HEUSE and J. OTTO (Ann. Physik, 1932, [v], 14, 185—192).—Using a He thermometer in conjunction with a resistance thermometer, the v.-p. curves of some gases in the neighbourhood of atm. pressure were investigated, and extrapolated to 760 mm. The following results were obtained (temp. on thermodynamic scale): normal b.p. of N₂, $-195 \cdot 814^{\circ}$; normal b.p. of CO, $-191 \cdot 484^{\circ}$; normal b.p. of O₂, $-182 \cdot 963^{\circ}$; normal sublimation temp. of CO₂, $-78 \cdot 471^{\circ}$. A. J. M.

Physical properties of sulphur, selenium, and tellurium hexafluorides and carbon tetrafluoride. W. KLEMM and P. HENKEL (Z. anorg. Chem., 1932, 207, 73—86).—The m.p., v.d., and sp. gr. in both liquid and solid states of these compounds have been determined. The b.p. and v.p. of SF_6 , SeF_6 , and TeF_6 have also been measured and the heats of sublimation, vaporisation, and fusion calc. The results are in good agreement with previously recorded vals. J. W. S.

Specific heats of five organic liquids from their adiabatic temperature-pressure coefficients. W. T. RICHARDS and J. H. WALLACE, jun. (J. Amer. Chem. Soc., 1932, 54, 2705—2713).—The sp. heats of C_6H_6 , PhMe, CCl₄, CHCl₃, and C_7H_{16} have been determined with a precision of 0.5% by measuring the change of temp. with pressure under adiabatic conditions. The pressure range was 15—30 atm. and the temp. range 20—50°. The results confirm existing data. E. J. R. (c)

Spectroscopic determination of the specific heat of gases at high temperatures. E. JUSTI (Forsch. Gebiet Ingenieurwesens, 1931, A, 2, 117-124; Chem. Zentr., 1932, i, 1344).—Einstein's theory is valid for diat. gases and CO_2 at high temp. Vibration frequencies can be determined from spectra and the increase in sp. heat calc. from the tables given. L. S. T.

Heat capacity and entropy of carbon monoxide. Heat of vaporisation. Vapour pressures of solid and liquid. Free energy up to 5000° abs. from spectroscopic data. J. C. CLAYTON and W. F. GIAUQUE (J. Amer. Chem. Soc., 1932, 54, 2610-2626).-The heat capacities from 13° to the b.p., $81.61\pm0.05^{\circ}$ abs., of the liquid and the two cryst. forms, transition point $61.55\pm0.05^\circ$, m.p. $68.09\pm0.05^\circ$ abs., and the v.p. of the solid and liquid have been measured. The mol. heats of transition, vaporisation, and fusion are $151\cdot3\pm1$, $1443\cdot6\pm1\cdot0$, and $199\cdot7\pm0\cdot2$ g.-cal., respectively. The observed entropy of the gas at 81.61° abs. is about $R \log_{e} 2$ below the corr. calc. val., $37 \cdot 2$; an explanation is suggested. The entropy at 298.1° abs., calc. from mol. spectra, is 47.313. The free energy has been calc. up to 5000° abs. from spectroscopic data. Combination of these results with similar data for O₂ and calorimetric data for graphite gives ΔF° up to 3000° abs. for the reaction $C_{\text{graphite}} + \frac{1}{2}O_2 \rightarrow CO$. The free energy of formation of CO from β -graphite and O_2 at 298·1° abs. is -33 kg.-cal.

G. M. M. (c) Density of pyridine between 0° and 90°. R. MÜLLER and H. BRENNEIS (Z. Elektrochem., 1932, 38, 450–451).—The density of C_5H_5N falls linearly from 1.0031 at 0° to 0.9111 at 90°. H. F. G.

Adiabatic expansion of saturated vapours and the formation of mists. N. A. KOLOSOVSKI and V. V. UDOVENKO (J. Gen. Chem. Russ., 1931, 1, 1245—1248).—Saturated vapours, the mols. of which contain <10 atoms, have a negative sp. heat, and therefore condense on adiabatic expansion. This rule is verified for a no. of org. liquids. R. T.

Vapour pressure of chlorine heptoxide. C. F. GOODEVE and J. POWNEY (J.C.S., 1932, 2078–2081). --Cl₂O₇ (improved prep.) has b.p. 80°, m.p. $-91.5\pm2°$. A. J. M.

Conception of relative humidity, particularly at high temperatures. H. EBERT (Z. Physik, 1932, 76, 163—171).—The ordinary definition of relative humidity fails at high temp., particularly when the total pressure of gases present is less than the saturation v.p. of H_2O at the given temp.; for these temp. a formula is deduced giving the ratio of the mass of H_2O to the mass of air in any given vol., and this replaces the definition by partial pressures which is valid at lower temp. A. B. D. C.

Application of Knudsen's law to the evaporation of water. T. ALTY (Nature, 1932, 130, 167— 168).—When the temp. of an evaporating surface layer of H_2O is accurately measured there is still a discrepancy between calc. and experimental vals. for the rate of evaporation (cf. A., 1931, 904).

L. S. T.

Free energy, heat content, and entropy of iodine monochloride. J. MCMORRIS and D. M. YOST (J. Amer. Chem. Soc., 1932, 54, 2247—2256).— The equilibrium between I_2 , Cl_2 , and ICl has been investigated at 368—473° by measurement of the reaction of Cl_2 under const. pressure with I_2 , and at 136—179° by the reaction of NOCl and I₂. The free energy, ΔF° , of the reaction $\frac{1}{2}I_2(g) + \frac{1}{2}Cl_2(g) = ICl(g)$ is -3125 - 1.77T, which agrees with the val. derived from spectral data. A. F. (c)

Entropy of bromine from spectroscopic data. W. G. BROWN (J. Amer. Chem. Soc., 1932, 54, 2394– 2396).—The entropies in the standard state of $Br_2^{n_1}$, $Br_2^{n_2,s_3}$, and $Br_2^{s_1}$, calc. from analysis of the fine structure of the visible bands, are 58.56, 60.01, and 58.70, and for the 1:2:1 mixture the val. is 59.32. These vals. agree with sp. heat data. For gaseous Br_{29} , a correction for the entropy of 'mixing yields $S_{292}^{s_2n_1}=58.63$. H. F. J. (c)

Isotherms of water from 350° to 480° and for pressures up to 600 kg./cm.^2 C. J. VAN NIEUWEN-BURG and (MISS) H. B. BLUMENDAL (Rec. trav. chim., 1932, 51, 707—714).—The relations between p, v, and t have been investigated in detail over the range indicated. $p_c=226 \text{ kg./cm.}^2$, $v_c=3.06 \text{ cm.}^3/\text{g.}$, $t_c=$ 374° . D. R. D.

Equation of state of a non-ideal Einstein-Bose or Fermi-Dirac gas. G. E. UHLENBECK and L. GROPPER (Physical Rev., 1932, [ii], 41, 79-90).-Mathematical. N. M. B.

Van der Waals' equation of state. I. K. JABLCZYNSKI (Physikal. Z., 1932, 33, 536—543).— The coeffs. *a* and *b* of the van der Waals equation can be calc. independently from the pv^2 min. At pv^2 min. the min. vol. v=2b. *b* is const. over a wide temp. range, but *a* is dependent on temp. and vol. Vals. of *a* and *b* are calc. from experimental data on CO₂, CO, C₂H₄, N₂, H₂, O₂, and He. Vals. for crit. vol., pressure, and temp. have been calc.; they are not in agreement with observed data.

Equation of state for gases at low densities. D. LE B. COOPER and O. MAASS (Canad. J. Res., 1932, 6, 596-604).—A new equation of state is developed for gases at low densities, using a new function for the change in viscosity with temp. Satisfactory agreement is obtained with experimental results for CO₂. J. W. S.

Internal friction and density in flames. A. BECKER and K. VOGT (Ann. Physik, 1932, [v], 14, 241-258).—The internal friction and density in flames in relationship to the hydrodynamic resistance imposed by cylinders and spheres in the flame are investigated. A. J. M.

Diffusion of hydrogen through palladium. V. LOMBARD and C. EICHNER (Compt. rend., 1932, 195, 322—324; cf. this vol., 685).—Measurements at 275—595° and 70—772 mm. indicate that the rate of diffusion/temp. curve is approx. exponential. For a plate 0.051 mm. thick and 410° the rate of diffusion is proportional to $p^{0.62}$. There is some evidence that Pd undergoes a change of state at 460°. C. A. S.

Diffusion of mercury drops on rolled tin foils. F. W. SPIERS (Proc. Leeds Phil. Soc., 1932, 2, 280–288).—When Hg drops fall on Sn foil elliptical diffusion areas are formed; the amalgam has an approx. const. composition (11.8 at.-% Hg), and shows a hexagonal cryst. structure. The amalgam may be an intermetallic compound, HgSn₈. A. J. M.

W. R. A.

Influence of temperature on the diffusion velocity of solid metals (the zinc-copper system). C. MATANO (Mem. Coll. Sci. Kyoto, 1932, A, 15, 167-180).—By determining the change in resistance with time of metal foil composed of alternate layers of Zn and Cu, when immersed in a const.-temp. bath, the velocities of diffusion, V, at different temp. (87-302°) have been compared. $V=Be^{-\alpha/T}$, where B and α are consts. X-Ray photographs confirm that diffusion occurs. D. R. D.

Transformation of the β-phase in copper-zinc alloys. P. A. SALDAU and I. V. SCHMIDT (Ann. Inst. Anal. Phys. Chim., Leningrad, 1931, 5, 201-222).— The β-phase of Cu-Zn alloys heated at 440° during S4 days does not decompose with formation of α- and γ-phases. During this period the limits of the β-phase extend towards higher Zn content. At 480° the β-phase exists between 56.01 and 51.39 at.-%Cu, these limits widening as the temp. rises. R. T.

Lead-rich alloys of the system lead-antimony examined thermodynamically. F. H. JEFFERY (Trans. Faraday Soc., 1932, 28, 567—569).—Equilibrium data are consistent with coexisting solid and liquid phases containing Pb₂Sb in monat. Pb. This result is at variance with X-ray data. J. G. A. G.

Dia- and para-magnetism in series of metallic mixed crystals. E. VOGT (Ann. Physik, 1932, [v], 14, 1—39).—The dependence of magnetic susceptibility on the concn. of the mixed crystals Au-Ag, Au-Pd, and Pt-Pd and the effect of the adsorption of H₂ by these alloys has been investigated. The magnetic properties are most rationally explained by the concept of at. susceptibility. This quantity shows marked deviations from the mixture rule in the diamagnetic direction for the series Au-Pd and Pt-Pd, which may be explained by supposing that the valency electron of the added metal causes the paramagnetic Pd⁺ ions to change into the uncharged diamagnetic Pd atoms. Pd also loses its paramagnetism when it takes up H₂, presumably for the same reason.

A. J. M.

Existence of resistance limits in mixed crystals with haphazard atomic distribution. R. GLOC-KER (Ann. Physik, 1932, [v], 14, 40—50).—It is shown theoretically that there must be a sharp resistance limit. A. J. M.

System aluminium-magnesium-silicon. L. LOSANA (Metall. Ital., 1931, 23, 367–382; Chem. Zentr., 1932, i, 1425).—Thermal analyses of 150 alloys have been made. A ternary cutectic with 5.5% of Mg and 14% of Si occurs at 559°. The field of solid solutions is limited. Alloys rich in Mg have their hardness increased slightly by the first additions of Si. Si alloys containing even 0.5-1% Mg are very brittle. L. S. T.

Ternary alloys of aluminium with silicon and copper. G. G. URAZOV, S. A. POGODIN, and G. M. ZAMORUEV (Ann. Inst. Anal. Phys. Chim., Leningrad, 1931, 5, 157—200).—Alloys containing up to 24% Si and 40% Cu consist of a mixture of Si, CuAl₂, and solid solutions of Cu in Al. The solubility of Cu in Al increases with the Si content; at the same time the tempering qualities of the alloy diminish. The hardest alloy is the ternary eutectic Al-Si-CuAl₂, m. p. 525°, containing 5% Si, 27% Cu, and 68% Al. R. T.

Structure of some ternary alloys of aluminium, copper, and iron. K. YAMAGUCHI and I. NAKAMURA (Bull. Inst. Phys. Chem. Res. Tokyo, 1932, 11, 815— 833).—From the thermal analysis and microstructure of these alloys the phase diagram for the system Al-Cu-Fe has been evolved. The ternary phase usually designated "N" is an intermetallic compound of composition Cu₂FeAl₇ which appears to form a solid solution sparingly. It is formed by a peritectic reaction 2CuAl₂ (liq.) +FeAl₂ (liq.) \rightarrow Cu₂FeAl₇ (solid). Another ternary phase, richer in Cu than "N," has been recognised. Its form is polygonal and it gives a brown colour with aq. Fe(NO₃)₃ or HNO₃. J. W. S.

Copper-nickel-silicon alloys rich in copper. E. CREPAZ (Metall. Ital., 1931, 23, 711-716; Chem. Zentr., 1932, i, 1426-1427).—The reduction in mixed crystal formation between Cu and Si with a fall in temp. is confirmed; at 750° the solubility of Si is 6.7% compared with 2.7% at room temp. The solubility of Ni and Si in Cu has been determined, together with the Brinell hardness of the quenched and tempered alloys. Hardness changes suddenly at the ratio 2Ni: Si. L. S. T.

Influence of silicon on copper-nickel alloys containing little tin. L. GUILLET, M. BALLAY, and A. LE THOMAS (Compt. rend., 1932, 195, 89–92).— The effect of Si when added to ordinary bronze or Ni-Sn alloys is similar to that in Cu-Ni alloys. In the case of Cu-Ni alloys with small Ni content the compound Ni₂Si appears if more than 1% Si is present, but with >50% Ni, 3% Si may be added without this result. C. A. S.

Change of austenite into martensite in ironnickel alloys under load. E. SCHEL (Z. anorg. Chem., 1932, 207, 21-40).—The amount of martensite formed in Fo-Ni steel at any temp. is increased considerably by tension. Plastic deformation of steel, however, leads to martensite formation only over a definite temp. range above the transition temp. Slip-plane formation decreases the transition tendency. Spontaneous martensite formation may be due either to internal tension or, more probably, to mechanical instability of the austenite. J. W. S.

Diffusion and segregation in solid solutions. A. SMEKAL (Z. Metallk., 1932, 24, 121-124).-Hanemann and Schröder's theory of the mechanism of diffusion in and separation of segregates from solid solutions is not in accordance with known facts. The orientation of segregates is determined not so much by the presence of free lines of movement for the atoms of the segregate in the lattice of the solid solution as by the presence of internal stresses which usually concentrate along planes of slip, twinning, or cleavage; with a high rate of pptn. of a constituent from a solid solution the segregates collect along these planes, but with a low rate of pptn. the stresses set up are at first insufficient to promote orientation of the segregates, and as soon as the first slip plane appears new nuclei of the segregate become visible along it. If the rate of diffusion of the segregates themselves exceeds the rate of pptn., then the shape of the segregates may change appreciably without further pptn. The shape and orientation of segregates are also influenced by the nature of the solid solution lattice as well as by that of the lattice of the new constituent. A. R. P.

Diffusion and segregation in solid solutions. M. VON SCHWARZ (Z. Metallk., 1932, 24, 124—126).— Evidence in support of the above considerations is afforded by examination of Si-Cu solid solutions under the polarising microscope after various heat-treatments. A. R. P.

Formation and properties of precipitates. Theory of co-precipitation. VIII. I. M. KOLT-HOFF (Chem. Weekblad, 1932, 29, 442—448).— Mixed crystal formation, resulting from adsorption during the growth of a ppt., is discussed. The extent to which true co-pptn. takes place is dependent on the degree of displacement of the adsorption equilibrium during growth of the ppt. A ppt. resulting from coagulation of a colloid carries impurities only as an adsorbed film on the surface of the particles; penetration never occurs. Occluded impurities are gradually removed if a freshly-formed ppt. is allowed to remain in contact with its mother-liquor. H. F. G.

Solubility of hydrogen in water at 25° from 25 to 1000 atmospheres. R. WIEBE, V. L. GADDY, and C. HEINS, jun. (Ind. Eng. Chem., 1932, 24, 823–825).—The solubility, S, rises from 0.0178 c.c. per g. of H₂O at 1 atm. to 15.20 at 1000 atm. (calc. as at s.t.p.). Over the range 50—1000 atm., $S=0.0244+0.01712p=0.00000196p^2$. D. R. D.

Solubility of antimony trisulphide and stannic sulphide in ammonia and ammonium carbonate. P. A. EPIK (Z. anal. Chem., 1932, 89, 17–23).— Sb₂S₃ is appreciably sol. (about 1·28%) in aq. NH₃, especially on warming, but almost insol. in aq. $(NH_4)_2CO_3$. SnS₂ is readily sol. in aq. NH₃ and slightly sol. (about 0·17%) in aq. $(NH_4)_2CO_3$. These results invalidate the quant. separation of As from Sb and Sn by the different solubilities of their sulphides in aq. NH₃ and $(NH_4)_2CO_3$. E. S. H.

Interdependence of curves representing one and the same property of a binary system, expressed as molar concentrations, and as concentrations by weight. V. A. ANOSOV (Ann. Inst. Anal. Phys. Chim., Leningrad, 1931, 5, 143—150).—Property-composition curves vary in shape according to whether the composition is expressed in mol.-% or in wt.-%. R. T.

Shape of curves representing properties of binary systems in the case of undissociated compound formation. V. A. ANOSOV (Ann. Inst. Anal. Phys. Chim., Leningrad, 1931, 5, 151-156).— Theoretical. R. T.

Freezing points of ternary alcohol mixtures. D. S. DAVIS (Chem. Met. Eng., 1932, 39, 345).—A nomograph, based on an empirical equation, is given to enable Aldrich and Querfeld's (A., 1931, 901) f.-p. data for the system MeOH-EtOH-H₂O to be interpolated. C. I.

Sorption of condensible vapours by porous solids. I. Application of the capillary theory.

A. G. FOSTER (Trans. Faraday Soc., 1932, 28, 645-657; cf. A., 1929, 389; this vol., 16, 697).-Theoretical. One or two layers of strongly adsorbed mols. fill the small pores, but in larger pores capillary condensation ensues in certain cases, and it is suggested that the hysteresis previously observed (loc. cit.) is due to retarded meniscus formation. The influence of temp. on the desorption equilibria accords with the Kelvin equation which enables isothermals for different liquids and the same adsorbent to be reduced to a uniform scale. Systems with completely reversible isothermals afford no evidence of condensation. Isothermals of this type are attributed to layer adsorption and the sp. properties of the sorbed liquid markedly affect their shape, whilst in capillary adsorption the shape of the isothermals is governed largely by the size of the pores. J. G. A. G.

Solubility and activated adsorption. E. W. R. STEACIE (Trans. Faraday Soc., 1932, 28, 617-618; cf. A., 1931, 904).—Polemical against Taylor (this vol., 331). J. G. A. G.

Sorption velocity of gases by porous solids. J. SAMESHIMA (Bull. Chem. Soc. Japan, 1932, 7, 177– 188).—The velocity of sorption of gases by porous solids at const. pressure and temp. is discussed. The sorption proceeds in two stages, the velocity of the first being given by $dx/dt=K(S-x)/x^r$, where x denotes the amount sorbed at time t, and K, S, and r are consts. The velocity of the second stage is given by $x-\alpha \log t=k$, where α and k are const. O. J. W.

Adsorption with silica gel at low temperatures. W. D. URRY (J. Physical Chem., 1932, 36, 1831– 1845).—Below a temp. near the crit. temp., T_c , He, A, O_2 , and CH₄ partly undergo capillary condensation, but at higher temp. there is surface adsorption. Within the gel pores T_c seems to be abnormally high. An automatic Toepler pump is described. C. A. (c)

Selective adsorption by silica gel from ammoniacal solutions of heavy metals. BERTHON (Compt. rend., 1932, 195, 384—386).—Ammoniacal solutions of the sulphates of Cu, Zn, Cd, and Ni have been examined with reference to the adsorption which occurs in contact with Patrick's SiO₂ gel. C. A. S.

Adsorption of metallic cations by cellulose. P. PASCAL and (MLLE.) J. HANSOT (Compt. rend., 1932, 195, 349—351).—The adsorption from solutions of Pb(NO₃)₂, TINO₃, and PbCl₂ buffered at $p_{\rm H}$ 4.8 has been examined. C. A. S.

Adsorption of dyes on diamond, charcoal, and artificial silk. H. LACHS and S. PARNAS (Z. physikal. Chem., 1932, 160, 425—444).—Paneth and Radu's experiments (A., 1924, ii, 606) have been repeated by an improved method, and their results confirmed. In the adsorption by diamond and acetate silk, the measured surface area of the adsorbent shows the adsorbed film to be unimol., and although the other adsorbents have greater adsorptive power, this is due to the existence of a large internal adsorbing surface in addition to the observed surface, and there is no evidence of the formation of multimol. films. The internal surface of viscose is > that of cuprammonium silk. R. C. Light absorption and adsorption energy. J. H. DE BOER (Z. physikal. Chem., 1932, B, 18, 49—52).— The adsorption energy of an adsorbed mol. will change when the mol. is excited by absorption of light. The absorption bands will consequently be displaced by adsorption in a direction determined by the relation between the adsorption energies of the excited and normal mol. Colour changes accompanying the formation of mol. compounds may be explained similarly. R. C.

Attraction and repulsion between the plates in Schultze's "gorge "method. S. RAY (Kolloid-Z., 1932, 60, 77).—Theoretical. The effect described (this vol., 112) is independent of the geometrical form, but not of the material, of the plates. E. S. H.

Capillary behaviour of glycine. R. JONES and W. C. M. LEWIS (Biochem. J., 1932, 26, 638—639).— The surface tension of glycine dissolved in H_2O has a max. val. at the isoelectric point. S. S. Z.

Light-sensitive surface layers. II. F. WEI-GERT and E. EBERIUS (Kolloid-Z., 1932, 60, 13–23; cf. this vol., 460).—The red-sensitive surface layer formed at the surface of AgBr-gelatin emulsions by slow drying is followed by a second layer, which is sensitivo to green light. The thickness of the layer is < 700 Å., and it probably consists of a unimol. layer of gelatin oriented with the long axes of the mols. perpendicular to the surface. E. S. H.

Significance of interfacial reactions. E. HEY-MANN (Allgem. Oel- u. Fett-Ztg., 1932, 29, 389—393). —A discussion of adsorption phenomena. E. L.

Protein monolayers. A. H. HUGHES and E. K. RIDEAL (Proc. Roy. Soc., 1932, A, 137, 62-77).-Protein films on liquid surfaces, previously examined, are probably not homogeneous, and a method is described whereby a film of protein of known wt. can be spread directly from the solid protein on to the surface. Such films have been examined quantitatively by measurement of the surface pressure and surface potential, and qualitatively by means of the dark-field ultramicroscope, on 0.01N-HCl and -NaOH, and on a phosphate buffer, $p_{\rm H}$ 5.9. Homogeneous films of gliadin were obtained with a thickness of 3 Å., and the change from a liquid to a gelatinous film has been detected by both methods. A general structure is assigned to protein films on the assumption that the basic polypeptide chains are stretched flat on the surface of the liquid in the most expanded state of the film. L. L. B.

Influence of temperature on structure of cellulose nitrate films. DESMAROUX and MATHIEU (Compt. rend., 1932, 195, 383—384).—The discrepancy between the authors' results (cf. this vol., 798) and those of Trillat (cf. this vol., 683) is attributed to the circumstance that the film used by the latter was evaporated at 70° instead of at room temp.; such high-temp. films exhibit well-developed cryst. character. C. A. S.

Magnetic birefringence of aqueous solutions of salts of rare earths. C. HAENNY (Compt. rend., 1932, 195, 219—222; cf. this vol., 10). Data are recorded for solutions of the nitrates. C. A. S. Preparation of colloidal gold solution. A. R. BONHAM (Canad. Pub. Health J., 1932, 23, 92–94).— Freshly doubly distilled H_2O (1200 c.c.) and 1% $K_2C_2O_4$ solution (15 c.c.) are heated to the b. p. and treated with 15.6 c.c. of a mixture of 1% AuCl₃ (50 c.c.) and 1% KOH (15 c.c.). When a red colour develops the heat supply is diminished, and at a ruby shade is stopped. After 5 min. the solution is placed in the dark. CH. ABS.

Radius of particles in a disperse system. R. AUDUBERT (Compt. rend., 1932, 195, 306–307; cf. this vol., 911).—For suspensions of gamboge, mastic, As_2S_3 , and Fe_2O_3 calc. vals. of the radii are in fair agreement with the results of counting and weighing, but not of fractional centrifuging. C. A. S.

Dependence of light scattering in aërosols on the particle size and the wave-length. I. D. GUREVITSCH and G. P. LUTSCHINSKI [with V. F. MICHAILOV] (Kolloid-Z., 1932, 60, 24—34).—The formulæ of Rayleigh and of Clausius, which are derived for isodisperse systems, do not hold for the aërosols investigated (cf. A., 1927, 9). The intensity of the scattered light I for const. wave-length can be expressed by either (a) $I=Knd^2$ or (b) $I=Knd^3$ (where n is the no. of particles per unit vol., d the diameter of the particle, and K a const.), according to the structure of the disperse particles. Formula (a) holds for dense spheres (oil and tobacco smoke) and (b) for loose aggregates (MgO and Na₂O₂ smokes). The constancy of $I\lambda^4$ in Rayleigh's equation is only a special case of the general constancy of $I\lambda^n$, where n increases with decreasing mean particle size.

E. S. H.

Viscosity of suspensions. II. Viscosity of gold hydrosol. (MLLE.) D. SACHS (J. Chim. phys., 1932, 29, 280—286).—The val. of K in the Einstein viscosity formula is 35 for Au hydrosols prepared by electro-dispersion, thus differing widely from theory. The application of this formula is regarded as unjustifiable (cf. A., 1931, 1367). E. S. H.

Osmotic pressure of solutions of cellulose acetate. J. GRARD (J. Chim. phys., 1932, 29, 287— 296).—Apparatus and technique applicable to solutions of cellulose acetate in $COMe_2$ at 20° are described. The osmotic pressure increases more rapidly than the concn.; the apparent mol. wt. decreases correspondingly with increasing conen. For 3% solutions the mol. wt. varies between 23,000 and 34,000 according to the source of the material. There is no exact relation between the osmotic pressure of different samples and their sp. viscosity, but in general high osmotic pressure accompanies low viscosity.

E. S. H.

Importance of cryolysis for enzymic processes and formation of emulsions. F. F. NORD, O. M. VON RANKE-ABONYI, and G. WEISS (Ber., 1932, 65, [B], 1148—1170).—A lyophile-colloidal zymase solution, after freezing and thawing, shows a temporarily enhanced activity due to an increase of surface. Certain compounds which increase the enzymic activity in various cell systems by increasing the cell permeability are destroyed by lyophile-colloidal particles which can therefore exert a protective action. It follows that the adsorptive may exercise a twofold function in biologically important reactions. Measurements of surface tension, drop no., viscosity, electrical conductivity, or cataphoretic rate of migration show that lyophilic colloids in solution or emulsion undergo an irreversible physical change under the influence of frost. If viscosity measurements are excluded, the direction of change is similar for all colloids in dilute systems. In more conc. solutions or emulsions a different kind of change is observed with ovalbumin. Emulsions prepared with emulsifiers which have been frozen are somewhat more stable than those obtained without this pre-treatment. It appears that the functions of a colloid carrier depend on its physical condition. H. W.

Thermodynamics of solvation equilibrium in colloidal solutions. G. V. SCHULZ (Z. physikal. Chem., 1932, 160, 409—424).—An equation has been derived for the mol. potential, μ_1 , of the free solvent in a sol by assuming that μ_1 can be treated as equiv. to the mol. potential of the solvent in a true solution. Similarly, an expression for the mol. potential, μ_2 , of the solvent bound by the disperse phase has been obtained by regarding μ_2 as equiv. to the mol. potential of the solvent in a gel. These equations lead to the osmotic pressure relations established experimentally (this vol., 225, 570) and make it possible to calculate from osmotic and swelling pressure data the mol. free energy of the bound solvent in any state of a colloidal system. R. C.

Electrical properties of oil-water emulsions, with special reference to the structure of the plasmatic membrane. II. H. H. DIXON and T. A. BENNET-CLARK (Sci. Proc. Roy. Dublin Soc., 1932, 20, 211-226; cf. ibid., 1930, 19, 35).-Emulsions of olive oil in H₂O containing Na oleate as emulsifier are unstable and not truly reversible when the H_2O -phase ratio is >30%. Application of a small e.m.f. causes columns of the H_2O phase to form throughout the emulsion by elongation of the droplets; hence a large increase in electrical conductivity occurs and the permeability of the emulsion to H₂O-sol. substances is increased. Homogenised emulsions automatically recover the original resistance. H₂O-inoil emulsions may remain polarised after the passage of an electrical current, the p.d. being retained for a considerable time. With a suitably adjusted Na : Ca ratio in the emulsion, very small e.m.f. may bring about the puncturing of the oil layer by the deformed H₂O phase. Within limits the sensitivity of the emulsions decreases with decreasing Na: Ca ratio; the sensitivity increases rapidly with rise of temp. and varies with the age of the emulsion. The points of similarity between the electrical behaviour of H_oO-inoil emulsions and the plasmatic membrane are summarised. E. S. H.

Electric charge on an oil droplet in an emulsion. W. C. M. LEWIS (Trans. Faraday Soc., 1932, 28, 597— 607).—Theoretical. The total electric charge density is calc. on certain assumptions (cf. Knapp, *ibid.*, 1921, 17, 457). The charge density is independent of droplet size and equilibrium is therefore possible in a polydisperse system. In oil emulsions, the charge responsible for electrophoresis is only a small fraction of the total charge, but in the case of air bubbles

in H_2O , the total charge is electrophoretic. The pressure relations inside droplets are considered. J. G. A. G.

Action of light on the flocculation of colloidal solutions in a fluorescent medium. A. BOUTARIO and J. BOUCHARD (Bull. Soc. chim., 1932, [iv], 51, 757—760).—The flocculation of As₂S₃ hydrosols by electrolytes is accelerated by visible light in the presence of eosin, fluorescein, or erythrosin. Ultraviolet light has a stronger accelerating influence. This effect occurs only with fluorescent substances; it has been observed with many colourless fluorescent compounds under the influence of ultra-violet light, but not with non-fluorescent dyes, and the accelerating effect increases with the fluorescent power. The apparent flocculation val. of the electrolyte is lowered. E. S. H.

Electrolyte coagulation of silicic acid sols. J. POSTMA (Rec. trav. chim., 1932, 51, 726-738).— The coagulation of neutral and alkaline SiO₂ sols and aq. Na₂SiO₃ has been examined. For BaCl₂ and CaCl₂, the coagulation concn. decreases with increasing alkalinity; for NaCl, NH₄Cl, and Al₂(SO₄)₃, the reverse is the case. The limiting concn. of BaCl₂ becomes smaller and the quantity of Ba^{**} adsorbed by the ppt. becomes the greater the older is the solution. The results are discussed theoretically. D. R. D.

Application of physico-chemical analysis to the investigation of peptisation. A. DUMANSKI (Kolloid-Z., 1932, 60, 39-52).—A procedure for determining peptising effect and representing the results in a triangular diagram is described. The experimental results show the solid-phase effect in the peptisation of Fe(OH)₃ by FeCl₃, the amount peptised being a max. for medium amounts of peptiser. Addition of electrolytes to this system reduces the amount of peptisation, the effect of cations being in the order Li'>Na'>Mg">Ca">Sr">Ba"; the effect of Cl' or Br' is negligible, but SO₄" is a powerful antipeptiser. Results are also given for the systems : Fe(OH)₃mannitol-NaOH; Fe(OH)₃-Na tartrate-NaOH; Cu(OH)₂-K Na tartrate-NaOH; CaCO₃-sucrose-NaOH. E. S. H.

Polymorphism of substances of high mol. wt. III. Mutarotation of gelatin in correlation with the change in its Röntgen spectrum on coagulation. J. R. KATZ (Rec. trav. chim., 1932, 51, 835-841).—A discussion of published data. D. R. D.

Influence of anions on the diffusion velocity of OH' ions in gelatin jellies. V. V. EFIMOV (Kolloid-Z., 1932, 60, 78).—HCO₃', HPO₄'', and H₂PO₄'' reduce markedly the diffusion velocity of OH' in gelatin gels (cf. this vol., 807). E. S. H.

Rôle of acids in the gelation of pectin sols. S. GLÜCKMANN (Kolloid-Z., 1932, 60, 52—59).—The increased gelation tendency of pectin sols in the presence of acids is due to the liberation of pectic acid from the cation with which it is combined. A buffering effect is shown only by samples of pectin which have a high ash content; the ash gives a measure of the cation combined with pectic acid and the buffering effect is a simple exchange between the pectin salt and the added acid. When an excess of acid is added, no increase in gelation tendency occurs until high acid conces. are reached, when a further increase is caused by chemical alteration of the disperse phase. E. S. H.

Cresol-soap systems. III. Gelating powers of isomeric cresols with sodium salts of the acetic acid series. S. JENCIC [with H. BUBERL] (Kolloid-Z., 1932, 60, 59-71; cf. B., 1927, 494, 563). -Na salts of fatty acids containing an even no. of C atoms form gels with o-, m-, and p-cresol. The concn. required for gelation in absence of H₂O for the series Na stearate to Na hexoate increases progressively over the range 1.6-10% for m-, 1.0-8.7% for p-, and 0.3-1.2% for o-cresol. Gels in o- and p-cresol contain the cresol as an under-cooled melt, which is stable for about a month and then crystallises. The m.p. and setting points of gels of equal %-composition rise with increasing mol. wt. of the fatty acid. The gels undergo syneresis, particularly those containing the lower fatty acid radicals. E. S. H.

Physico-chemical studies on proteins. VI. Effect of salts on caseinogen-sodium hydroxide and casein-sodium hydroxide equilibria. A. D. ROBINSON, R. A. GORTNER, and L. S. PALMER (J. Physical Chem., 1932, 36, 1857-1881).-Determination of the p_{π} of caseinogen and casein solutions of high alkalinity shows the amount of alkali " bound " per g. of protein, w, to increase indefinitely with the $p_{\rm H}$, and the binding of alkali in amounts exceeding stoicheiometrical proportions is therefore ascribed to adsorption. w apparently increases with the protein concn., but as the same effect occurs with alanine solutions of $p_{\rm H}$ 9.7, it is probably not significant. The proteinate ion is assumed to have the same activity as Cl'. Uni-univalent salts always reduce the $p_{\rm H}$, and more so at $p_{\rm H}$ 6-9 than at $p_{\rm H}$ 11-12.5. The caseinogen and casein preps used showed no difference in alkali-binding power, and added salts had almost the same effect on both. K. V. T. (c)

Physico-chemical behaviour of lecithin. II. Capillary activity of lecithin-cholesterol dispersions. R. JONES and W. C. M. LEWIS (Biochem. J., 1932, 26, 633-637).—The position of the isoelectric point identified with that of the surface-tension max. (A., 1929, 1381) is altered by the addition of cholesterol from p_{π} 2.6, characteristic of pure lecithin, to p_{π} 4. Filtration experiments show that the large particles of lecithin which give turbidity to the dispersion are the capillary-active units; particles of colloidal or mol. dimensions are not active. S. S. Z.

Dehydration of zeolite gels by freezing. P. G. BIRD (Ind. Eng. Chem., 1932, 24, 793-794).—On freezing a zeolite or other gelatinous ppt., the solid separates in distinct clusters, separated by ice. On melting, the H_2O is easily drained away. When dried in this way, zeolite had a higher base-exchange val. than when dried in an oven at 55°. A dynamic method for testing this capacity is described.

D. R. D.

Effect of ultrasonic waves on thixotropic gels. H. FREUNDLICH, F. ROGOVSKI, and K. SÖLLNER (Z. physikal. Chem., 1932, 160, 469-472).—Thixotropic Fe₂O₃ gels are liquefied by ultrasonic waves (cf. Wood and Loomis, Phil. Mag., 1927, [vii], 4, 418), the change starting at the air-gel interface. The time of setting of the liquefied gel is the same as when it has been liquefied by shaking in the hand. The sound waves have no further action after liquefaction is complete. Thixotropic Al_2O_3 gels behave similarly. The colour changes on liquefaction suggest that the thixotropy of gels of the hydrated oxides is closely related to coagulation. R. C.

Organic thixotropic system with microscopically visible particles. H. VON RECKLINGHAUSEN (Kolloid-Z., 1932, 60, 34—36).—Disperse systems of mercaptobenzthiazole, containing particles of microscopic dimensions, in C_6H_6 , PhMe, EtOH, CCl₄, PhNO₂, and light petroleum are thixotropic. The time required for re-setting of the shaken gel in each medium bears no clear relation to other properties of the liquids. E. S. H.

Swelling of wool fibres in water and in aqueous solutions of sodium hydroxide, as shown by the change in cross-sectional area. M. H. NORRIS (Trans. Faraday Soc., 1932, 28, 618—626).—Apparatus for determining to within 0.001 mm. the diameters of fibres immersed in a fluid is described. Results obtained with NaOH solutions are correlated with X-ray data which indicate permanent penetrations of the fibre micelles by NaOH. Stretched and steamed fibres (β -keratin) swell more than unstretched fibres in H₂O and 0.05N-NaOH. The cross-sectional diameter ratios are unchanged by swelling or by subsequent contraction. J. G. A. G.

Crystallo-polyamphionic theory of solutions, colloids, and plastics. V. Y. KURBATOV (Plast. Mass., 1931, No. 1–2, 36–46).—The theory postulates associations (formed with elimination of H_2O) of ions carrying an equal no. of positive and negative charges. CII. Abs.

Homogenisation of glass melts as a difformation process. H. JEBSEN-MARWEDEL (Kolloid-Z., 1932, 60, 37—38).—The striæ of glass melts are discussed in terms of Ostwald's conception of difform systems (A., 1931, 906). The particles are probably thread-like, consisting of chains of SiO₂ mols.

E. S. H.

The Debye-Hückel theory and electrophoresis. R. AUDUBERT (Compt. rend., 1932, 195, 210-212).— For suspensions of gamboge, mastic, Fe₂O₃, and As₂O₃ in solutions of electrolytes of valencies 1--6, it is found that the change in the cataphoretic velocity (u_0-u) and in the electrokinetic potential $(\psi_0-\psi)$ is proportional to the square root of the ionic strength at low conces. At higher concess. deviations occur which increase with the valency of the electrolyte (cf. A., 1925, ii, 115). C. A. S.

Variability of electrokinetic potential difference. G. ETTISCH and A. ZWANZIG (Z. physikal. Chem., 1932, 160, 385-408).—The measurements previously reported (A., 1930, 697) have been amplified. It is now found that the electrokinetic potential, ζ , for the pure aq. NaCl solution increases in abs. val. with the pressure, p, up to about 20 cm. and then becomes const. In presence of alcohols the variability of ζ with p is more pronounced, and extends to higher pressures. The val. of ζ calc. by Helmholtz's equation is therefore, in general, not uniquely determined by the state of the phase boundary, and cannot serve to characterise it. R. C.

Equilibrium of para- and ortho-hydrogen. R. W. HARKNESS and W. E. DEMING (J. Amer. Chem. Soc., 1932, 54, 2850—2852).—The ratio of para- to ortho-H and percentage of para-H at 20—273° abs. have been calc. by Dennison's formula. E. J. R. (c)

Theoretical derivation of van 't Hoff's dilution law. J. ŠEBOR (Chem. Listy, 1932, 26, 234–235).— Theoretical. R. T.

Ionisation constants of acids in aqueousalcoholic solutions on the basis of catalytic effects. H. M. DAWSON and A. KEY (Proc. Leeds Phil. Soc., 1932, 2, 296–300).—A reaction velocity method, based on the catalytic effect of an acid, for the determination of ionisation consts. of acids in aq. or EtOH-H₂O solution is described. The effect of dilution on the ionisation of CH₂Cl·CO₂Hin 75% EtOH is satisfactorily represented by the law of mass action. The val. of K for this acid in the above solvent is $4 \cdot 0 \times 10^{-5}$. A. J. M.

Dissociation of salts in water. IV. Bi-bivalent salts. R. W. MONEY and C. W. DAVIES (Trans. Faraday Soc., 1932, 28, 609-614; cf. A., 1931, 1126).—The degree of dissociation and dissociation const. of sulphates and oxalates of bivalent metals have been calc. from conductivity data. Evidence of appreciable complex anion formation amongst oxalates of transitional metals is found only with Fe" and Ni" (cf. A., 1931, 66). The dissociation consts. of the alkaline-earth oxalates increase from Mg to Ba. J. G. A. G.

Polyhalides. III. Behaviour in solution. H. W. CREMER and D. R. DUNCAN (J.C.S., 1932, 2031-2042) .- Aq. solutions of the polyhalides of the series RIBr₂, RIBrCl, and RICl₂ are characterised by equilibria of the type $5IBr_2'+3H_2O \Longrightarrow 2I_2+IO_3'+$ 10Br'+6H'. The solutions also contain IOH, but no IBr, ICl, Br₂, or Cl₂. In aq. RICl₄, the main equilibrium is $5ICl_4' + 9H_2O \implies I_2 + 3IO_3' + 20Cl' + I8H'$. R has no influence on the degree of hydrolysis as determined by partition experiments with CCl₄, except in the case of HIBrCl and HICl₂, which are less hydrolysed than their salts. IBr, ICl, and ICl₃ are more hydrolysed than the polyhalides derived from them. Absorption spectra are recorded for solutions of IBr, RIBr₂, and C₅H₅N,IBr, in various solvents. The reactions of the above polyhalides in aq. solution have been examined in detail. Iodine mononitrate and tri*nitrate* are formed by the reactions $IBr + AgNO_3 =$ $AgBr+INO_3$; $2INO_3+AgNO_3=AgI+I(NO_3)_3$, in MeOH solution. D. R. D.

Alkali arsenites. I. R. CERNATESCU and A. MAYER (Z. physikal. Chem., 1932, 160, 305–326).— The conductivity and f.-p. depression of aq. As_2O_3 neutralised with NaOH have the same vals. as for a solution of NaAsO₂ of the same concn. Conductivity data suggest that the K salt formed on neutralisation must also be KAsO₂. The dissociation const. of arsenious acid, deduced from the hydrolysis consts. of NaAsO₂ and KAsO₂, is 9×10^{-10} . From a mixture of equiv. amounts of KOH and As_2O_3 a salt may be crystallised which according to f.-p. measurements appears to be represented by the formula $K_2As_2O_4$ in aq. solution. The conductivity of aq. K_3AsO_3 differs from that of a mixture of aq. As_2O_3 and KOH in the mol. ratio 1:6. R. C.

Changes of salts of tervalent metals in solution. III. Equilibrium between the violet and green forms of potassium chromium alum. C. MONTE-MARTINI and E. VERNAZZA (L'Ind. Chimica, 1932, 7, 857—865; cf. this vol., 351, 708).—Violet solutions tend to turn green even at 0°. Solutions turned green by boiling become violet on cooling, but the change is never complete. At any temp. between 0° and 100°, both green and violet solutions reach the same equilibrium, which is almost independent of the conen. between 20% and 4%. Below 35°, the violet \rightarrow green change and above 35° the green \rightarrow violet is the faster. At 19°, 50% of each is present, but at 42° only 17% of the violet form. The velocities are almost independent of the conen. between 5 and 20%. T. H. P.

Activity coefficient of potassium chloride in aqueous solution from b.-p. data. B. SAXTON and R. P. SMITH (J. Amer. Chem. Soc., 1932, 54, 2626—2636).—The b.-p. elevations for concns. up to $7\cdot 8M$ have been measured, and the activity coeffs. calc. Two new arrangements for measuring b.-p. elevation are described. G. M. M. (c)

Activity coefficients of sulphuric acid in anhydrous acetic acid. V. K. LAMER and W. C. EICHELBERGER (J. Amer. Chem. Soc., 1932, 54, 2763—2766).—Previous e.m.f. measurements of these coeffs. (A., 1931, 1127) can be accounted for on the basis of the Gronwall, LaMer, and Sandved extension of the Debye-Hückel theory (A., 1928, 841) by assuming that H_2SO_4 is a binary electrolyte in this solvent with an *a* val. of 11 Å. at 0.0025—0.038 M. G. M. M. (c)

F. p. of aqueous solutions. I. F.-p. apparatus. G. SCATCHARD, P. T. JONES, and S. S. PREN-TISS. II. Potassium, sodium, and lithium nitrates. G. SCATCHARD, S. S. PRENTISS, and P. T. JONES. III. Ammonium chloride, bromide, iodide, nitrate, and sulphate. G. SCATCHARD and S. S. PRENTISS (J. Amer. Chem. Soc., 1932, 54, 2676-2690, 2690-2695, 2696-2705).—I. Differential measurements were made, temp. being measured with a multiple-junction thermocouple and concn. by conductivity. The solutions were kept saturated with N_2 under 1 atm., the effect of dissolved gas being shown to be approx. proportional to the square of the salt concn. A precision of 0.0_42° is claimed.

II. The results are consistent with a size for NO_3' between those of Br' and I'. The theory that for ions of the noble gas type the size is the only factor which need be considered in calculating the properties of aq. solutions of alkali halides has been tested.

III. With these salts a factor is operative which is negligible for other uni-univalent salts and similar in effect to association. A. S. S. (c)

Individual differences in the osmotic coefficients of strong electrolytes. G. KARAGUNIS (Praktika, 1930, 5, 314-319; Chem. Zentr., 1932, i, 1347).—The order of the osmotic coeffs. for chlorides is different from that for fluorides. The coeffs. depend on the solubilities, and the minima required by Fajans' solubility rule are reflected in the osmotic coeffs. L. S. T.

Solving higher degree equilibrium equations with polyphase duplex slide rule. M. J. POLISSAR (Ind. Eng. Chem. [Anal.], 1932, 4, 332-334).— Mathematical. E. S. H.

Transformation of the constituents of binary and ternary systems. I. I. STEPANOV (Ann. Inst. Anal. Phys. Chim., Leningrad, 1931, 5, 57–74).— Theoretical. R. T.

Singular tensimetric diagrams of the system water-acetic anhydride. K. P. MISCHTSCHENKO and S. I. TSCHERBOV (Ann. Inst. Anal. Phys. Chim., Leningrad, 1931, 5, 47-56).—The v.p. shows a min. at 50 mol.-%, corresponding with formation of AcOH. R. T.

Phosphates of carbamide and guanylcarbamide. A. COCHET and J. HOUDIN (Compt. rend., 1932, 195, 324—326; cf. B., 1932, 636).—The 20° isotherm for the system $CO(NH_2)_2-H_3PO_4-H_2O$ shows that $CO(NH_2)_2,H_3PO_4$ is the only solid phosphate of carbamide. The composition at the invariant point is $CO(NH_2)_2$ 53·30, H_3PO_4 23·14, H_2O 23·56%. *Guanylcarbamide phosphate* (B,H_3PO_4), prepared by heating at 100° H_3PO_4 and a solution of dicyanodiamide, has m. p. 178°. C. A. S.

Fusion diagrams of highly-refractory oxides. IV. Aluminium oxide. H. VON WARTENBERG and H. J. REUSCH (Z. anorg. Chem., 1932, 207, 1–20; cf. A., 1931, 567).—The m. p. of Cr_2O_3 , La_2O_3 , and Ga_2O_3 are 2275°, 2315°, and 1740°, respectively. M.-p. data for mixtures of Al_2O_3 with BeO, MgO, SrO, BaO, NiO, CoO, Cu_2O , TiO₂, ThO₂, CeO₂, La_2O_3 , Mn_3O_4 , Fe₃O₄, Ga_2O_3 , and Cr_2O_3 are recorded. J. W. S.

Lowering of eutectic points. J. MULLER (Compt. rend., 1932, 195, 240—242; cf. this vol., 692).— Further measurements of the lowering of the eutectic point in the system H_2O-KNO_3 on the addition of acids, bases, and salts have been made. C. A. S.

System HgBr₂-KBr-H₂O. (MLLE.) M. PERNOT (Compt. rend., 1932, 195, 238-240; cf. A., 1931, 695).—Between 0° and 80° the system is similar to HgI₂-KI-H₂O: the only compound formed is HgBr₂,KBr,H₂O. HgBr₂,2KBr (cf. A., 1925, ii, 887) is probably a mixture of this and KBr. C. A. S.

System magnesium oxide-magnesium chloride-water. C. R. BURY and E. R. H. DAVIES [with G. GRIME] (J.C.S., 1932, 2008—2015).—At 25° the stable solid phases are : Mg(OH)₂ (I), shown by X-ray analysis to have the brucite structure; 3MgO,MgCl₂,11H₂O (II); MgCl₂,6H₂O. Under certain conditions, gels are formed, composed of cryst. needles of (II) with solution in the interstices. The conditions of formation of magnesian cement [shown by chemical and X-ray analysis to be a mixture of (I), (II), and solution], have also been determined. On weathering, the cement becomes covered with a layer of MgCO₃, which retards the decomp. and deliquescence of (II) in damp air. Nevertheless, it is advisable to impregnate the surface with oil or wax. D. R. D.

System $NiSO_4$ -CaSO₄-H₂O. A. N. CAMPBELL and N. S. YANICK (Trans. Faraday Soc., 1932, 28, 657-661).—Solubility data at 45°, 75°, and 90° show that CaSO₄,2H₂O is present throughout and that the max. in the solubility curve is smooth and does not correspond with double salt formation.

J. G. A. G.

System water-alcohol-ether at low temperatures. A. LALANDE (Compt. rend., 1932, 195, 133-136).—The equilibria at 0° and -15° have been examined (cf. A., 1911, ii, 26; B., 1923, 201A).

C. A. S. Ternary system allylthiocarbimide-anilinebenzene. N. S. KURNAKOV and E. F. PLAKSINA-SCHISCHOKINA (Ann. Inst. Anal. Phys. Chim., Leningrad, 1931, 5, 29-46).—The compound, C₃H₅·NCS,NH₂Ph, m.p. 99°, is formed. R. T.

Reversibility of the reactions between sulphur dioxide and calcium oxide and between sulphur and calcium oxide. J. ZAWADZKI, C. Z. MORGEN-STERN, T. SIBERA, and S. BRETSZNAJDER (Rocz. Chem., 1932, 12, 457-467).—The equilibrium pressures of the systems CaS-CaSO₄, CaO-SO₂, and CaO-S have been measured at different temp. R. T.

Salicylic acid as a secondary standard substance in calorimetry. P. E. VERKADE (J. Chim. phys., 1932, 29, 297–301).—A reply to Keffler (this vol., 23). The val. preferred for the heat of combustion of salicylic acid is 5237.7 g.-cal. (15°) per g. (weighed in vac.). E. S. H.

Energy of dissociation of nitrogen. T. C. SUTTON (Nature, 1932, 130, 132).—Using the val. -20.6 for the heat of formation of N₂O, Datta's val. for the energy of dissociation of N₂ becomes 9.0 volts or 208 kg.-cal. (cf. this vol., 799). L. S. T.

Heat of formation of nitrous oxide. T. C. SUTTON (Phil. Mag., 1932, [vii], 14, 275–285).— Calorimetric data for the reaction $H_2+N_2O \longrightarrow H_2O+N_2$ lead to -20.5 ± 0.3 kg.-cal. N. M. B.

Heats of formation of the hydrates of manganous oxalate. M. L. SMITH and B. TOPLEY (J.C.S., 1932, 1977–1979).—Measurements of the heat of dissolution of MnC_2O_4 and its hydrates in HNO_3 indicate that $MnC_2O_4+2H_2O$ (liq.)= $MnC_2O_4,2H_2O+6247$ g.cal.; $MnC_2O_4+3H_2O$ (liq.)= $MnC_2O_4,3H_2O+7800$ g.cal. D. R. D.

Heats of dilution and other thermochemical data for bi-univalent salts. III. Magnesium, strontium, and barium nitrates in water at 15°. H. HAMMERSCHMID and E. LANGE (Z. physikal. Chem., 1932, 160, 445—465; cf. this vol., 23).—From measurements of the heats of dilution up to 0·1*M* the differential and integral heats of dissolution, Φ_m and V_m , and the apparent and partial relative mol. heat capacities at 20° have been cale. The relations of Φ_m and V_m to the concn. correspond with the Debye-Hückel limiting law only at the highest dilutions, whereas with the heat capacities the theoretical relations are approx. realised up to 0·1*M*. For all the magnitudes, however, the individuality of the salt is perceptible in the concn. curve. The residual thermodynamic effects, *i.e.*, the heat effect, work done, and entropy change in the transition from the state of unit activity to the particular real concn., have been calc. for the $Ba(NO_3)_2$ solutions at 15° and 25°, and the "real" effects, ascribable to interionic forces and association, have been calc. for all three salts. The constituent elements of the dilution process responsible for the sign, magnitude, individuality, and variation with temp. of the real effects are qualitatively discussed. R. C.

Heat absorption in the cooling of salt solutions. A. STEINBACH (Forsch. Gebiet Ingenieurw., 1931, A, 2, 105—108; Chem. Zentr., 1932, i, 1344).—Data are given for CaCl₂ solutions. L. S. T.

Essential oils and heat absorption. H. NICOL (Biochem. J., 1932, 26, 658—665).—The absorption of radiant heat is chiefly due to H_2O vapour and only secondarily to the odoriferous constituents.

S. S. Z.

Transference numbers of aqueous solutions of potassium, sodium, lithium, and hydrogen chlorides at 25° by the moving-boundary method. L. G. LONGSWORTH (J. Amer. Chem. Soc., 1932, 54, 2741—2758).—Measurements were made at 0.001— 0.2N. With dil. solutions a correction for the conductivity of the H₂O is important. An interpolation formula connecting transference nos. with conen. is derived. E. J. R. (c)

Determination of electrolytic resistances at high frequencies by the bridge method. W. GEYER (Ann. Physik, 1932, [v], 14, 299–320).— Various errors in the bridge method are eliminated, and measurements recorded for $MgSO_4$ and NaCl solutions; the results agree with Debye's theory.

A. J. M.

Conductivity of dielectric liquids. A. NIKU-RADSE (Physikal. Z., 1932, 33, 553-575).—A summary of the present position of the subject. W. R. A.

Limiting equivalent conductances of several univalent ions in water at 25°. D. A. MACINNES, T. SHEDLOVSKY, and L. G. LONGSWORTH (J. Amer. Chem. Soc., 1932, 54, 2758—2762).—Using an extension of Onsager's equation with new transference and conductance data the limiting equiv. conductance of Cl' is calc. to be 76.32, from which the following limiting conductances have been calc. : K^{*}, 73.50; Na^{*}, 50.10; H^{*}, 349.72; Ag^{*}, 61.90; Li^{*}, 38.68; NO₃', 71.42; OAc', 40.87. E. J. R. (c)

Determination of the mobilities of anions of weak acids. C. W. DAVIES (Trans. Faraday Soc., 1932, 28, 607—609; cf. A., 1928, 22).—The solvent correction to be applied to conductivity data for salts of weak acids is evaluated for a particular case (A., 1931, 66). The use of the "normal" correction leads to serious errors in the conductivities. J. G. A. G.

Conductivity measurements with aqueous solutions of alkylammonium picrates. P. WAL-DEN and E. J. BIRR (Z. physikal. Chem., 1932, 160, 327-336).—From measurements at 18° at dilutions up to 6000 litres the mobilities of the cations have been calc. From the vals. of the product of the mobility and the viscosity of the solvent NMe_4° and NPr_4° appear to be unsolvated in H_2O and other solvents, whilst the partly alkylated ions are solvated. R. C.

Basic salts. I. Basic zinc chloride. E. HAYEK (Z. anorg. Chem., 1932, 207, 41-45).—Conductivity measurements for the systems ZnO-HCl and ZnO-ZnCl₂ indicate the existence of the basic salts 4ZnO,ZnCl₂,5H₂O and ZnO,ZnCl₂,H₂O (cf. A., 1930, 436). The salts have been isolated and analysed. J. W. S.

Complex nature of polonium ions. M. HAIS-SINSKY (Compt. rend., 1932, 195, 131—133; cf. this vol., 701).—The relative amounts of Po carried to the cathode and anode in the electrolysis of acid and alkaline solutions show that in alkaline solution the Po is probably present as polonite, but in the acid solutions as a complex, e.g., $[Po(NO_3)_6]''$, $[Po(C_2O_4)_3]'''$ (cf. A., 1931, 697). C. A. S.

Conductivity measurements in pyridine. P. WALDEN, L. F. AUDRIETH, and E. J. BIRR (Z. physikal. Chem., 1932, 160, 337-365).-Measurements at 25° with solutions of org. and inorg. salts show marked differences in the ionisation of various solutes. In the order of diminishing strength the cations form the series Ag>Li>K>Na and the anions the series picrate > $ClO_4 > I > NO_3 > Br > Cl$. Kohlrausch's square-root law is valid, being applicable to strong and moderately strong electrolytes when v > 8000litres, and the validity of the principle of independent ionic migration has been established for several of the solutes. For the tetra-alkylammonium salts the val. of the product of the equiv. conductivity at infinite dilution and the viscosity of the solvent is considerably higher for C5H5N than for other solvents, an abnormality which is apparently traceable to the cations. There are no grounds for postulating a Grotthus conductivity for the pyridinium ion in $C_5H_5N.$ R. C.

Potentials of ferromanganese and of ferrochromium anodes at different current densities and hydrate concentrations. M. DE K. THOMPSON and R. B. MORRISSEY (Trans. Amer. Electrochem. Soc., 1932, 61, 259-266).—Single potentials of Fe-Mn and Fe-Cr anodes in aq. NaOH or KOH have been measured at various c.d. At higher alkali conens. the potential for a given c.d. is almost independent of the conen., although the current efficiencies for the individual anode products (permanganate or chromate, O₂, and oxides) change notably over this range. H. J. T. E.

Variation of potential of electrolytic iron with $p_{\rm fl}$ of the medium. A. TRAVERS and J. AUBERT (Compt. rend., 1932, 195, 138—139).—The limiting potential (relative to the HgCl electrode) of electrolytic Fe in N-HCl, -H₂SO₄, -H₃PO₄, or -HClO₄ is -0.51 to -0.52 volt, and -0.730 in 1% Na₂SO₄. Addition of a depolariser, e.g., MnO₂, has no effect, but if the Na₂SO₄ solution is deprived of O₂ by bubbling H₂ through it, and the current of H₂ maintained, the potential falls to -0.78 volt, and in a N-alkali solution similarly treated to -1.050 volt. The H electrode thus formed is not reversible. An Fe electrode used for a few min. as cathode gives immediately on being withdrawn potentials of -0.91 volt in 1% Na₂SO₄ and -1.14 in N-NaOH. C. A. S.

Mercury sulphates and standard cells. R. B. ELLIOTT and G. A. HULETT (J. Physical Chem., 1932, 36, 2083—2086).—The e.m.f. of Cd and Zn cells prepared with Hg_2SO_4 which has crystallised on slow reduction with SO_2 of a half-saturated solution of $HgSO_4$ in 1 : $6H_2SO_4$ is fairly const., and is lowered by covering the crystal surfaces with finely-divided Hg. L. P. H. (c)

Glass electrodes. S. I. SOKOLOV and A. H. PASSINSKI (Z. physikal. Chem., 1932, 160, 366— 377).—The deviation of the potential of an electrode of Li, Na, or K glass in a strongly alkaline solution of an alkali hydroxide from the val. corresponding with a reversible H electrode is greatest if the cation present in solution is the same as that in the glass or has a lower at. no. If the at. no. is higher, the deviation is much smaller and the slope of the potential– p_{π} curve never changes in sign. The deviations are ascribed to the migration into the glass of the external metal ion in preference to H^{*}. The readiness with which this occurs will depend on the size of the anhyd. ion, the space occupied in the glass by its cation, and the phase boundary potential. R. C.

Rate of autoxidation of oxidation-reduction systems and its relation to their free energy. E. S. G. BARRON (J. Biol. Chem., 1932, 97, 287–302). —The autoxidation by mol. O_2 of a no. of reversible oxidation-reduction dyes (cf. A., 1930, 639) has been studied electrometrically. At const. $p_{\rm H}$ and in absence of catalysts a linear relationship exists, with a few exceptions, between E'_0 (the e.m.f. when oxidant/ reductant equals 1) and the logarithm of the time required to oxidise the dye from 2 to 50% oxidation. The same relation holds for the rate of oxidation of single oxidation-reduction systems. With some dyes the rate indicates a reaction of the first order.

F. O. H.

Oxidation-reduction potential of hexuronic acid. I. D. GEORGESCU (J. Chim. phys., 1932, 29, 217-237).—Hexuronic acid extracted from orange juice establishes a definite potential corresponding with rH_2 15 \pm 0.5. C. W. G.

Theory of electrolytic polarisation. H. FRICKE (Phil. Mag., 1932, [vii], 14, 310—318).—Mathematical. N. M. B.

Influence of high-frequency currents on polarised electrodes. I. S. GLASSTONE and G. D. REYNOLDS (Trans. Faraday Soc., 1932, 28, 582-596). —The decrease of polarisation of a Pt or Pb cathode resulting from applied high-frequency currents (H.F. effect) is approx. proportional to the high-frequency c.d. At high polarising c.d. the H.F. effect is small and almost independent of the gas saturating the electrolyte, and the magnitude, for a given highfrequency c.d., is approx. proportional to the highfrequency c.d., is approx. proportional to the highfrequency e.m.f. With low polarising c.d. the H.F. effect is very large in solutions saturated with air or O_2 , but small for H_2 or N_2 . Although high-frequency oscillations do not affect the min. H_2 overvoltage, the residual current is increased, especially in the presence of O_2 . These H.F. effects and the mechanism of the

"electrolytic detector" are accounted for on the view that high-frequency currents exert their depolarising effect by increasing the rate of diffusion of active material from, or depolariser to, the electrode. The magnitude and mechanism of the H.F. effect are probably the same at both anode and cathode.

J. G. A. G.

Alternating-current capacities of electrolytic condensers. F. W. GODSEY, jun. (Trans. Amer. Electrochem. Soc., 1932, 61, 331-345).—Anode films in electrolytic condensers are readily formed in a.c. circuits if two anodes of equal area are used. The capacity of such an anode differs widely from the d.c. capacity at similar voltage, when the effective a.c. formation voltage is taken as the max. voltage which appears across the anode film during the formation period. If, however, the effective formation voltage on a.c. is calc. from measured electrolyte potentials, a close agreement is obtained. The film behaves as if it consisted of two parts, an inner rectifying layer and an outer layer penetrated by the ions and solvent mols. of the electrolyte solution, the relative dimensions of these parts depending on the operating conditions. Such a structure corresponds with the author's H. J. T. E. adsorbed liquid theory.

Potential gradients in anodic films. F. W. GODSEY, jun. (Trans. Amer. Electrochem. Soc., 1932, **61**, 347-357).—Potential gradients for anode films in electrolytic condensers calc. on the basis of theories of film structure range from 160×10^6 to 2×10^6 volts per cm. The gas oxide theory is rejected because of the high gradients required, and the solid oxide theory because of the extremely high dielectric const. which must be postulated for the film. It is inferred that the film contains a certain proportion (probably 30 vol.-%) of the electrolyte solvent, held either by adsorption or absorption (cf. preceding abstract). H. J. T. E.

Electrolytic valve action and electrolytic rectifiers. E. NEWBERY (Proc. Roy. Soc., 1932, A, 137, 134—145).—The behaviour of various valve and rectifying electrodes has been investigated by using the cathode-ray oscillograph. Valve action depends on the formation of an adherent insulating anodic film which is permeable to H^{*} but not to the anions present; rectifying action occurs when such a film is irreducible by electrolytic H₂ and not further oxidisable by discharged anions. The film responsible for the rectifying action of an Al electrode is the oxide only, the presence of hydroxide being a marked disadvantage. The action of the Ta rectifier is similar to that of Al. L. B.

Unimolecular decomposition of simple molecules. R. MECKE (Z. physikal. Chem., 1932, B, 18, 53-60).—Examination of the decomp. of CO₂ and CH₂O (cf. this vol., 680) by means of the theory previously advanced (*ibid.*, 559) shows that, according to the mode of decomp., either normal or excited atoms may be formed. R. C.

Initiation of gaseous explosions by small flames. J. M. HOLM (Phil. Mag., 1932, [vii], 14, 18-56).—A theoretical relation between the limiting diameters for the propagation of flames in small tubes and consts. of the combustible mixture is deduced, assuming extinction to be due primarily to the cooling effect of unburnt gases. Methods of determining limiting diameters and the conditions for ignition through apertures in metal plates are described. There was no evidence that a min. time of contact with a flame is necessary for ignition. H. J. E.

Oxidation of carbon monoxide. G. HADMAN, H. W. THOMPSON, and C. N. HINSHELWOOD (Proc. Roy. Soc., 1932, A, 137, 87-101).—The oxidation of moist CO takes place at a rate which is proportional to the concn. of CO and H₂O and inversely proportional to that of O_2 . In cylindrical bulbs it is proportional to the square of the diameter. These facts are consistent with the assumption that the primary process is the interaction of CO and H₂O, the H₂ produced setting up reaction chains, and the retarding action of O_2 breaking the chains by an oxidation process at the vessel wall and not by a "poisoning" of the primary process. The chain length is of the order 10⁶ in a 7.5 cm. diameter Si vessel at 600°. The efficiency of collisions in propagating the chain is as high as 1 in 100. The kinetics of the dry reaction are quite different, confirming the view that direct oxidation takes place independently of traces of H_2O . With dry gases at lower pressures there is an explosive region bounded by limits outside which the reaction L. L. B. is very slow.

Velocity of dissociation of nitrogen tetroxide by method of sound waves. W. T. RICHARDS and J. A. REID (J. Amer. Chem. Soc., 1932, 54, 3014— 3015).—The velocity coeff. at 25° and 260 mm. is approx. 4.8×10^4 and the activation energy closely approximates to the heat of dissociation of N₂O₄. It may be assumed, therefore, that the velocity of association of N₂O₄ has little if any temp. coeff.

Ĉ. J. W. (c)

Kinetics of chemical change in solution. E. A. MOELWYN-HUGHES (Phil. Mag., 1932, [vii], 14, 112— 130).—The rates of many bimol. reactions in dil. solution between neutral solute mols., or between a neutral solute mol. and an ion, agree with those calc. from the no. of collisions with energy > the energy of activation E. The rate of hydrolysis of esters, amides, and substituted glycines catalysed by H⁺ in aq. solution is expressed by a similar relation, but different expressions must be used in calculating the no. of collisions and E. Discrepancies in certain more complicated reactions in solution are accounted for by assuming additional degrees of freedom. H. J. E.

Kinetics of the reversible reaction between arsenious acid and iodine. E. JózEFOWICZ (Rocz. Chem., 1932, 12, 441-456).—Roebuck's results (A., 1903, ii, 14; 1906, ii, 76) have been confirmed. The heat of the reaction $I_3' \rightleftharpoons I'+I_2$ is -4300 g.-cal., and of $I_2+H_2O \longrightarrow HIO+H'+I'$ is -23,200 g.-cal. B. T.

Saponification of acetamide and acetanilide by a base. (MLLE.) J. M. A. HOEFLAKE and F. E. C. SCHEFFER [with M. J. R. H. VAN NOUHUYS and (MME.) J. C. POSTHUMUS-BRUYN] (Rev. trav. chim., 1932, 51, 673—691).—The rates of saponification of NH₂Ac and NHAcPh by aq. KOH have been measured at various temp. and the results explained thermodynamically. The concn. of NH₂ in the partly hydrolysed $\rm NH_2Ac$ was determined by bubbling air through the solutions, the val. of $p_{\rm NH_3}$ in air/ $c_{\rm NH_3}$ in solution having been determined for aq. KOH, KOAc, and $\rm NH_2Ac$. The degree of saponification of NHAcPh was determined by back-titration of the chilled solution with alkali after adding excess of $\rm H_2SO_4$.

D. R. D.

Kinetics of thiocyanate-brominated fatty acid reactions. V. K. LAMER and J. GREENSPAN (J. Amer. Chem. Soc., 1932, 54, 2739—2741).—After 1500 min. interfering reactions obscure the kinetics of the halogen replacement by CNS' in the halogenated fatty acids. Halogen in the β -position in an ion is more reactive than in the α -position. E. J. R. (c)

Semicarbazone formation. J. B. CONANT and P. D. BARTLETT (J. Amer. Chem. Soc., 1932, 54, 2881-2899).-A quant. study of the factors affecting the equilibrium and rates of semicarbazone formation. The extent of hydrolysis of a given semicarbazone is a function of the acidity of the solution; an equation is derived for its expression. The formation of semicarbazones is subject to general acid catalysis and a fairly satisfactory formulation is developed in terms of the effect of acidity on the amount of semicarbazide reacting and acid catalysis. The equilibria and rates of semicarbazone formation for a variety of ketones and aldehydes are measured under comparable conditions. Velocity coeffs. for formation and hydrolysis are reported as follows : MeCHO 361, 1040; PhCHO 2.05, 0.62; furfuraldehyde 0.73, 0.55; CMe₃·CHO 20, 37; AcCO₂H 7·37, 3·8; COMe₂ 6·02, 1800; cyclohexanone 36, 7600; pinacolone 0.068, 86. There is no apparent relation between the speed of formation of the semicarbazone and its stability. Certain relations between structure and equilibria and rates of semicarbazone formation are pointed out.

C. J. W. (b)

Rate of absorption of carbon dioxide in water and in alkaline media. J. W. PAYNE and B. F. DODGE (Ind. Eng. Chem., 1932, 24, 630-637).-Air or H₂ with different proportions of CO, was passed up a packed glass tube in countercurrent to H₂O, solutions of Na₂CO₃, NaOH, Na₂CO₃+NaHCO₃, and sucrose. The average over-all absorption coeff. is independent of the CO, concn. A 4-fold increase in gas rate has no effect on the coeff. Increase in liquid rate increases the coeff. very materially. A 16-fold variation in Na₂CO₃ concn. has no significant effect on the coeff. Rise in temp. greatly increases the coeff. The absorption coeff. is less for aq. Na₂CO₃ than for pure H₂O. Addition of NaHCO₃ to aq. Na₂CO₃ decreases the coeff. Addition of small amounts of sucrose and CH₂O to aq. Na₂CO₃ increases the coeff. slightly. The coeff. for dil. NaOH is > for aq. The rate of absorption in dil. NaHCO3 is Na₂CO₃. appreciably less than in pure H₂O. The absorption rate for aq. Na₂CO₃ is practically const. throughout the tower and does not diminish with falling partial pressure of CO₂. The diffusion theory of absorption is discussed; chemical reaction rate must also be H. I. taken into account.

Velocity of dissolution and sublimation of a solid rotating in a liquid. V. GIAMBALVO (Nuovo Cim., 1931, 8, 246-257; Chem. Zentr., 1932, i, 1332).

-Results obtained when a rotating solid gradually dissolves in different conc. solutions or sublimes in air are discussed. L. S. T.

Reduction of cupric oxide by carbon monoxide and hydrogen. A. JULIARD (Bull. Soc. chim. Belg., 1932, 41, 289—308).—The results previously reported (this vol., 577) can be explained by assuming that the velocity of reduction of CuO is determined at each moment by the velocity of diffusion of the reducing gas through the envelope of reduced material to the CuO surface. Mathematical equations developed to represent the course of reaction are shown to be in accordance with experimental results. E. S. H.

Adsorption and reflexion processes in the interaction of hydrogen and metals. K. F. BON-HOEFFER and A. FARKAS (Trans. Faraday Soc., 1932, 28, 561).—A correction. The discontinuities attributed to surface hydride formation (this vol., 568) are due to a non-uniform temp. distribution along the wire (cf. Busch, Ann. Physik, 1921, 64, 401).

J. G. A. G

Reaction regions. XXI. Reaction regions Al-MoO₅-CaF₂, Al-MoO₂-CaF₂, Al-S-B₂O₃, and Si-Cu-PbO. W. P. JORISSEN and A. H. BELIN-FANTE. XXII. Prevention of explosive reactions in gas and vapour mixtures by small amounts of various substances. W. P. JORISSEN, J. BOOY, and J. VAN HEININGEN (Rec. trav. chim., 1932, 51, 853-867, 868-877).-XXI. The ranges of composition within which the reactions propagate themselves throughout the mass when they have been started by means of a mixture of powdered Fe and S have been determined. The results, which are expressed by means of triangular diagrams, show a striking analogy to the explosion regions of three-component gas mixtures.

XXII. Explosion regions are given for mixtures of air and CH_4 with Bu^{β}Cl, PrBr, EtI, SO₂Cl₂, SiCl₄, and SiHCl₃. < 1% of POCl₃ is sufficient to render all mixtures of air and CH₄ non-explosive. D. R. D.

Linear velocity of crystallisation of copper at the cathode in electrolysis of copper sulphate. A. GLAZUNOV and A. ROŠKOT (Chem. Listy, 1932, 26, 308—311).—The velocity of crystallisation, V, of Cu is 10—20 times that of Ag under similar conditions; V diminishes in the presence of gelatin and with increasing concn. of CuSO₄. As the c.d. is increased, V rises at first rapidly and then more slowly.

R. T.

Reaction kinetics in heterogeneous systems. Oxidation of anthracene with chromic acid. V. MAJER and V. MAREČEK (Z. physikal. Chem., 1932, 159, 181—193).—In the oxidation of anthracene suspended in aq. $K_2Cr_2O_7$ and H_2SO_4 at 60—100° the rate of disappearance of the chromic acid follows the unimol. law, although for a short time after reaction has begun the velocity coeff., k, rises slowly. k increases with the rate of stirring, the amount of anthracene suspended in unit vol. of liquid, the ratio anthracene : CrO_3 , and the interfacial area in such a way as to suggest that the reaction is a surface reaction in which diffusion plays an important part, although certain features of the reaction, in particular the fact that k remains const. as the reaction proceeds and the interfacial area therefore diminishes, suggest a more complicated mechanism. k increases by 11% for 1° rise in temp. Addition of AcOH increases k, apparently because the solubility of the anthracene is increased. R. C.

Homogeneous catalysis of gaseous reactions. Catalytic decomposition of nitrous oxide by halogens. F. F. MUSGRAVE and C. N. HINSHELwood (Proc. Roy. Soc., 1932, A, 137, 25-36).—The thermal decomp. of N_2O is catalysed by halogens, the free halogen atom probably being the catalyst. As the concn. of the catalyst increases, the rate reaches a limiting val. The reactions are homogeneous and unimol. with respect to the N_2O . L. L. B.

Comparison of catalytic effects produced by acids in aqueous and in aqueous-alcoholic solution. H. M. DAWSON and G. V. HALL (Proc. Leeds Phil. Soc., 1932, 2, 289—295).—The catalysing powers of $CH_2Cl \cdot CO_2H$ and AcOH in EtOH-H₂O mixtures were determined. The catalytic activity of the undissociated acid is reduced, whilst that of the acid anion is increased, by replacing H₂O by EtOH. It is probable that this effect is directly connected with the diminution of the ionisation consts. caused when aq. EtOH is used instead of H₂O as a solvent.

A. J. M.

Fenton's reaction. IV. A. T. KUCHLIN (Rec. trav. chim., 1932, 51, 887-913).-Oxidation of glucose by $FeSO_4$ and H_2O_2 yields (1) at 30° in dil. solution, osone, and α -keto- and $\alpha\beta$ -diketo-gluconic acids; (2) at 30° in conc. solution, CH₂O; (3) at 70° in conc. solution, CO₂, CH₂O, H₂C₂O₄, glycollic, tartronic, and glyceric acids, and probably unidentified lower ketonic acids. The $FeSO_4$ catalyses oxidation of the secondary alcohol groups, whereas HNO₃, KMnO₄, and aq. Br without catalysts oxidise the end C atoms. The influence of the concn. of H', Fe", Fe", and glucose on the initial velocity of oxidation has been investigated. β-Glucose and -mannose are oxidised more rapidly than the a-forms. The catalytic action of Fe" is not due to complex formation nor to the formation of any peroxide of Fe; it is probable that the electric field due to the Fe" ions causes a deformation of the sugar mols, which favours oxidation of certain OH groups. Fe" does not act similarly, although complex formation occurs to a greater extent. D. R. D.

Slow hydrolysis of zinc acetate. J. GUÉRON (Compt. rend., 1932, 195, 150—152; cf. A., 1887, 767). —The hydrolysis of 0.0015M-Zn(OAc)₂ has been examined potentiometrically and the result is shown by $p_{\rm H}$ -time curves. Equilibrium is attained after varying times at $p_{\rm H}$ 5.9—6.0. Hydrolysis is accelerated by CO₂ in the solution, the time for half variation of $p_{\rm H}$ varying from 1 to 50 hr., and, also by increase, relative to vol., of the glass surface, *e.g.*, by introducing glass wool (cf. this vol., 481). C. A. S.

Chain reactions in enzymic catalysis. J. B. S. HALDANE (Nature, 1932, 130, 61; cf. this vol., 880).— A discussion. L. S. T.

Chain reactions in enzymic catalysis. D. RICHTER (Nature, 1932, 130, 97).—A discussion (cf. preceding abstract). Christiansen's energy chain mechanism affords a more satisfactory explanation of the observed facts in enzymic reactions than does the chain mechanism proposed by Haber and Willstätter. L. S. T.

Catalytic oxidation of uric acid. Z. DOBROWOL-SKA (Biochem. J., 1932, 26, 543-550).-Thioglycollic acid, dithioglycollic acid, cysteine, or cystine is without influence on the oxidation of uric acid either in the presence or absence of salts of Fe or Cu. Monohydrated Na urate separates from systems containing uric acid and thioglycollic acid at $p_{\rm II}$ 10.5—11.5. Methylene-blue catalyses the oxidation of uric acid under aërobic but not anaërobic conditions, the velocity of the reaction varying with $p_{\rm H}$. The reaction is inhibited according to the $p_{\rm H}$ of the medium by Cu salts $(0.0001 M - CuSO_4)$ and to a slight extent by 0.004 M-KCN over the range $p_{\rm R} 6$ -10. The catalytic activity of solutions of methylenc-blue rises considerably during the first few weeks, especially when S. S. Z. alkaline.

Influence of various sulphur compounds on the precipitation of a mixture of silver iodide and bromide [from silver nitrate] by a mixture of alkali iodide and bromide. E. CALZAVARA (Bull. Soc. Franç. Phot., 1932, 19, 13-15).-Only thioacetic acid, thiosinamine, and K selenotrithionate show welldefined sulpholysis (or selenolysis), which is retarded, in the last two cases, by gelatin. Activators containing S retard the pptn. of AgBr and AgI, even when sulpholysis is not perceptible, both in neutral and in alkaline media; gelatin alone also retards the pptn., but in many cases tends to check the retardation caused by the activators. The activators displace the equilibria in favour of iodide pptn. Intermediate compounds, e.g., Ag β -thiolactate, can sometimes be detected. J. L.

Catalysis in Deacon's process. (MLLE.) A. E. KORVEZEE (Rec. trav. chim., 1932, 51, 815—834).— The stability of the Cu compounds formed in Deacon's process (CuCl₂, CuO, Cu₂OCl₂) in presence of Cl₂, H₂O, HCl, and O₂ has been studied at 450° and total pressure 0.5 atm. The catalysis is chemical in character, depending on the formation of intermediate compounds. D. R. D.

Nitrogen, iron, and contact catalysis. H. H. GRAY (Chem. and Ind., 1932, 537-538).—Sieverts' view (A., 1907, ii, 741) that gaseous N_2 is insol. in α -Fe was corrected by himself (A., 1931, 1120) and numerical vals. of solubility were given together with the assertion of the formation of a definite nitride. The evidential val. of the activated adsorption interpretation is not accepted. C. A. K.

Dispersity of catalyst and catalytic activity. K. YOSHIKAWA (Bull. Chem. Soc. Japan, 1932, 7, 201-210).—The hydrogenation of C_2H_2 using Ni and Pd catalysts containing varying amounts of kieselguhr has been studied. The quantity of kieselguhr added to the catalyst influences the activity of the resulting mixture. By passage over Ni or Pd distributed on a suitable amount of kieselguhr, C_2H_2 is hydrogenated almost entirely to C_2H_4 instead of to C_2H_6 . A possible mechanism of the reaction is suggested. O. J. W. Photolysis of hydrogen peroxide in aqueous solution. L. J. HEIDT (J. Amer. Chem. Soc., 1932, 54, 2840—2843).—In the photolysis at $28\pm2^{\circ}$ in very intense light of wave-length 3130 Å. the quantum yield approaches 1 as the H₂O₂ concn. decreases. G. M. M. (c)

Quantum yield in photochemical decomposition of gaseous hydrazine. R. R. WENNER and A. O. BECKMAN (J. Amer. Chem. Soc., 1932, 54, 2787—2797).—In the decomp. in light of wave-length 1990 Å. and under pressures of 2—14mm. the quantum yields range from 1 at the lower to 1.7 at the higher pressure. A reaction mechanism is proposed.

G. M. M. (c) Photochemical, mercury-sensitised reactions between hydrogen, oxygen, and carbon monoxide. M. BARAK and H. S. TAYLOR (Trans. Faraday Soc., 1932, 569—581; cf. A., 1931, 1136).—The combination of H_2 and O_2 in a static system at 14° under the influence of excited Hg is autocatalytic in $2H_2: O_2$ and H_2 -rich mixtures, but with mixtures rich in O_2 or containing CO the rate of reaction is approx. const. With equal concn. of H_2 and CO, the H_2 is oxidised 5 times as rapidly as the CO. The average velocity is max. with $2H_2: O_2$ mixtures (300 mm.) and this is unaffected by CO, but excess of O_2 has a greater retarding effect than excess of H_2 . The rate of interaction of H_2 and CO is about 18% of that between $2H_2$ and O_2 under similar conditions. The mechanism of H_2O formation is discussed. The data are consistent with an almost exclusive initial formation of H_2O_2 and a reaction sequence involving short chains.

Photodichroism and photoanisotropy. XI. Production of photodichroic mirrors. F. WEI GERT and F. STIEBEL. XII. Technique. F. WEI GERT (Z. physikal. Chem., 1932, B, 16, 113—122; 18, 73—87; cf. A., 1931, 1378).—XI. On development of grainless Lippmann plates after exposure to red light the Ag separates in a highly reflecting form, originating in a thin layer on the surface of the emulsion which can readily be wiped off and has a spectral sensitivity distribution quite different from that of the interior, the sensitivity to red being particularly pronounced. Exposure to green or blue light has a similar, but very much less marked, effect. The mirrors produced after exposure to polarised light exhibit photodichroism and photodireflexion.

XII. A modified polarimeter with monochromator enabling photoanisotropic effects to be measured rapidly and very accurately, and a method for the simultaneous determination of photodichroism and photo-double refraction, utilising a quarter-wave mica plate, are described. R. C.

Action of X-rays on ferrous sulphate solutions. N. A. SCHISCHAKOV (Phil. Mag., 1932, [vii], 14, 198– 203; cf. A., 1929, 408).—The action of X-rays on aq. $FeSO_4$ containing H_2SO_4 in presence and absence of O_2 produces, in addition to direct oxidation, a reaction between $FeSO_4$ and H_2SO_4 forming $Fe_2(SO_4)_2$ and H_2 . H. J. E.

Action of radon on some unsaturated hydrocarbons. II. Propylene and cyclopropane. G. B. HEISIG (J. Amer. Chem. Soc., 1932, 54, 23282332; cf. A., 1931, 1252).—In the radon polymerisation of propylene at an initial pressure of 675.8 mm. and of *cyclo*propane at 683.5 mm. the -M/N ratios are 4.9 and 3.3, respectively. Low vals. of $\Delta(H_2 + CH_4)/-\Delta HC$ are associated with higher -M/N vals.

W. E. V. (c)

Behaviour of metals towards salts, especially ammonium salts in presence and in absence of ammonia. H. EHRIG (Z. anorg. Chem., 1932, 206, 385-397).-The conditions under which metals, deposited electrolytically from ammoniacal solutions, tend to redissolve in the electrolyte have been investigated. The metals examined include Cu, Bi, Pb, Ni, Co, Fe, Cd, Zn, and Mg in solutions of NH3, NH₄NO₃, NH₄Cl, $(NH_4)_2SO_4$, and NaNO₃ with and without addition of NH₃. Cd, Zn, and Mg dissolve readily in these solutions; Cu in smaller degree, and chiefly when the wet electrode is exposed to the air and replaced in the electrolyte. Cd, Zn, and Mg reduce NH_4NO_3 to NH_4NO_2 , N_2O appearing in the gases evolved from Zn and Mg. The dissolution of Cd is not completely prevented by applying a cathodic potential. Addition of $\rm NH_3$ to aq. $\rm NH_4NO_3$ accelerates the dissolution of Zn, increases slightly that of Cd, and retards the dissolution of Mg. These effects bear a relation to the solubilities of the corresponding hydroxides in the solutions concerned. E. S. H.

Hydrazinates of some silver salts. H. GALL and H. ROTH (Z. anorg. Chem., 1932, 206, 369–377).—The compounds $AgCNS, N_2H_4$, $AgCN, N_2H_4$, $AgNO_3, N_2H_4$, and $Ag_2SO_4, 3N_2H_4$ have been isolated. The thermal decomp. temp. of the last two have been determined. Hydrazinates of Ag salts containing O in the acid radical undergo irreversible decomp. in the solid phase below room temp., forming Ag; those containing halogen or similar acid radicals have a wider temp. region of existence. E. S. H.

Pyrogenic decomposition of calcium sulphite. I. TRIFONOV (Z. anorg. Chem., 1932, 206, 425—426).— The reactions $4CaSO_3=3CaSO_4+CaS$ and $2CaSO_3=2SO_2+2CaO$ are followed at high temp. by the reaction $CaS+2SO_2=CaSO_4+2S$. The complete change at high temp. may be represented : $3CaSO_3=2CaSO_4+CaO+S$. E. S. H.

Theory of mercurammonium salts (bromides, and chlorides). Crystallisation of dimercurammonium bromide and hydrated dimercurammonium chloride. M. FRANÇOIS (Ann. Chim., 1932, [x], 17, 254—269).—All the mercuric halides form compounds with NH₃ corresponding with the formula $HgX_2,2NH_3$; by the further action of NH₃, they give mono- and di-mercurammonium halides, HgH_2NX and Hg_2NX , respectively. There is no chloride or bromide, however, to correspond with the iodide $3HgI_2,4NH_3$ obtained by the action of NH₃ under reduced pressure. From this can be obtained the compound $Hg_9N_4I_6$. There is a corresponding Br compound, $Hg_9N_4Br_6$, but no Cl compound. Methods for the prep. of the different compounds are given, and also for the prep. of cryst. specimens of Hg_2NBr and Hg_3NCI, H_2O . M. S. B.

Chemistry of boron. A. STOCK (Bull. Soc. chim., 1932, [iv], 51, 697-712).--A lecture.

Preparation of ultramarine and similar substances from aqueous alkali aluminium silicates by the action of sulphide solutions. E. GRUNER (Fortschr. Min. Kryst. Petr., 1931, 16, 73—74; Chem. Zentr., 1932, i, 1213—1214).—Aq. alkali Al silicates and alkali sulphide solutions produce blue colours which on drying or washing disappear with formation of H₂S and S. At 21° permutites can take up 2·5—5 atoms of S per 3 mol. Permutites retain air tenaciously. After evacuation, the material no longer produces a blue colour; air-free permutite takes up 2 S per 3 mol.: 2NaOH,2Na₂O,3Al₂O₃,6SiO₂,6H₂O affords 2NaSH(or Na₂S₂),2Na₂O,3Al₂O₃,6SiO₂,6H₂O. At room temp. or up to 150° the blue colorations show no X-ray interference patterns; when prepared at 250° they give those of pyrogenie ultramarines, and react as true ultramarines. A. A. E.

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Reactions and properties of nitric oxide and its compounds. II. Salts of nitric oxide-sulphurous acid. H. GEHLEN (Ber., 1932, 65, [B], 1130—1140; cf. A., 1931, 922).—Addition of solutions of K_2SO_4, N_2O to solutions of the requisite salts gives the compounds $K_4Zn(SO_4, N_2O)_3, 2H_2O$; $K_4Mn(SO_4, N_2O)_3, 2H_2O$; $K_2Co(SO_4, N_2O)_3, 2H_2O$; $K_4Cd(SO_4, N_2O)_2, 2H_2O$. An analogous Na salt could not be prepared. The salts appear to be complex approximate the salts appear to be complex for the salts appear to be complex.

not be prepared. The saits appear to be complex compounds. They decompose slowly in cold, rapidly in warm, H_2O , immediately in presence of acid with production of SO_4'' and N_2O . When gently heated they evolve H_2O followed by a mixture of Na and NO_2 , leaving K_2SO_4 and the sulphite of the heavy metal which decomposes partly into SO_2 and oxide. They may be preserved for several weeks in vac. over KOH. Tl_2SO_4, N_2O is obtained by the action of NO on alkaline solutions of Tl_2SO_3 . The same rate of absorption of NO is shown by equiv. solutions of Li_2SO_3 , Na_2SO_3 , K_2SO_3 , and Tl_2SO_3 in presence of the corresponding hydroxide. Selenites and tellurites do not absorb NO. Decomp. of solutions of K_2SO_4, N_2O by dil. H_2SO_4 is a suitable method for the prep. of N_2O , which is obtained pure after washing with 4N-KOH and H_2O . Similarly purified N_2O obtained by thermal decomp. of NH_4NO_3 at 229—231° and 247—249° has a max. purity of 99.08% and 99.37%, respectively.

Arsenic bromosulphide. H. B. VAN VALKEN-BURGH and S. F. DAVIS (J. Colo. Wyo. Acad. Sci., 1929, 1, No. 1, 51).—When H₂S is passed over AsBr₃ at 150°, AsSBr, m.p. 118° (approx.), is formed.

CH. ABS. Precipitation of the hydrofluoric acid solution of protoactinium and tantalum by ammonia. F. REYMOND and CHENG DA-CHANG (Compt. rend., 1932, 195, 144—146; cf. A., 1931, 1021, 1026).—The method previously used to recover Pa and Ta from HF solution leads to loss of Pa. To a solution containing, e.g., 0.2 g. Ta₂O₅ should be added 10 drops of H₂SO₄, and the mixture heated until white fumes appear; on cooling and diluting, the Ta₂O₅ is completely pptd. by NH₃. Or the mixture containing H₂SO₄ may be directly calcined (in absence of H₂SO₄ some Ta is volatilised), but in this case some Ta₂O₅ adheres irremovably to the side of the crucible. C. A. S. Synthesis of chromium thiocyanate complexes of heavy metals. D. ISAMADOS (Praktika, 1930, 5, 61-64; Chem. Zentr., 1932, i, 1353; cf. this vol., 133). —The compounds Sn₃[Cr(CNS)₆],2H₂O, As[Cr(CNS)₆], and Cd₃[Cr(CNS)₆]₂,2·5H₂O, are described.

L. S. T.

Concentration of polonium (Ra-F) from active lead nitrate. C. KULLE (Coll. Czech. Chem. Comm., 1932, 24, 247—258).—On shaking $Al(OH)_3$ or $Fe(OH)_3$ with a neutral solution of active $Pb(NO_3)_2$ and NH_4NO_3 , the Po is adsorbed. From the $Al(OH)_3$ the Po is conc. electrolytically; from the $Fe(OH)_3$, by distillation. Alternatively, the hydroxides may be dissolved in HCl and the Po pptd. on a rotating Ag plate. A method is given for the determination of radioactive substances in solutions by direct measurement of the ionisation effect, without evaporation.

D. R. D.

[Reactions of iodine.] E. ANGELESCU and V. D. POPESCU (Z. physikal. Chem., 1932, 160, 466—467).— A reply to criticism (this vol., 585). R. C.

Structure and polymerisation of brown ferric orthohydroxide. A. KRAUSE and M. CIOKÓWNA (Rocz. Chem., 1932, 12, 468—477).—The ratio Ag : Fc in the product obtained by addition simultaneously of $Fe(NO_3)_3$ and AgNO₃ to boiling aq. NaOH is 3 : 4, whilst when the solution is boiled 3 min. before addition of AgNO₃ and 30 min. after, the ratio approaches 1 : 1. This is explained on the assumption that the ppt. has the structure $(HO)_2(Fe \cdot FeO_2H)_2 \cdot O \cdot FeO$ in the first case, 3 H atoms being replaceable by Ag, and $(HO)_2 \cdot Fe \cdot (FeO_2H)_n \cdot O \cdot FeO$ in the second, n = 1 H atoms being replaceable. R. T.

Metal carbonyls. XV. Derivatives of iron carbonyls with o-phenanthrolene. W. HIEBER and F. MUHLBAUER. XVI. Derivatives of cobalt and nickel carbonyls. W. HIEBER, F. MUHLBAUER, and E. A. EHMANN (Ber., 1932, 65, [B], 1082–1089, 1090–1101).—XV. When gently heated, a solution of Fe(CO)₅ and o-phenanthrolene monohydrate in COMe₂ becomes intensely blue at 60° owing to the formation of an additive product; at 65–70°, the solution becomes red, CO is evolved, and the compound Fe(CO)₃, $C_{12}H_8N_2$ is deposited. The production of the additive product is a time reaction, apparently conditioned by a rearrangement of the five CO groups initially enclosing the Fe atom. Fe(CO)₅ and o-phenanthrolene in pyridine at 90° afford the substance Fe₂(CO)₅, ($C_{12}H_8N_2$)₂, C_5H_5N , from which pyridine is slowly evolved at 120°. If the solution is heated at 100° and subsequently cooled, the product

 $Fe_3(CO)_{7\cdot5}(C_{12}H_8N_2)_2$ separates. $Fe_3(CO)_6(C_{12}H_8N_2)_2$ is obtained by the action of o-phenanthrolene on $Fe_2(CO)_4(C_5H_5N)_3$ in anhyd. MeOH. The compounds are pyrophoric. Their dark colour is attributed to the org. complex. With undiluted NO slow reaction occurs : $2Fe(CO)_3(C_{10}H_8N_2)+2NO=$

occurs: $2Fe(CO)_3(C_{10}H_8N_2)+2NO =$ Fe₂(CO)₅(NO)₂(C₁₀H₈N₂)₂+CO. The behaviour towards acids resembles that of other carbonyl derivatives except that the stable [Fe(C₁₀H₈N₂)₃]^{*} is immediately produced; the other phenomena are explained by the production of Fe(CO)₄, and, particularly, of Fe(CO)₄H₂.

XVI. [Co(CO)₄]₂ (mol. wt. determined in freezing

 C_6H_6) loses CO at 55-60° with production of $[Co(CO)_3]_4$ [mol. wt. determined in $Fe(CO)_5$]. The Co carbonyls are distinguished by great tendency towards polymerisation and high chemical activity. With pyridine there is a ready evolution of CO and production of Co₂(CO)₅,4C₅H₅N, whilst o-phenanthrolene in dil. MeOH affords Co(CO)₃(C₁₀H₈N₂). The compounds are decomposed by Br with evolution of CO. With acids reaction occurs : $2Co(CO)_3 + 2H^+ =$ $Co^{++}+Co(CO)_3$ [polymeride]+3CO+H₂; 3Co(CO)₃+ $2H^+ = Co^{++} + Co(CO)_3$ [polymeride] + Co(CO)_4 [dimeride] $+2CO+H_2$; a volatile Co carbonyl is evolved. When gently warmed with the requisite alcohol, Co(CO)₄ evolves CO and yields Co₂(CO)₅, MeOH and $Co_2(CO)_{5,1}$. 5EtOH. Ni(CO)₄ is appreciably more stable than $Co(CO)_4$ towards chemical reagents. In pyridine in absence of air and moisture a yellow coloration is observed at 40°. Partial substitution of CO by pyridine is beset with difficulty, since the equilibrium $Ni(CO)_4 + xC_5H_5N = Ni(CO)_{4-x} + xCO$ (x<4) is readily displaced towards the left when the solutions are cooled and Ni(CO)₄ is re-formed. CO must be continuously removed. The primary products are $Ni_2(CO)_4, 3C_5H_5N$ and Ni(CO)₂, C_5H_5N . If the solution is subjected to continuous distillation in high vac., the substance Ni₂(CO)₃, 2C₅H₅N is readily prepared (apparatus described). Similarly, substituted Ni carbonyls are not obtained under like conditions with MeOH or anhyd. $C_2H_4(NH_2)_2$. In pyridine, COMe2, or anhyd. EtOH, o-phenanthrolene and $Ni(CO)_4$ at room temp. afford the relatively stable $Ni(CO)_{2}, C_{10}H_8N_2$, stable to NO but decomposed by Br with quant. evolution of CO. It is decomposed by acids: $Ni(CO)_2 + 2H' = Ni' + 2CO + H_2$ and $2Ni(CO)_2 + 2H' = Ni(CO)_4 + Ni'' + H_2$. The amounts of CO and H evolved are less than those corresponding with the Ni" produced; since fixation of H to Ni does not appear to occur, it is probable that CO and nascent H react with one another under the experimental con-H. W. ditions.

Recommended specifications for analytical reagent chemicals. W. D. COLLINS and collaborators (Ind. Eng. Chem. [Anal.], 1932, 4, 347—350).— Specifications and tests are recommended for C_6H_6 , $Cu(OAc)_2, H_2O, Cu(NO_3)_2, 3H_2O$, Pb subacetate, phenolphthalein, KNO₃, NaF, NaNO₂, PhMe, and $C_6H_4Me_2$. Corrections are made to former specifications for MoO₃, CuO, KI, and NaHCO₃. E. S. H.

Removal of colour from solutions to be examined by colour comparisons. P. L. HIBBARD (Ind. Eng. Chem. [Anal.], 1932, 4, 283).—The colour of soil extracts, plant extracts, solutions of dyes or indicators, etc. may be removed by adding saturated aq. Br, decolorising with NaOH, adding HCl to liberate Br again, and finally removing the Br by adding Na₂SO₃. E. S. H.

Technique of colorimetry. N. E. PESTOV (Z. anal. Chem., 1932, 89, 9—17).—The sources of error in colorimetry and the choice of conditions for comparison are discussed. A technique for reading is recommended. E. S. H.

Thermometric titration. T. SOMIYA (J.S.C.I., 1932, 51, 135-140).—Mainly a summary of published

work (cf. B., 1927, 329, 439; A., 1928, 858; B., 1929, 274, 670; 1930, 674, 777). The reaction between Ac_2O and NH_2Ph is also suitable for the analysis of salts of NH_2Ph by thermometric titration.

E. S. H.

Microanalysis of extremely hygroscopic substances. D. F. HAYMAN (Ind. Eng. Chem. [Anal.], 1932, 4, 256).—The substance is stored in a small bottle in a vac. desiccator, stoppered and weighed immediately. When mixed quickly with dry, powdered CuO, it does not become sticky and can be transferred to Pregl's micro-Dumas apparatus. In a second procedure, N_2 is passed over the material at 100° for 90 min. before weighing. E. S. H.

Simple basic indicators. I. Acidity functions of mixtures of sulphuric and perchloric acids in water. L. P. HAMMETT and A. J. DEVRUP (J. Amer. Chem. Soc., 1932, 54, 2721—2739).—For certain mixtures of conc. acids and H_2O basic indicators are desirable. Basic org. substances suitable for determining the acidity of mixtures containing 0—100% H_2SO_4 and 0—70% HClO₄ are enumerated.

W. T. H. (c)

Use of the quartz lamp in quantitative analysis. A. JERMSTAD (Dansk Tidsskr. Farm., 1932, 6, 141— 148).—Illumination with a quartz lamp permits the use of fluorescent indicators for 0.1—0.001N-acidalkali titrations. R. S. C.

Use of mixed indicators in acidimetry. P. BRUÈRE (Ann. Falsif., 1932, 25, 325-328).—The advantages of using more than one indicator are discussed. The sulphonephthaleins are more satisfactory than litmus. T. McL.

Standardisation of N-hydrochloric acid with solid sodium thiosulphate. J. BICSKEI (Z. anal. Chem., 1932, 88, 414-417).—Na₂S₂O₃ (2-5 g.) is dissolved in a little H₂O, the solution treated with 3 g. of KI and 20 c.c. of 4% aq. KIO₃, and the mixture titrated with the HCl using starch as indicator.

A. R. P.

Rapid determination of moisture in seeds and other granular substances. R. M. DAVIES.—See B., 1932, 685.

Determination of water in presence of alcohols, aldehydes, and acetals. J. Ross (J.S.C.I., 1932, 51, 121-122T).—The mixture is heated at 110-120° for 12 hr. with a known wt. of previously evaluated Bz_2O . From the amount of BzOH and unchanged Bz_2O the amount of H₂O originally present may be calc. CH₂O forms CH₂(OBz)₂, which is weighed and a correction applied. A little CHMe(OH)₂ may be present. The method is applicable with appropriate corrections to mixtures containing HCO₂H, AcOH, MeOAc, and EtOAc. A. A. L.

Microchemical detection of hydrogen peroxide and of other peroxides by means of lead sulphide. R. KEMPF (Z. anal. Chem., 1932, 89, 88—90).—Photographic printing paper, after being fixed, is treated with 0.05% Pb(OAc)₂ solution followed by saturated H₂S solution. The decolorising of the resulting PbS by H₂O₂ can be used to detect as little as 0.0005 mg. of the latter. O. J. W. Argentometric determination of chloride, especially in the presence of bromide and iodide, using diphenylamine-blue as indicator. R. LANG and J. MESSINGER (Z. anal. Chem., 1932, 88, 336— 342).—The Br' is removed by boiling the solution (40 c.c.) with 5 c.c. of H_3PO_4 (d 1.7) and 0.2 g. of KIO₃. If I' is also present this is first removed with KIO₃ and 10 c.c. of 10% AcOH; no loss of Cl' occurs in either process. An alternative procedure for removing both Br' and I' consists in adding H_2SO_4 and COMe₂ followed by a slight excess of KBrO₃. In all cases the Cl' is titrated with AgNO₃, using diphenylamine-blue as indicator. A. R. P.

Determination of chlorine and bromine in a mixture of chloride and bromide. J. BOUGAULT and E. CATTELAIN (Ann. Chim. Analyt., 1932, [ii], 14, 289–291).—The method of pptg. and weighing as AgCl and AgBr, and reducing the mixed ppt. with Zn and dil. H_2SO_4 and weighing as Ag gives accurate results when Zn of high purity is used. E. S. H.

Determination of active oxygen in lead oxides. M. LE BLANC and E. EBERIUS (Z. anal. Chem., 1932, 89, 81–88).—An improved form of apparatus in which the Pb_3O_4 is treated with HCl and the liberated Cl_2 passed into a solution of KI is described.

O. J. W. Iodometric determination of polysulphide sulphur. P. SZEBERÉNYI (Z. anal. Chem., 1932, 88, 433–435).—In the method previously described (this vol., 710) the reaction between NaOI and polysulphide S is facilitated by immersion of the vessel in boiling H_2O . Heating the mixture over a free flame results in the production of IO_3' , which converts the polysulphide into polythionate instead of into SO_4'' .

A. R. P.

Preservation and determination of sodium thiocyanate. J. GREENSPAN (J. Amer. Chem. Soc., 1932, 54, 2850).—To prevent mould formation in CNS' solutions 1 drop of PhMe is added to 100 c.e. of solution. In oxidising CNS' with I_2 a borax buffer is advantageous. W. T. H. (c)

Standards [for colorimetric determination of ammonia by Nessler's reagent]. R. DANET (J. Pharm. Chim., 1932, [viii], 16, 68).—A solution containing 0.8 c.c. of 0.1% K₂CrO₄ and 22 c.c. of 0.1% Co(NO₃)₂ per 100 c.c. is suitable. R. S. C.

Colorimetric determination of nitrate with diphenylamine or diphenylbenzidine. K. PFEIL-STICKER (Z. anal. Chem., 1932, 89, 1-8).—Riehm's method (B., 1930, 1149) is recommended; with slight variations in procedure it is useful for determining NO_3' in solutions containing 0.02—10 mg. per litre. With increasing dilution of the H_2SO_4 the influence of temp. and Cl' content increases. The concn. and rate of addition of the reagents are controlled.

E. S. H.

Colorimetric determination of dilute solutions of azoimide. G. LABRUTO and D. RANDISI (Annali Chim. Appl., 1932, 22, 319—324).—HN₃ in dil. solution can be determined accurately by the colour developed with FeCl₃. E. W. W.

Combustion in micro-elementary analysis. A. FRIEDRICH (Angew. Chem., 1932, 45, 476–478).—The substance is weighed out in a small glass tube (4 cm. long and 7 mm. diam.) closed at one end, which is introduced into the combustion tube with the open end facing the Pt contact. The tube is heated first at the open end, the burner being then gradually moved towards the closed end, *i.e.*, in the direction opposed to the stream of O_2 . By this procedure the danger of incomplete combustion is avoided.

A. B. M.

Determination of carbon dioxide and titratable base in sea-water. D. M. GREENBERG, E. G. MOBERG, and E. C. ALLEN (Ind. Eng. Chem. [Anal.], 1932, 4, 309-313).- A semi-micro-method for determining the total CO2 content of sea-water with a portable manometric apparatus is described. The method is suitable for work on board ship and the results are reproducible to within 1%. The differential titration method for determining CO_3'' , HCO_3' , and free CO_2 in sca-water has been studied. When phenolphthalein and Me-orange are used as indicators the results are reproducible to within 1%, and the total CO₂ agrees to about 1% with that obtained with the above apparatus. For sea-water having $p_{\rm H} > 7.8$, the difference between the base titration val. and the total CO_2 gives the CO_3'' content. E. S. H.

Direct titration of normal oxalates in neutral solution using fluorescein as an adsorption indicator. A. W. WELLINGS (Trans. Faraday Soc., 1932, 28, 565-566).—The 0.1-0.05M-oxalates are titrated quantitatively with Pb(OAc)₂. Acid and alkali interfere. J. G. A. G.

Determination of silica in silicates. N. A. TANANAEV and F. I. PERTSCHIK (Z. anal. Chem., 1932, 88, 348—352).—The method depends on the decomp. of the silicate with HF, followed by evaporation with $H_2C_2O_4$, heating of the residue at 190—200° to remove excess of $H_2C_2O_4$, and finally fusion with a weighed quantity of NaPO₃. The difference between the sum of the wt. of sample and NaPO₃ and the wt. of the phosphate glass obtained gives the SiO₂. The method is applicable to silicates containing Fe₂O₃, TiO₂, CaO, MgO, K₂O, Na₂O, and <15% Al₂O₃. A. R. P.

Determination of sodium potassium cobaltinitrite, and use [of the latter] for determination of potassium. L. CUNY (J. Pharm. Chim., 1932, [viii], 16, 55–58).—0.25—8 mg. of K can be determined by pptn. as $Na_2K[Co(NO_2)_6]$, evaporation with conc. HCl, and volumetric determination of Cl' in the residue. R. S. C.

Atomic mass of sodium. I. End-point of sodium chloride-silver titration. C. R. JOHNSON (J. Physical Chem., 1932, 36, 1942—1949; cf. A., 1931, 584).—To eliminate arbitrary factors in the determination of the end-point comparison was made nephelometrically or potentiometrically with standard solutions prepared with concns. of salts and acids such as should be present at the end-point of the analysis proper. L. P. H. (c)

Detection of cæsium, rubidium, and thallium by the drop method. N. A. TANANAEV (Z. anal. Chem., 1932, 88, 343—347).—With a solution of equimol. amounts of PdCl₂ and AuCl₃ in dil. HCl solutions of CsCl, RbCl, and TlCl yield brown to black compounds of the type $M_2AuPdCl_7$. Tl and Cs yield red to brown ppts. with $KBiI_4$, but Rb gives no such ppt. Cs₂AuPdCl₇ and Rb₂AuPdCl₇ are sol. in NaOH, but the Tl compound is blackened due to reduction of the Au and Pd by the TlOH. The application of these tests to the detection of Cs, Rb, and Tl in the presence of one another and of other cations is discussed.

A. R. P. Determination of silver in solutions of potassium argentocyanide. A. WOGRINZ (Z. anal. Chem., 1932, 89, 120—121).—Ag is pptd. from solutions of KAg(CN)₂ by Al, collected, dissolved in HNO₃, and titrated with NH₄CNS. O. J. W.

Micro-electrolytic determination of silver, mercury, and cadmium in ammoniacal solution. (Determination of copper, cobalt, and nickel in organic substances.) A. OKÁČ (Z. anal. Chem., 1932, 89, 106—112; cf. this vol., 590, 712).—The micro-electrolytic method for the determination of Cu, Co, and Ni already described can be applied to the determination of Ag, Hg, and Cd, but not to Zn. By means of a two-fold separation Cu, Co, and Ni can also be determined with sufficient accuracy in presence of org. radicals. O. J. W.

Iodometric titration of colloidal silver. E. EINECKE (Z. anal. Chem., 1932, 89, 90–95).—Excess of I solution is added to the colloidal Ag solution and titrated back with $Na_2S_2O_3$. The reaction between Ag and I is complete after 2 hr., and can be carried out in daylight. O. J. W.

Use of acidimetric indicators in argentometry. F. J. GARRICK (Proc. Leeds Phil. Soc., 1932, 2, 301– 302).—The usual acidimetric indicators (Me-orange, Me-red, bromophenol-blue) may be used satisfactorily in argentometry. A. J. M.

Determination of small amounts of lime in presence of large amounts of magnesia. R. HEILINGÖTTER (Chem.-Ztg., 1932, 56, 582—583).—For the analysis of magnesite, SiO₂, silicates, Fe, and Al are removed by the usual methods, Ca is pptd. by $(NH_4)_2C_2O_4$, the ppt. dissolved in dil. HCl and repptd. repeatedly until a const. wt. is obtained. Mg is determined by difference. E. S. H.

Micro-determination of barium. E. J. KING (Biochem. J., 1932, 26, 586–589).—The Ba is pptd. by an excess of standard H_2SO_4 and the excess of H_2SO_4 determined by pptn. with benzidine and titration of the benzidine sulphate with NaOH.

S. S. Z.

Composition of analytical barium sulphate precipitates. F. L. HAHN and R. KEIM (Z. anorg. Chem., 1932, 206, 398—406).—When equiv. solutions of BaCl₂ and K_2SO_4 are mixed under conditions such that neither reagent is in excess during any part of the mixing, but KCl is also present, the pptd. BaSO₄ has a slight excess of SO₄". The excess is shown to be present partly as K_2SO_4 and partly as H_2SO_4 .

E. S. H.

Quantitative precipitations at extreme concentrations. III. V. NJEGOVAN and V. MAR-JANOVIÓ (Z. anal. Chem., 1932, 89, 112—120; cf. A., 1930, 1544).—Further details are given concerning the quant. pptn. of Mg as phosphate and the application of the method to the determination of $PO_4^{\prime\prime\prime}$.

0. J. W.

Direct titration of magnesium and manganous sulphate using fluorescein as an adsorption indication, and the extension of the method to the direct titration of other soluble sulphates and alums. A. W. WELLINGS (Trans. Faraday Soc., 1932, 28, 561—564).—In the absence of acid, Cl', and NO_3' , fluorescein indicates, by the colour change yellow \longrightarrow pink \longrightarrow dark orange (after shaking), the quant. pptn. of 0.1—0.05M·MgSO₄ and -MnSO₄ by Ba(OH)₂. Similarly, other sol. sulphates, which do not yield deeply-coloured hydroxides, may be titrated quantitatively in the presence of Mg(OAc)₂ or Mn(OAc)₂. Elevation of temp. obscures the endpoint. J. G. A. G.

Rinmann's-green test for zinc. A. A. BENE-DETTI-PICHLER (Ind. Eng. Chem. [Anal.], 1932, 4, 336—337).—A drop of the test solution is placed on a piece of filter-paper previously impregnated with $K_3Co(CN)_6$ and the paper is then ignited. A disc of green ash on the spot where the drop was added is produced by 0.0006 mg. of Zn. The test solution is best prepared by dissolving in HNO₃ the ZnS pptd. in a separation. Sn and Sb also give a green ash, and the presence of Ti, Mn, Fe, Ni, Co, or Cd interferes with the test. E. S. H.

Determination of zinc oxide in presence of zinc sulphide. C. V. BORDEIANU.—See B., 1932, 677.

Separation and determination of copper in presence of aluminium by means of 8-hydroxyquinoline. J. CALVET (Compt. rend., 1932, 195, 148-150; cf. A., 1927, 848).—Unless present in very great excess Cu is accurately separated from Al by 8-hydroxyquinoline (3% solution) in presence of Na tartrate and AcOH or NH₃ at 70-80°; AcOH should be $\geq 6-7\%$. The dried ppt. is Cu(C₉H₆NO)₂. Fe in small quantities, Mg, Be, Mn, Zn, and Cd do not interfere, but Ni and Co must be absent. C. A. S.

Macro-electroanalysis and separation of copper and nickel. J. GUZMAN (Anal. Fis. Quim., 1932, 30, 433-440).-Macro-electroanalysis is defined as the quant. deposition of 1 g. or more of metal, which may be effected economically and at low c.d. by the use of a large Cu cathode, the (rotating) anode being a passive Fe wire or a Pt spiral. Details of the determination of Cu and Ni in acid and ammoniacal solution are given; the results differ by not more than 0.05%. The following procedure is recommended for analysis of Cu-Ni alloys (about 75% Cu): the sample (1 g.) is dissolved in 8 c.c. of HNO₃ (d 1·12) and 1 g. of $(NH_4)_2SO_4$ is added; the Cu is deposited on a Cu cathode of area 212 sq. cm. within 20 min. by electrolysis at 1.4 amp. per sq. dm. The solution is then neutralised with aq. NH₃, 10 g. of (NH₄)₂SO₄, 5 g. of Na₂SO₃, and 25 c.c. of aq. NH_3 (d 0.92) are added, and the Ni is deposited under the same conditions as the Cu, except that an Fe anode may be employed. H. F. G.

Gasometric determinations by means of the ureometer. II. G. D'ESTE (Boll. Chim. farm., 1932, 71, 437-445).-Cu^{II} salts : 10 c.c. of a solution containing about 0.25 g. of Cu, 0.5 c.c. of aq. FeCl₃, 3 Q and 10 c.c. of a 1.5% solution of N_2H_4 , H_2SO_4 are thoroughly shaken in the reaction chamber (this vol., 550) with 10 c.c. of 20% aq. KOH. N_2 is quantitatively liberated in 5 min.; 8.8 c.c. N_2 (at 0° and 760 mm.) =0.100 g. Cu. Hg^{II} salts: 0.5 g. of HgCl₂ and 0.5 g. of NaCl are dissolved in 15 c.c. of H₂O, 10 c.c. of 1.5% aq. N_2H_4 , H_2SO_4 are added and shaken with 5 c.c. of 10% aq. KOH; 40.8 c.c. N_2 =1.00 g. HgCl₂. Iodates: 10 c.c. of 1% iodate solution are allowed to react with a mixture of 10 c.c. of 1.5% aq. N_2H_4 , H_2SO_4 and 5 c.c. of H_2SO_4 (1:4); 1 c.c. N_2 = 0.007643 g. KIO₃. Bromates: to 10 c.c. of a 1% bromate solution are added 0.3 g. of KBr and treated as the iodate; 1 c.c. N_2 =0.00497 g. KBrO₃. Hypochlorites and hypobromites solution are treated with 5 c.c. of 1.5% aq. N_2H_4 , H_2SO_4 neutralised with KOH. By this method N_2H_4 , salts may be determined: 1 c.c. N_2 =0.00581 g. N_2H_4 , H_2SO_4 . Na₂O₂: about 0.1 g. of Na₂O₂ is allowed to react with 5 c.c. of NaOBr solution diluted with 10 c.c. H_2O or 10 c.c. of fresh solution of 10% K_3 Fe(CN)₆; 28.7 c.c. O_2 =0.100 g. Na₂O₂.

Detection and nephelometric determination of small quantities of mercury. J. GOLSE and M. JEAN (Bull. Soc. Pharm. Bordeaux, 1931, 3, 168-176; Chem. Zentr., 1932, i, 1272).-1 c.c. of the solution, containing ≤ 2 mg. Hg per litre, is treated with 0.1 c.c. of 2.5% strychnine sulphate solution and 0.1 c.c. of 0.5% KI solution, and the turbidity is compared with that produced by known quantities of Hg. For solutions containing 2-0.2 mg. per litre, 25 c.c. are treated with 0.1 c.c. of a solution of 1 g. As₂O₃ and 5 c.c. N-NaOH per litre, and the As and Hg are pptd. by Bougault's reagent. The centrifuged and washed ppt. is dissolved with Br, and excess of Br is removed in a current of air. 1 drop of a solution of 0.01 g. of phenolphthalein and 1 c.c. NaOH in 100 c.c. H₂O, 1 drop of N-NaOH, and $0.1N \cdot H_2SO_4$ to slight acidity are added; H₂O is added to 1 c.c., and the determination continued as above, the comparison sample being treated similarly. A. A. E.

Determination of small quantities of mercury. M. JEAN (Bull. Soc. Pharm. Bordeaux, 1931, 3, 176– 183; Chem. Zentr., 1932, i, 1271–1272).—Hg is pptd. with CH₂O and dissolved in 0.02N-I; excess of I is removed at 100° and the I combined as HgI₂ determined by Bernier and Peron's method with KMnO₄ or by conversion into iodate with Br and titration with 0.02N-Na₂S₂O₃ after addition of KI and AcOH.

A. A. E.

Determination of aluminium and excess acid in aluminium salts. H. L. DAVIS.—See B., 1932, 677.

Occurrence and determination of iron in seawater. T. G. THOMPSON, R. W. BREMNER, and I. M. JAMIESON (Ind. Eng. Chem. [Anal.], 1932, 4, 288—290).—The presence of org. compounds, Cl', NO_3' , NO_2' , and F' in sea-water interferes with the determination of Fe by KCNS. These substances are removed by evaporating the sample with H_2SO_4 . The interference due to SO_4'' is obviated by using a large excess of KCNS. Surface sea-water shows a scasonal variation of Fe content, which is diminished at times of max. diatom growth. The Fe content generally increases with the depth. E. S. H.

Analysis of alloy steels. P. L. BLANKEN.—See B., 1932, 680.

Potentiometric titration of sodium and potassium ferrocyanide. K. MASAKI (Bull. Chem. Soc., Japan, 1932, 7, 188–200).—Potentiometric titrations at 25° of K₄Fe(CN)₆ and Na₄Fe(CN)₆ solutions with HgCl₂, NiSO₄, and CoSO₄ solutions, using Pt as the indicator electrode, show that the following reactions take place : $2\text{Hg}^{"}$ +Fe(CN)₆ : $^{""}$ =Hg₂Fe(CN)₆; 2Ni["]+ Fe(CN)₆ : $^{""}$ =Ni₂Fe(CN)₆; 2Co["]+Fe(CN)₆ : $^{""}$ = Co₂Fe(CN)₆. Similar reactions occur with FeCl₃ and with AgNO₃. O. J. W.

Electrolytic micro-determination of nickel and cobalt. A. $O \ltimes \measuredangle \delta$ (Z. anal. Chem., 1932, 88, 431— 433).—The metals are deposited together by electrolysis in aq. NH₃, the solution being stirred with a current of CO₂. The weighed deposit is dissolved in HNO₃ and the Ni pptd. with dimethylglyoxime, the Co being determined by difference. A. R. P.

Titration with dichromate and an internal indicator, and its applications. F. SIERRA and F. BURRIEL (Anal. Fis. Quim., 1932, **30**, 441-444).— $Fe(CN)_6''''$ may be determined as follows : to 50 c.c. of the solution $[1\% K_4Fe(CN)_6]$ are added 25 c.c. of 2N-HCl and 1 c.c. of 0.4% benzidine acetate solution, and the whole is diluted to 100-150 c.c. and titrated slowly and with vigorous stirring with 0.1N-K₂Cr₂O₇; at the end-point a greenish-yellow to dark brown coloration, accompanied by a violet ppt., is produced as a result of oxidation of the indicator. The error is about $\pm 0.5\%$. H. F. G.

Separation of uranium-X from uranium. H. HERSZFINKIEL and J. TOŁWINSKA (Rocz. Chem., 1932, 12, 426—440).—Suitable adsorbents for removing U-X from aq. UO₂^{••} are Fe(OH)₃, CeF₃, and BaSO₄. Adsorption is increased by adding salts which form double compounds with UO₂^{••}, thereby diminishing its concn., but do not combine with Th. Such salts are NaF, NH₄HCO₃, and K₂CrO₄; Na₄P₂O₇ and (NH₄)₂C₂O₄ combine with both UO₂^{••} and Th^{•••}. Better results are obtained by adding Fe(OH)₃ or BaSO₄ to the solution than by pptg. them in presence of the UO^{••}₂ salt. R. T.

Low-temperature thermostat. F. O. LUND-STROM and C. W. WHITTAKER (Ind. Eng. Chem. [Anal.], 1932, 4, 294—295).—Heat is conducted away from the bath to the cooling agent by means of a Cu rod soldered through the wall of the bath, which is also made of Cu, thus rendering a cooling coil in the bath unnecessary. Ice is used as cooling agent for maintaining temp. between room temp. and 7°, and liquid NH_3 is used for temp. between 7° and -25° .

E. S. H.

Mercury-vapour lamp for laboratory use. I. BALINKIN and D. A. WELLS (Rev. Sci. Instr., 1932, [ii], 3, 388—391).—Hg is contained in the lower limbs of an h-shaped Pyrex tube, and an arc is started by tilting. Connexion to 60—120 volts is made through sealed-in W electrodes. C. W. G.

Microscope-centrifuge and some of its uses. E. N. HARVEY (J. Franklin Inst., 1932, 214, 1-23).

Trichromatic colorimeter. J. ZERNICKE (J. Opt. Soc. Amer., 1932, 22, 418-421).

X-Ray reflexion spectrograph. H. KERSTEN (Rev. Sci. Instr., 1932, [ii], 3, 384–387). C. W. G.

Photovoltaic cell as indicator in precise titrometry. H. M. PARTRIDGE (Ind. Eng. Chem. [Anal.], 1932, 4, 315—317).—The application of the photovoltaic cell to titrations is described. A few readings are taken and the end-point is determined by interpolation. In acid-alkali titrations, using phenolphthalein as indicator, an accuracy of 1 in 1000 is obtained. E. S. H.

Photometric eyepiece for visual quantitative spectrum analysis. F. TWYMAN (Trans. Optical Soc., 1932, 33, 176—181).—A spectrum is split into halves, and a selected line in one half is brought vertically above a selected line in the other half. The intensity of the brighter line is reduced to that of the other by means of a neutral wedge. In analyses of Pb-Cd alloys an error of 11% was obtained in the Cd content, of which 7% was due to irregularities in the wedge. C. W. G.

F/1.8 quartz monochromator-spectrograph. J. W. PERRY (Trans. Optical Soc., 1932, 33, 159—175). —The design of large monochromators and spectrographs is discussed, and a combined instrument (F/1.6at $0.185 \,\mu$ to F/2.0 at $1.2 \,\mu$) is described. C. W. G.

Use of thermopiles for absolute measurement of radiant energy. P. A. LEIGHTON and W. G. LEIGHTON (J. Physical Chem., 1932, 36, 1882—1907). —A line thermopile of the many-junction type and the galvanometer system required have been invetigated in respect of construction, drift, calibration, auxiliary resistances, effects of diverging light, surface variations in sensitivity, and integration.

L. P. H. (c)

Determination of relative humidities by means of thermocouples. J. H. LANNING (Ind. Eng. Chem. [Anal.], 1932, 4, 286—287).—Two small thermocouples are used, one having a small drop of H_2O surrounding it. The difference of temp. caused by the evaporation of the drop is recorded electrically. E. S. H.

Hydrogen electrode and apparatus for the determination of $p_{\rm H}$. P. L. DU Nour (Science, 1932, 75, 643—644). L. S. T.

Methods. XVII. Electrometric apparatus. L. PINCUSSEN and J. GÖRNE (Biochem. Z., 1932, 249, 126—129).—An electrode designed for the rapid determination of p_{Π} of small amounts of fluid and an example of the use of electrometric methods in the micro-determination of Ca are described.

P. W. C.

Specification for burettes. W. MORSE (Ind. Eng. Chem. [Anal.], 1932, 4, 263).—A few distinctive graduation marks below the lowest usual mark on a burette obviate the inconvenience of running past the mark. E. S. H.

Apparatus for accurately reading burettes. A. J. SCHATTENSTEIN (Z. anal. Chem., 1932, 88, 435– 436).—The device comprises a glass tube 2 cm. long, which slides smoothly over the burette tube and can be held in any position by a metal clip. On the upper portion of the tube are engraved a thin line encircling the tube and a thick black line extending only half-way round. On the other side of the tube to the black line there are 10 subdivisions below the circular line corresponding with nine divisions of the burette and thus providing a vernier scale. The black line at the back serves to render the bottom of the meniscus more conspicuous. A. R. P.

Electrically operated burette tap. R. KÖPPEN (Chem. Fabr., 1932, 273).—The lower end of the burette is closed by a ground cylindrical glass bulb which rests on the shoulder of the constriction and encloses an Fe armature. Surrounding the burette is a coil of wire, so placed that on passage of current the armature, and with it the bulb, rises and permits the liquid to flow from the burette. No grease is necessary. H. F. G.

Micro-burette. R. B. DUSTMAN (Ind. Eng. Chem. [Anal.], 1932, 4, 345-346).—The apparatus can be read to 0.01 c.c. E. S. H.

Removing "frozen" plugs from stopcocks. H. W. BALLEY (Ind. Eng. Chem. [Anal.], 1932, 4, 324).—Two key removers are described. E. S. H.

Nitrometer. R. Poggi and B. BALDI (Annali Chim. Appl., 1932, 22, 317-319).—A nitrometer tube is narrow in its upper half and wide below, continuously graduated, and suitable for both macro- and semi-micro-determinations. E. W. W.

Experiments with a high-temperature ozoniser. R. P. ALLEN (J. Physical Chem., 1932, 36, 1601— 1648).—Treatment of EtOH, MeCHO, COMe₂, and AcOH in an ozoniser operated by a Tesla coil and heated externally gave results essentially the same as those of former workers. Some evidence was obtained of photosensitisation by heat. C. A. (c)

Magnetic damping, oil- or air-damping for analytical balances? F. SARTORIUS (Chem.-Ztg., 1932, 56, 583).—Magnetic damping of the swinging balance suffers through the difficulty of excluding traces of Fe from the balance materials. Oil-damping leads to inaccuracy through the different resistance offered by the liquid under changing temp. and humidity. Air-damping is free from objection; an apparatus is recommended, depending on the airfriction between two Al cylinders in relative motion. E. S. H.

Calibration of a McLeod gauge in a vacuum system. K. H. RAMASWAMY (Phil. Mag., 1932, [vii], 14, 96—99).—A method of calibrating without dismounting the gauge is described. H. J. E.

Pressure pump for circulating gases in a closed system. E. B. KESTER (Ind. Eng. Chem. [Anal.], 1932, 4, 298).—The apparatus is actuated by a H_2O pump through a Hg medium and has no solid moving parts or bearing surfaces. It circulates 6—20 litres per hr. and operates continuously. It is devised for overcoming the strong resistance offered by a column of viscous liquid, such as tar. E. S. H.

Pressure control with automatic liquid-levelling device. J. V. VAUGHEN (Ind. Eng. Chem. [Anal.], 1932, 4, 346).—A Hg reservoir, suspended by a suitable spring, maintains a const. flow of Hg, which displaces liquids at a const. rate into a reaction vessel. E. S. H.

Apparatus for reactions in liquid phase at elevated temperatures and pressures. H. AD-KINS (Ind. Eng. Chem. [Anal.], 1932, 4, 342—345).— Apparatus for reactions involving the agitation of a liquid and a solid in presence of a gas at temp. and pressures above normal is described. The apparatus is suitable for org. hydrogenations. E. S. H.

Apparatus for pressure control in vacuum distillations. L. M. ELLIS, jun. (Ind. Eng. Chem. [Anal.], 1932, 4, 318—319). E. S. H.

Safety device for high-vacuum pumps operated for periods without supervision. W. PUPP (Physikal. Z., 1932, 33, 530-531). W. R. A.

Apparatus for study of changes in alloys. Isothermalmicrodilatometer. Registering thermomagnetometer. P. CHEVENARD (J. Phys. Radium, 1932, [vii], 3, 264–280).—The micro-dilatometer is for the study of the instability of alloys, and measures, as a function of the log. of the time, the spontaneous variation in length of a specimen at const. temp. In most cases the curves are semi-rectilinear, and the angle of the curve is taken as an index of the instability of the alloy. The thermo-magnetometer registers variations of magnetisation of ferro-magnetic bodies as a function of time. A. J. M.

Electronic tubes. A. DAUVILLIER (J. Phys. Radium, 1932, [vii], 3, 229–238).—A description of four types of discharge tube useful for studying diffraction of electrons, crystal structure, X-ray spectra of gases, and the production in air of soft X-rays, up to 8 Å. in wave-length, respectively. A. J. M.

Micro-mol. wt. determinations by the method of molar depression of the m.p. II. J. PIRSCH (Ber., 1932, 65, [B], 1227—1229; cf. this vol., 713, 714).—In addition to the solvents previously used (*loc. cit.*), bornylamine is recommended. Camphene dibromide has a very high mol. depression, but is not sufficiently stable and does not give const. vals. for the mol. depression with different standard substances.

H. W.

Automatic apparatus for intermittent washing. B. H. CARROLL (Ind. Eng. Chem. [Anal.], 1932, 4, 323-324).—The distinctive feature of the apparatus is a two-way tap, which is turned intermittently by a small motor, actuated by clock contacts. The apparatus is devised particularly for washing photographic films. E. S. H.

Unit for removal of solid particles from gas streams. R. C. STRATTON, J. B. FICKLEN, and E. W. KRANS (Ind. Eng. Chem. [Anal.], 1932, 4, 334).—A modified gas-washing bottle is described, in which the gas enters the absorption liquid through a Gooch crucible, closed at the top by a rubber stopper. The apparatus is very efficient for ordinary gas-absorption purposes. E. S. H.

Accurate air separator. P. S. ROLLER (Ind. Eng. Chem. [Anal.], 1932, 4, 341).—The apparatus formerly described (A., 1931, 706) has been improved by adding an automatic tapper. E. S. H. Ashing apparatus for samples containing traces of iodine. G. M. KARNS (Ind. Eng. Chem. [Anal.], 1932, 4, 299—300).—The apparatus obviates the necessity for using the rapid stream of O_2 generally recommended. E. S. H.

Movable hot-ring for evaporation of saline solutions in gravimetric analysis. K. LESCHEW-SKI (Z. anal. Chem., 1932, 89, 50-51).—The device obviates loss through spurting during evaporation. The solution is placed in a boiling-tube, and outside the tube, at the level of the liquid surface, is placed a ring of asbestos paper wrapped with an electricallyheated Ni-Cr coil. As evaporation proceeds the hot-ring is gradually lowered. E. S. H.

Reciprocal lattice projecting ruler and chart. L. J. B. LACOSTE (Rev. Sci. Instr., 1932, [ii], 3, 356— 364).—A simple rapid graphical method of interpreting secondary spectra of oscillating crystal photographs is described. C. W. G.

Apparatus for counting sand grains. J. E. APPEL (Science, 1932, 76, 58-59).—A simple apparatus for the rapid counting of small particles is described. L. S. T.

Geochemistry.

Evidence for the constitution of the ether. J. MACKAYE (J. Franklin Inst., 1932, 214, 73-98).

Determination of the radioactivity of the atmosphere. G. ALIVERTI (Nuovo Cim., 1931, 8, 233— 245; Chem. Zentr., 1932, i, 1335).—A modification of Gerdien's method is described. L. S. T.

Italian natural gases. III. Determination of higher hydrocarbons by analysis by condensation. M. G. LEVI, C. PADOVANI, and M. BUSI (Annali Chim. Appl., 1932, 22, 380—392).—Various Italian natural gases have been analysed; most contain some hydrocarbons higher than CH₄.

E. W. W.

Determination of carbonaceous waste gases and soot in the air. J. HIRSCH (J. State Med., 1932, 40, 300–302).—The air (Berlin) was passed over heated CuO after removal of CO_2 ; more CO_2 was produced. C particles may be collected on a filter and then heated with CuO to produce CO_2 . CH. ABS.

Chemistry of the water and silt of Lake Agigea. P. PETRESCU (Bul. Soc. Chim. România, 1931, 13, 57-81).—The compositions of the dissolved and suspended matter in the H_2O of Lake Agigea are tabulated. The particle size in the latter has also been investigated. J. W. S.

Analysis of rains and snows at Mount Vernon, Iowa. S. F. WILLIAMS and O. K. BEDDOW (Chem. News, 1932, 145, 40-43).

"Ferrosilite" as a name for the normative molecule FeSiO_3 . H. S. WASHINGTON (Tsch. Min. Petr. Mitt., 1932, 43, 63—66).—The name ferrosilite (fs), first proposed by the author in 1903, for the mol. FeSiO₃ in the calculation of rock analyses, is preferable to hypersthene suggested by Barth (A., 1931, 1390). L. J. S.

"Doctoring " of the norm. C. E. TILLEY (Tsch. Min. Petr. Mitt., 1932, 43, 68—69).—Further criticism of Barth (A., 1931, 1390). L. J. S.

Magmatic and non-magmatic silicate systems. F. LOEWINSON-LESSING (Tsch. Min. Petr. Mitt., 1932, 43, 45-62).—A comparison of the chemical and mineral composition of igneous rocks with that of stony meteorites, contact-metamorphic rocks (hornfelses), and slags shows certain essential differences. In the latter types differentiation has played no part as in igneous magmas. L. J. S. Petrology and chemistry of a titaniferous amphibolite from Riboira, Galicia. I. PARGA-PONDAL (Anal. Fís. Quím., 1932, 30, 426-432).—The mineral contains hornblende 58%, plagioclase and quartz 30.6%, titanite 6.1%, ilmenite 4.3%; or SiO₂ 47.9%, Al₂O₃ 13.08%, and TiO 5.29%. It appears to be an ortho-amphibolite. The manner of formation is discussed. H. F. G.

Geochemistry of scandium. V. M. GOLD-SCHMIDT and C. PETERS (Nachr. Ges. Wiss., Göttingen, 1931, 257—279; Chem. Zentr., 1932, i, 1356—1357).— An exhaustive review of the occurrence of Sc. Results of spectro-analytical examination of numerous minerals and rocks are tabulated. Most of the Sc in rocks is present in the Mg and Fe^{II} silicates.

A. A. E. Igneous history of the Buckskin Gulch stock, Colorado. Q. D. SINGEWALD (Amer. J. Sci., 1932, [v], 29, 52-67).—A detailed account of the petrology is given, and the crystallisation-differentiation is discussed. C. W. G.

Garnet rock near West Redding, Conn. W. M. AGAR and P. KRIEGER (Amer. J. Sci., 1932, [v], 29, 68—80).—Petrological and mineralogical descriptions and an analysis are given. C. W. G.

Origin of circulating sulphate solutions in rocks and soils. E. BLANCK and H. EVLIA (Chem. Erde, 1932, 7, 298—319).—The presence of free SO_3 , as well as CO_2 , in ground-water is of importance in rock weathering. Free SO_3 in soils has been attributed to the decomp. of pyrite, but it appears that the decay of albuminous substances from plants is more important. Determinations were made of the total S and the SO_3 portion present in plants and in the soil during each month of the year. L. J. S.

Vanadium content of sedimentary rocks. K. Jost (Chem. Erde, 1932, 7, 177–290).—The amounts of V present in sedimentary rocks of various kinds and of different geological ages are tabulated from the literature, and many new determinations are also given. Determinations were made by the potentiometric method of Zintl and Zaimes (B., 1928, 525). The average amount in clays and shales is 0.012%, in sandstones 0.002%, and still less in limestones and dolomites. Larger amounts are present in laterites and bauxites (including sedimentary Fe ores and Mn
ores) as in rocks containing org. remains, bitumen, coal, and oil. The V from the weathering of igneous rocks (average V 0.018%) goes mostly with the clays, and in the presence of org. matter there is a further enrichment from solution due to reduction, especially in arid climates. L. J. S.

Form of the calcium carbonate in the shells and skeletons of recent and fossil organisms. F. K. MAYER (Chem. Erde, 1932, 7, 346-350).—X-Ray powder photographs show that the material consists in some cases of calcite and in others of aragonite.

L. J. S.

Ore-bearing diabases of the Dill district. R. MOSEBACH (Chem. Erde, 1932, 7, 320—345).—Analysis of an olivine-dolerite shows NiO 0.22%, and the rock contains small nests of sulphide minerals—pyrite, pyrrhotine, pentlandite, and chalcopyrite. These have been formed by hydrothermal action, the Fe and Ni being derived mainly from the olivine of the rock. L. J. S.

Classification of sedimentary clays. J. DE LAPPARENT (Compt. rend., 1932, 195, 257—258).—Of these there are three chief types: (1) halloysite clays (type, the grey plastic clay of the Paris basin): felted lamellæ of halloysite with small crystals of rutile and anatase; (2) montmorillonite clays (type, oligocene clays of Algiers and Oran): minute lamellæ of montmorillonite, free from Ti; and (3) kaolinite clay (type, tonstein of the Sarre basin): essentially kaolin, free from Ti. (1) has been formed from granite decomposed elsewhere and accumulated by H_2O action, (2) and (3) were formed *in situ*, probably from felspars, (2) in a dry, (3) in a moist climate.

C. A. S.

Meteorite from the Black Hills, Wyoming. C. C. O'HARA (Science, 1932, 76, 34).—Unoxidised drillings from a new meteorite (Bear Lodge meteorite) contain 91.70% Fe and 8.12% Ni. L. S. T.

Process of peat formation. G. KEPPELER (Angew. Chem., 1932, 45, 473—476).—Formulæ are deduced relating the true degree of conversion (x) of the initial plant material into peat with the glucose val. and with the amount of the acid-insol. residue (cf. B., 1920, 394A). The formulæ when applied to a peat "profile" and to various peat samples gave

concordant vals. of x which, however, are much higher than those previously assumed. The glucose vals. for a no. of peat-forming plants varied from 36.7%to 69.3%, and corresponding variations occurred in the acid-insol. residues. The significance of the formulæ used is discussed. A. B. M.

Anomalous heat effects of certain radioactive minerals. A. DORABIALSKA (Rocz. Chem., 1932, 12, 416—425).—The heat effects of orangite and monazite are considerably greater than would follow from their content of radioactive elements. This effect is not due to adsorption of H_2O or to chemical processes or morphological changes taking place in the crystals. The continuous evolution of heat is associated with the La and Yt fractions, being absent from the Ca and Er fractions. Heat effects of the same order of magnitude are given by La and Yt derived from other sources. R. T.

Volcanic ash from Guatemala. E. DEGER (Chem. Erde, 1932, 7, 291–297).—An account is given of the eruption on Jan. 21, 1932, of the Fuego volcano, and analyses of the ash are recorded. L. J. S.

Phosphate beds in the Cioclovina caves. E. GEORGEACOPOL and (MLLE.) M. DAVIDESCU (Bul. Chim. Soc. Române Stiinte, 1929, **31**, 3—22).—The beds, which have been formed by the fossilisation of bones, contain (1) $Ca(H_2PO_4)_2$, sol. in H_2O ; (2) $CaHPO_4$, insol. in H_2O , sol. in ammoniacal NH_4 citrate; (3) $Ca_3(PO_4)_2$, insol. in the above; (4) $Ca_3(PO_4)_2$,CaO, sol. in 2% citric acid; (5) Fe and Al phosphates. (1), (2), and (4) are immediately assimilable by plants, (3) dissolves slowly under the action of CO_2 , (5) are insol. and valueless as fertilisers. The effect of soil, humidity, etc. on fertilising val. is considered. D. R. D.

Laterite and laterite soils. ANON. (Imp. Bur. Soil Sci. Tech. Comm., 1932, No. 24, 30 pp.).—The characteristics of true laterites are discussed. In tropical areas, intense leaching leads to the formation of laterites *in situ*. The product contains Al_2O_3 (in excess of that requisite to combine with the SiO₂) in the form of gibbsite. Special methods of analysis and an extensive bibliography are appended.

A. G. P.

Organic Chemistry.

Significance of X-ray structure in organic chemistry. J. HENGSTENBERG and H. MARK (Naturwiss., 1932, 20, 539-544).

Number of structural isomerides of homologues of methane and methyl alcohol. D. PERRY (J. Amer. Chem. Soc., 1932, 54, 2918—2920). —The no. of primary, sec.-, and tert.-isomeric alcohols for C_{21} to C_{30} , and structurally isomeric paraffins for C_{19} to C_{39} and for C_{60} , are calc. by Henze and Blair's method (A., 1931, 1147, 1148). C. J. W. (b)

Separation of normal long-chain hydrocarbons by fractional distillation in high vacuum. (MISS) H. S. GILCHRIST and (MISS) B. KARLIK (J.C.S., 1932, 1992—1995).—An electrically heated apparatus is described (cf. Müller, A., 1928, 1176). Mixtures of eicosane $(1\cdot3-50\%)$ and triacontane $(50-98\cdot7\%)$ and of tetracosane (3%) and triacontane (97%) are separable as shown by X-ray examination of the fractions obtained. H. B.

Action of radon on some unsaturated hydrocarbons. II. Propylene and cyclopropane. G. B. HEISIG.—See this vol., 918.

Mechanism of polymerisation of unsaturated compounds. R. ODA (Nia Kem., 1932, 5, 47-53). --Mols. of unsaturated compounds are considered to tend to become arranged so as to have a min. electric moment; union of chemical linkings then takes place. CH. ABS. Formation of various organic sulphur compounds from ethylenic hydrocarbons. A. MAILHE and M. RENAUDLE (Compt. rend., 1932, 195, 391— 393).—In presence of SiO₂ gel at 650—725° H₂S and C₂H₄, propylene, Δ^{a} -*n*-butene, or *iso*amylene give H₂, CH₄, mercaptans (I), aromatic, ethylenic, and saturated hydrocarbons, neutral sulphides (II), thiophen and its homologues (III), and CS₂. (II) are formed by decomp. of (I), and (III) from (II). Bu₂S or BuSH in presence of SiO₂ gel at 700° gives thiophen. More CS₂ is formed at the higher temp. R. S. C.

New isomeride of benzene. Hexa- $\Delta^{\alpha\epsilon}$ -diene- Δ^{γ} -inene. LESPIEAU and GUILLEMONAT (Compt. rend., 1932, 195, 245—247).— $\alpha\beta$ -Dibromoethyl ether with the Mg₂ derivative of C₂H₂ affords α -bromo- γ -ethoxy- Δ^{γ} -butinene (I), b.p. 47—48°/14 mm., and $\alpha\zeta$ -dibromo- $\beta\delta$ -diethoxy- Δ^{γ} -hexinene in two stereoisomeric forms, b.p. 158—162°/14 mm. [Br₂-derivatives (II), m.p. 113—114° and 70—70.5°]. With Zn dust in BuOH at 110° (I) affords mainly vinylacetylene. The mixture (II) similarly affords hexa- $\Delta^{\alpha\epsilon}$ -diene- Δ^{γ} inene, b.p. 84.5—85° (hexabromide, m.p. 105—106°). J. L. D.

Detection of chloropicrin. E. V. ALEXEEVSKI (J. Chem. Ind., Russia, 1931, 8, No. 20, 50–51).— Reduction in aq. solution with Ca affords HNO_2 , which is detected with β -C₁₀H₇·NH₂ and H₂SO₄. CH. ABS.

Determination of small amounts of ethyl iodide. R. D. COOL (J. Biol. Chem., 1932, 97, 47–52).—Oxidation is effected with Cl_2 or Br to HIO_3 , which is determined with KI and $Na_2S_2O_3$, after removal of excess Cl_2 or Br with PhOH. A. A. L.

Oxidation of alcohols by chromic acid. L. SEMICHON and M. FLANZY (Compt. rend., 1932, 195, 254-256).—Primary and sec. alcohols with dil. CrO₃ afford acids and ketones rapidly and nearly quantitatively. CMe₃·OH is incompletely oxidised under similar conditions after 125 hr. *iso*Butyric acid suffers graded oxidation to COMe₂ and EtCO₂H. Glycerol and the sugars afford CH₂O and HCO₂H. J. L. D.

Microchemical detection of methyl alcohol in presence of ethyl alcohol. C. Kollo and N. CRISAN (Bul. Soc. Chim. România, 1932, 13, 82— 88).—By oxidation with Beckmann's reagent, condensation of the aldehydes with 5:5-dimethyldihydroresorcinol, and separation of the products by fractional micro-sublimation, small quantities of MeOH in min. concn. of 0.5% can be detected in presence of EtOH. R. S. C.

Partial esterification of polyhydric alcohols. XII. Function of ethylene oxide rings. A. FAIRBOURNE, G. P. GIBSON, and D. W. STEPHENS (J.C.S., 1932, 1965—1972).—The production of glycerol $\alpha\gamma$ -Et₂ ether (I) (0.72 mol.) from $\alpha\gamma$ -dichlorohydrin (II) (1 mol.) and NaOH (2.2 mols.) in EtOH involves four reactions, viz., the formation and opening of two ethylene oxide rings : OH·CH(CH₂Cl)₂ \longrightarrow CH₂>CH·CH₂Cl \longrightarrow OEt·CH₂·CH(OH)·CH₂Cl \longrightarrow CH₂>CH·CH₂·OEt \longrightarrow OH·CH(CH₂·OEt)₂. The

conditions governing these reactions are investigated

and modified so that each intermediate can be isolated. Ring formation occurs under the action of NaOH, whilst fission of the ring (leading to the β-OH compound) is accomplished by acid or alkali (not in neutral solution). Gradual addition of aq. NaOH (1 mol.) to (II) at 75-80° gives 0.86 mol. of epichlorohydrin (III), which with EtOH-H_SO4 affords α -chlorohydrin γ . Et ether, the detection of which during the prep. of (I) from (II) is difficult owing to its decomp. by EtOH-NaOH at approx. the same rate as it is produced. This is converted by 27% NaOH at 80-100° into glycidyl Et ether, which with 1% EtOH-H₂SO₄ gives (I). The prep. of glycerol $\alpha\gamma$ -Ph₂ ether (IV) from (II) is similarly investigated. (III) heated with NaOPh gives (IV), but with PhOH (2 mols.) at 110°, α -chlorohydrin γ -Ph ether results. Treatment of a mixture of (II) and PhOH with 27% NaOH at 70-80° and then at 100° gives glycidyl Ph ether (63% yield), converted by PhOH and a little alkali into (IV).

The compounds described by Suzuki and Inoue (A., 1930, 736) are not the di-*p*-nitrobenzoates of glycerol α - and β -Me ethers (A., 1931, 599); the structure of the " β "-chlorohydrin used is unproven. H. B.

Partial esterification of polyhydric alcohols. XIII. Glycerol α -phenyl ether. XIV. Iodohydrins. A. FAIRBOURNE and D. W. STEPHENS (J.C.S., 1932, 1972—1973, 1973—1977).—XIII. Glycerol α -Ph ether exists in two forms, m.p. 54° and 68°. $\alpha\gamma$ -Di-o-tolyloxy- β -acetoxypropane has m.p. 36° (cf. A., 1931, 599).

XIV. Di-*p*-nitrobenzoates of specimens of α -iodohydrin obtained from different sources are identical; β -iodohydrin is unknown. $\alpha\beta$ -Di-iodohydrin, m.p. 43°, is prepared from allyl alcohol and I; its *p*-nitrobenzoate, m.p. 66—67° (decomp.), laurate, m.p. 38—39°, palmitate, m.p. 55°, and stearate, m.p. 55—56°, are similarly obtained from the allyl esters. $\alpha\gamma$ -Di-iodohydrin p-nitrobenzoate, m.p. 81—82°, palmitate, m.p. 48—49°, and stearate, m.p. 49—50°, are prepared by acylation of $\alpha\gamma$ -di-iodohydrin (from $\alpha\gamma$ -dichlorohydrin and KI). Comparison of the above and related pairs of esters shows that the m.p. of the as-compound may be higher than, the same as, or lower than the m.p. of the s-isomeride (cf. Robinson et al., this vol., 364). The glyceryl palmitate, m.p. 69°, of Bergmann and Carter (A., 1930, 1555) is the β -ester. H. B.

Equilibrium in binary systems with erythritol as component. N. A. PUSHIN and M. DEŽELIO (Monatsh., 1932, 60, 431–437).—Thermal analysis shows that erythritol does not give definite compounds or solid solutions, but only mechanical mixtures with o- and p-C₆H₄(NH₂)₂, CH₂Cl·CO₂H, CCl₃·CO₂H, mannitol, or SbBr₃. Palmitic, stearic, oleic, elaidic, and picric acid do not mix with erythritol when molten and form two liquid layers. Mannitol and glycerol resemble erythritol in their behaviour towards the two and three first-named acids, respectively.

H. W. Partly acylated sugar alcohols. I. Treatment of benzoylated mannitol αζ-di-iodohydrin with silver fluoride. II. The dibenzoylmannitol of Einhorn and Hollandt. A. MÜLLER (Ber., 1932, 65, [B], 1051—1055, 1055—1059).—I. d-Mannitol is converted by successive treatment with CPh₃Cl and BzCl in pyridine into $\alpha\zeta$ -ditriphenylmethylmannitol $\beta\gamma\delta\epsilon$ -tetrabenzoate, m.p. 183—184°, $[\alpha]_{10}^{30}$ +42·62° in CHCl₃ (or +2EtOH, m.p. 141—142°), transformed by HBr-AcOH into d-mannitol $\beta\gamma\delta\epsilon$ -tetrabenzoate (I), m.p. 145—147° after softening, $[\alpha]_{11}^{37}$ about -0·5° in CHCl₃, from which $\alpha\zeta$ -diacetyl-d-mannitol $\beta\gamma\delta\epsilon$ -tetrabenzoate, m.p. 146°, $[\alpha]_{10}^{39}$ +40·38° in CHCl₃, and d-mannitol hexabenzoate, m.p. 149— 150°, $[\alpha]_{10}^{19}$ +53·97° in CHCl₃, are derived. (I) and p-C₆H₄Me·SO₂Cl in pyridine yield $\alpha\zeta$ -di-p-toluenesulphonyl-d-mannitol $\beta\gamma\delta\epsilon$ -tetrabenzoate, m.p. 171° or, more usually, m.p. 166°, $[\alpha]_{10}^{19}$ +36·98° in CHCl₃, which with NaI in COMe₂ at 100° affords $\beta\gamma\delta\epsilon$ -tetrabenzoyl-d-mannitol $\alpha\zeta$ -iodohydrin (II), m.p. 70—71°, $[\alpha]_{10}^{37}$ +31·93° in CHCl₃ (additive compound with 1 mol. of dioxan, $[\alpha]_{10}^{19}$ +32·05° in CHCl₃). (II) and AgF in pyridine give a small yield of substance, m.p. 147— 148°, $[\alpha]_{10}^{27}$ +45·79° in CHCl₃, which does not add Br or reduce Fehling's solution. The formation of a double linking by the action of AgF on the iodohydrins of sugar alcohols appears evidence of the immediate proximity of the I atom to an O ring.

II. The mannitol dibenzoate of Einhorn and Hollandt does not react with CPh_3Cl in pyridine, thus confirming the $\alpha\zeta$ -structure (cf. Brigl and Grüner, this vol., 598); tetra-acetyl- α -mannitol α ; dibenzoate has m.p. 125–126°, $[\alpha]_{11}^{17}$ +41.64° in CHCl₃. Tri-ptoluenesulphonyl-d-mannitol az-dibenzoate, m.p. 133-134°, $[\alpha]_D^{175} + 43.56°$ in CHCl₃, is transformed by NaOAc and Ac₂O in a complex manner into a *product*, m.p. 135°, which yields $p-C_6H_4Me\cdotSO_3Na$ with NaI in COMe₂ at 175–180°, but not at 110°, giving an I-free *product*, m.p. 140–142°, $[\alpha]_{10}^{16}$ +54·39° in CHCl₃. Mannitol az-dibenzoate is converted by COMe, and H_2SO_4 into $\gamma\delta$ -isopropylidene-d-mannitol $\alpha\zeta$ -dibenzoate, m.p. 94–95°, transformed by NH_3 -MeOH into $\gamma \delta$ -isopropylidenemannitol, m.p. 84°, $[\alpha]_{11}^{21}$ +27.66° in H_2O , identical with the $\alpha\beta$ -isopropylidenemannitol of Irvine and Patterson (J.C.S., 1914, 105, 989), the constitution of which follows from its conversion into az-ditriphenylmethyl- γ 8-isopropylidene-d-mannitol β s-diacetate, m.p. 143°, $[\alpha]_{\rm D} \pm 0^{\circ}$, by successive treatment with CPh₃Cl and Ac_2O in pyridine. α -Sorbitol benzoate, m.p. 140°, $[\alpha]_{\beta}^{ls} + 1.85°$ in pyridine, from d-sorbitol and BzCl in pyridine, did not react with H. W. CPh₃Cl.

Component of Polygara tenuifolia. J. SHINODA, S. SATO, and D. SATO (Ber., 1932, 65, [B], 1219-1223).-Continued extraction of P. tenuifolia with MeOH, evaporation of the extract to dryness after addition of MgO and H_2O , and subsequent treatment with EtOH and Et₂O affords polygaritol (I), m.p. 142—143°, $[\alpha]_{D}^{16}$ +47.81° in H_2O , which does not reduce Fehling's solution or react with NHPh·NH2, Br, or KMnO₄. It appears identical with the product isolated from P. amara, L., and P. vulgaris. The Ac_4 derivative has m.p. 73-75°. (I) is reduced by P and HI (d 1.7) to hexyl iodide, b.p. 167°. Oxidation of (I) with H_2O_2 followed by treatment with NHPh·NH, affords glucosazone, m.p. 208°, whereas after oxidation with NaOBr an osazone, m.p. 184°, is obtained identical with that derived from styracitol

and from hydroxyglucal. (I) is therefore $\alpha \epsilon$ -anhydromannitol. H. W.

Reaction between diethyl ether and phosphorus pentachloride. W. S. GUTHMANN (J. Amer. Chem. Soc., 1932, 54, 2938—2940).— PCl_5 (7 g.) boiled with 30 c.c. of Et₂O for 48 hr. gives an oil, not completely miscible with Et₂O, stable at room temp. in absence of moisture, and hydrolysed to MeCHO, HCl, H₃PO₄, H₃PO₃, and unidentified stable organo-P compounds. C. J. W. (b)

Synthesis and enzymic decomposition of galactose 6-phosphate. B. HVISTENDAHL (Svensk Kem. Tidskr., 1932, 44, 156—162).—The synthesis of galactose 6-phosphate from diisopropylidenegalactose is described (cf. A., 1931, 1393). Enzymes derived from bones hydrolyse galactose 6-phosphate five times as rapidly as those present in the kidneys, but in both cases the velocity of the reaction is less than half that which results when a glycerophosphate solution is employed. Fermentation experiments using treated and untreated yeast and galactose 6-phosphate, with or without added phosphate, tended to show that this ester does not play any part as intermediate product in the fermentation of galactose.

H. F. H.

Compounds of fructosediphosphoric acid. C. NEUBERG and M. SCHEUER (Biochem. Z., 1932, 249, 478—482).—The prep. and properties of the benzidine salt of fructosediphosphoric acid, $C_6H_{10}O_4(PO_4)_2$, B_3 (B=benzidine), are described. Impure Zn and Cd salts can be prepared from the Mg salt. The uranyl compound is insol. in H_2O . W. McC.

Thionitrates. I. tert.-Butyl thionitrate, CMe_3 ·S·NO₂. H. RHEINBOLDT and F. MOTT (Ber., 1932, 65, [B], 1223—1224).—tert.-Butyl thionitrate, m.p. -12°, b.p. 54—54·5°/13 mm., decomp. about 150°, is prepared by oxidising tert.-butyl thionitrite in AcOH with fuming HNO₃. H. W.

Detection and determination of dichloroethyl sulphide by combustion. M. MAXIM (Chem.-Ztg., 1932, 56, 503).—Determinations of this substance by the action on it of HI and titration of the liberated I, and by reduction of H_2SeO_3 and weighing the Se, are not sp. Since S is not usually present in the impurities associated with the compound, it is better to determine S by the Carius method or by combustion of the gas in an open tube, leading the products through H_2O_2 and BaCl₂, and determining the S as BaSO₄. A cloudiness or ppt. in the collecting vessel indicates the presence of dichloroethyl sulphide. B. P. R.

Industrial synthesis of sodium monoiodomethanemonosulphonate. G. AURISICCHIO (L'Ind. Chimica, 1932, 10, 714—716).—CH₂I·SO₃Na was prepared by direct sulphonation of 20% aq. CHI₃ by Na₂SO₃ under reflux condenser for >5 hr. CH₂I₂ is formed as intermediate product. NaI formed is decomposed by Cl₂ and the residual Cl₂ displaced by CO₂. The neutralised liquid is evaporated on the water-bath. NaCl is separated by treating the residue with EtOH. The product is recrystallised from EtOH. The yield is almost quant. O. F. L.

Oxidation of acetic acid and acetate by persulphate. F. FICHTER and L. PANIZZON (Helv. Chim. Acta, 1932, 15, 996—1008).—The principal initial product of the oxidation of acetate in alkaline and acid solution by $K_2S_2O_8$ appears to be Ac_2O_2 , which hydrolyses to AcO_2H , although in acid solution part breaks down to C_2H_6 ; during the hydrolysis MeOH, C_2H_4 , and/or CH_4 and CH_2O are formed. Simultaneously with the main reaction, succinic acid is formed by direct oxidation. The main reaction is identical with that which takes place during anodic oxidation of AcOH and during photolysis of uranyl acetate. H. F. G.

Special case of allylic isomerism. RAMBAUD (Compt. rend., 1932, 195, 389–391).—Et vinylglycollate (I) and PBr₃ give Et γ -bromocrotonate (II) and an inseparable mixture of unchanged (I) and Et α -bromovinylacetate, which isomerises partly to (II) when distilled. Me vinylglycollate and PBr₃ give only Me γ -bromocrotonate. (I) and SOCl₂ give *Et* α -chlorovinylacetate, b.p. 67.5°/23 mm., which with CaBr₂ yields (II). R. S. C.

Choleic acids. V. Separation of optical antipodes by means of co-ordination compounds. H. SOBOTKA and A. GOLDBERG (Biochem. J., 1932, 26, 905-909).—CHMeEt·CO₂H, CHPhEt·CH₂·OH, dipentene, and camphor have been resolved by this method. S. S. Z.

Electrolysis of a mixture of two fatty acids. M. MATSUI and S. ARAKAWA (Mem. Coll. Sci. Kyoto, 1932, A, 15, 189—194).—The hydrocarbons formed at the anode on electrolysing aq.-alcoholic solutions of binary mixtures of fatty acids, approx. neutralised with K₂CO₃, at 70—75° and 12—13 amp. per 15 sq. cm. with Pt electrodes, have been investigated. A mixture of AcOH and C₁₅H₃₁·CO₂H yields C₁₆H₃₄ and C₃₀H₆₂ (*n*-paraffins); AcOH and C₁₇H₃₅·CO₂H yield C₁₈H₃₈ and C₃₄H₇₀; EtCO₂H and C₁₅H₃₁·CO₂H yield C₁₈H₃₈ and C₃₀H₆₂; Pr^aCO₂H and C₁₅H₃₁·CO₂H yield C₁₈H₃₈ and C₃₀H₆₂; CH₂Cl·CO₂H and C₁₅H₃₁·CO₂H yield C₁₈H₃₈ and C₃₀H₆₂; CH₂Cl·CO₂H and C₁₅H₃₁·CO₂H yield C₁₈H₃₈ and C₃₀H₆₂; CH₂Cl·CO₂H and C₁₅H₃₁·CO₂H yield C₁₆H₃₃Cl and C₃₀H₆₂; CH₂Ph·CO₂H and C₁₅H₃₁·CO₂H yield PhCHO, C₃₀H₆₂, and (?) C₁₆H₃₃·Ph; CCl₃·CO₂H is decomposed at the temp. employed. The regularity of the results, which is shown also in the approx. quant. equality of the yields, suggests that the fatty acids and CH₂Cl·CO₂H all give analogous primary products, the varying stability of which determines the nature of the final products. D. R. D.

Reactions of olefinic compounds. I. Additivity of olefinic acids towards hypochlorous acid and ethyl hypochlorite : orientation in relation to additive mechanism. G. F. BLOOMFIELD and E. H. FARMER (J.C.S., 1932, 2062-2071).- Δγ-Hexenoic acid in Et₂O and aq. HOCl (Cl-free but containing CaCl₂) give after 55-60 hr. at 0° about 95% of S-chloro-y-hexolactone, b.p. 115-116°/5 mm., and ${<}5\%$ of (probably) γ -chloro- δ -hydroxyhexoic acid. Δ^{β} -Hexenoic acid and HOCl afford about 20% of (probably) γ-chloro-β-hydroxyhexoic acid, m.p. 83-84°, and nearly 80% of a mixture of β -chloro- γ -hexo-lactone, b.p. 80°/5 mm., and a non-volatile stereoisomeride (which when kept for 1 year gives cryst. material, C₆H₉O₂Cl, m.p. 175°). Δ^{a} -Hexenoic acid combines with HOCl much more slowly than its isomerides; the resultant product contains much unchanged material, α -chloro- β -hydroxyhexoic acid (I),

m.p. 82°, and an impure stereoisomeride (II) of (I) (free from any detectable amount of β -chloro- α hydroxyhexoic acid). (I) is oxidised by K₂Cr₂O₇- H_2SO_4 to $PrCO_2H$, whilst the impure acetate of (I) on reduction (Na-Hg), subsequent hydrolysis (EtOH-KOH), and oxidation (alkaline KMnO₄) gives small amounts of $H_2C_2O_4$ and $PrCO_2H$. (II) is oxidised ($K_2Cr_2O_7-H_2SO_4$) to fumaric and fatty acids (con-taining much $PrCO_2H$); its accetate is degraded (as above) to H2C2O4 and PrCO2H. Crotonic and sorbic acids give very small amounts of additive compounds with EtOCl. Of the three hexenoic acids, only the Δ^{β} -acid reacts smoothly with EtOCl in CCl₄ or Et₂O; at least 93% of a mixture of isomeric β -chloro- γ -hexolactones and <1% of (probably) γ -chloro- β -ethoxy-hexoic acid are formed in Et_2O ; it is assumed that the production of the lactones involves the loss of OEt after the inception of addition. The similarity in the results with HOCl and EtOCl suggests that the polarisations are Cl OH and Cl OEt. The addition of Cl to Δ^{β} -hexenoic acid can be represented analogously to that of EtOCl and HOCl, since chlorination in Et_2O or hexane at -8° gives solely β -chloro- γ -hexolactone and HCl (liberated from the outset of reaction); addition in all three cases is initiated mainly or wholly at C_{β} . The main activations (8-)

of Δ^{α} - and Δ^{γ} -hexenoic acids are at C_a and C_b , respectively. The chlorination of cinnamic acid in EtOH is discussed briefly. H. B.

Conjugated compounds. XVIII. Addition of hypochlorous acid to sorbic acid. G. F. BLOOM-FIELD and E. H. FARMER (J.C.S., 1932, 2072-2078). -Sorbic acid in Et₂O and aq. HOCl give a solid mixture (A) of 80% of δ -chloro- γ -hydroxy- Δ^{α} -hexenoic acid (Ag salt) and 20% of its lactone together with a stereoisomeric δ -chloro- γ - Δ^{α} -hexenolactone (I), decomp. above $140^{\circ}/5$ mm. (yielding sorbic acid), and (probably) the γ -lactone (II) of $\alpha\delta(\text{or }\beta\delta)$ -dichloro- $\beta\gamma$ (or $\alpha\gamma$)-dihydroxyhexoic acid; A, (I), and (II) represent 50-60, 20-25, and 15-30%, respectively, of the sorbic acid used, and practically the whole of the acid suffers attack at C_{δ} . Reduction of A (H₂, colloidal Pd, H₂O) affords a little unidentified chlorohydroxyhexoic acid, m.p. 141-142°, and (mainly) δ-chloro-y-hexolactone, b.p. 120°/9 mm., m.p. about 11.5°, which is reduced by Na-Hg in aq. EtOH to y-hexolactone and a trace of Cl-free acid and is oxidised (K₂Cr₂O₇-H₂SO₄) to small amounts of AcOH, succinic acid, and an oil. A is oxidised by O_3 to $H_2C_2O_4$ and an aldehyde (oxidised by H₂O₂ to a Cl-free substance, m.p. 87—94°), by neutral KMnO_4 to $\text{H}_2\text{C}_2\text{O}_4$ and an oily Cl-acid (see below), and by K₂Cr₂O₇-H₂SO₄ to fumaric acid, a trace of AcOH, and an oily Cl-acid (consisting largely of CHClMe·CO₂H). Reduction (H₂, colloidal Pd, aq. COMe₂) of (I) gives unidentified acidic material and (probably) a mixture of γ -hexolactone and δ -chloro- γ -hexolactone, whilst oxidation (neutral KMnO₄) affords H₂C₂O₄, a trace of AcOH, and CHClMe·CO₂H. (II) is also oxidised (KMnO₄) to CHClMe·CO₂H and AcOH. HOCl could not be added to A, suggesting that (II) arises by addition of HOCl to the primarily formed a8-chlorohydrin or by simultaneous attack at both the double linkings of sorbic acid.

Solid (B) and liquid (C) (mainly lactonic) products are also formed from β -vinylacrylic acid and HOCl; oxidation of B and C gives CH₂Cl·CO₂H. The mode of addition suggested by Muskat and Hudson (A., 1931, 1148) does not apply to B or to a large proportion of C. Consequently the hypothesis of Muskat and Northrup (A., 1930, 1553) is untenable. H. B.

Solid glycerides of sardine oil. K. KINO (J. Soc. Chem. Ind. Japan, 1932, 35, 247B—249B).—The following are isolated by fractional crystallisation, using COMe₂, CHCl₃-EtOH, and EtOH-Et₂O as solvents: $\alpha\gamma$ -dimyristo- β -palmitin, m.p. 59·8—60°; $\alpha\beta$ -dimyristo- γ -palmitin, m.p. 53°; β -myristo- $\alpha\gamma$ -dipalmitin, m.p. 58·5—59°; α -myristo- $\beta\gamma$ -dipalmitin, m.p. 55·5°, and a myristodipalmitin, m.p. 51°. Unsaturated fatty acid derivatives are also present.

H. A. P.

Autoxidation of the fatty acids. I. Oxygen uptake of elaidic, oleic, and stearic acids. G. W. ELLIS (Biochem. J., 1932, 26, 791-800).—The uptake by the first two acids of more than 20% of O in 24-48 hr. can be caused by a moderate rise of temp. (50-75°) in presence of Co oleate and by high dispersion of the acids. Stearic acid is liable to appreciable oxidation under these conditions at 75°. H₂O and CO₂ are evolved during the autoxidation. Their formation appears to be due to secondary reactions. In the case of elaidic acid under the most advantageous conditions for an initial oxidation process, 3 to 4 atoms of O are absorbed; 2 or 3 of these are retained by the non-volatile autoxidation product. S. S. Z.

Esters of orthoformic acid. P. P. T. SAH and T. S. MA (J. Amer. Chem. Soc., 1932, 54, 2964— 2966).—The following trialkyl orthoformates are prepared from CHCl₃, the appropriate alcohol, and Na in about 30% yield: Me, b.p. $103-105^{\circ}$; Et; Pr^{β} , b.p. 166—168°; Pr^{α} ; Bu^{\beta}, b.p. 224—226°; Bu^{α} , b.p. 245—247°, and *iso*amyl, b.p. 265—267°. Numerous physical data are given. C. J. W. (b)

Decomposition of valerolactone. R. W. THOMAS and H. A. SCHUETTE (J. Amer. Chem. Soc., 1932, 54, 3008—3009).—The partial decomp. of valerolactone as it approaches the b.p. is due (mainly) to the formation of a polymerisation product. C. J. W. (b)

Chemical examination of flowers of the mullen. L. SCHMID and E. KOTTER (Monatsh., 1932, 60, 305– 316; cf. this vol., 501).—The pale yellow material separable from the α -crocetinglucoside (*loc. cit.*) by means of C₆H₆ is identified as thapsiaic acid, CO₂H·[CH₂]₁₄·CO₂H, containing a small amount of α -crocetin. Separation cannot be effected by crystallisation from C₆H₆, EtOAc, or MeOH, but isolation is readily accomplished by hydrogenation of the crude product (Pd or PtO₂) after oxidation with HNO₃ (*d* 1·38) at 100° or by treatment with 5% NaOH at 50°. The acid, m.p. 124°, is further identified by the Ag salt, anhydride, m.p. 70·5°, Et₂ ester, m.p. 37—38°, and Me_2 ester, m.p. 52°. H. W.

Reactions and reagents for detecting organic compounds. I. E. EEGRIWE (Z. anal. Chem., 1932, 89, 121-125).—Tests for identifying tartaric, malic, glycollic, and oxalic acids in presence of other org. acids are described. O. J. W.

Formation of ethyl triacetylacetate. F. SEIDEL (Ber., 1932, 65, [B], 1205-1211).—The action of AcCl on Et sodioacetoacetate in anhyd. Et₂O affords AcOH, Et acetoacetate (I), Et diacetylacetate (II), and a small amount of *Et triacetylacetate* (III), b.p. 97-105°/14 mm., identified by conversion into Et 4-acetyl-3: 5-dimethylpyrazole-4-carboxylate (IV), m.p. 188° (readily isolated from accompanying products on account of its insolubility in H₂O). The Ac₃ derivative does not appear to be formed by the action of AcCl and K₂CO₃ on (II) at 100° or from the Na derivative of the latter and AcCl at room temp., whilst at 200° complete decomp. ensues. (IV) and $\text{NHPh}\cdot\text{NH}_2$ afford colourless *crystals*, m.p. 210—215°, or straw-yellow needles, m.p. 248°. Titration with Br shows (II) to contain 86.0-86.5% of the enolic form, depending considerably on temp. and concn. The method is applicable to the examination of the mixture of (I), $(\hat{I}\hat{I})$, and (III). The product of the action of Ac₂O on (I) at 170–180° is converted by N_2H_4 into 3: 5-dimethylpyrazole; the existence of Et β -acetoxyisocrotonate appears therefore to be doubtful.

H. W.

Constitution of protolichesteric acid and lichesteric acid. M. Asano and T. KANEMATSU (Ber., 1932, 65, [B], 1175-1178).-Lichesteric acid (I), m.p. 123.5°, is obtained by extracting Iceland moss from Tateyama with Et₂O, shaking the extract with aq. K₂CO₃, acidifying the alkaline solution, and boiling the ppt. with Ac₂O. When heated with excess of 0.1N-KOH (I) yields lichesterylic acid (II), m.p. 83-84° (semicarbazone, m. p. 125°). With diazomethane, 1-protolichesteric acid (JII) affords the substance (?) $\overset{\text{Me} \cdot [\text{CH}_2]_{12} \cdot \text{CH} \cdot \text{CH}(\text{CO}_2\text{Me})}{O - - \text{CO}} > C < \overset{\text{NH} \cdot \text{N}}{\text{CH}_2 \cdot \text{CH}}, \text{ m.p. } 60 -$ 61°, whereas (I) yields Me 1-lichesterate, m.p. 53-54°, $[\alpha]_{13}^{14}$ -28.07° in CHCl₃. Oxidation of (I) by KMnO₄ gives myristic acid, m.p. 54°. The constitutions $CO_2H \cdot C - CHR > 0,$ $COR \cdot CH_2 \cdot CHMe \cdot CO_2H$, and $CH_2: C \cdot CO \cdot O \cdot CHR \cdot CH \cdot CO_2 H$ (R=Me·[CH₂]₁₂·) are assigned to (I), (II), and (III), respectively. H. W.

α-Hydroxy-β-methoxysuccinic acid, its complexes with copper, and their circular dichroism. J. GIUNTINI (Compt. rend., 1932, 195, 125–127). α-Hydroxy-β-methoxysuccinic acid (cf. J.C.S., 1915, 107, 15) dissolves $Cu(OH)_2$ to a max. of 1·5 $Cu(OH)_2$ per mol. Observation of [α] indicate compounds containing per mol. of acid 1 and 1·5CuO (cf. A., 1925, ii, 15), the latter forming intense bluish-green crystals. The impossibility of obtaining a complex similar to TCu_2 (T=tartaric acid residue) when one alcoholic function is blocked shows that in the attachment (to the asymmetric C atoms) of the Cu atoms of the group (TCu_2T)^{IV} in Cu-T complexes the alcohol functions play an essential part. C. A. S.

Alginic acid: its mode of occurrence and its constitution. T. DILLON and (MISS) A. MCGUINNESS (Sci. Proc. Roy. Dublin Soc., 1932, **20**, 129–133).— Fresh *Laminaria* fronds do not evolve CO_2 with aq. Na₂CO₃ and do not, therefore, contain free alginic acid (I). The ash content (Ca and Fe) of impure (I) from fresh fronds decreases, but later increases, on dialysis; that of (I) from dried fronds decreases rapidly and does not later increase. Thus (I) is probably combined in the fronds with colloidal Ca and Fe compounds, which are rendered non-colloidal

$$\begin{array}{c} \operatorname{CO_{2}H} \cdot (\operatorname{CH} \cdot \operatorname{OH})_{2} \cdot \operatorname{CH} \cdot \operatorname{CH}(\operatorname{OH}) \cdot \operatorname{CH}(\operatorname{OH}) - \\ \operatorname{O} \\ \operatorname{CO_{2}H} \cdot (\operatorname{CH} \cdot \operatorname{OH})_{2} \cdot \operatorname{CH} \cdot \operatorname{CH}(\operatorname{OH}) \cdot \operatorname{CH} \cdot \operatorname{OH} \\ \operatorname{O} \\ \operatorname{O} \\ \end{array}$$

or insol. when dried. Neutralisation of gelatinous (I) by NaOH and analysis of the Ba salt indicate that (I) is $(C_6H_{10}O_7)_n$, giving, when dried, the lactone, $(C_6H_8O_6)_n$. The annexed formula is suggested.

R. S. C. Mechanism of the production of thiol acids (RSH) and sulphonic acids (RSO₃H) from dithioacids (RS₂R). III. Action of copper salts. P. W. PREISLER and D. B. PREISLER (J. Amer. Chem. Soc., 1932, 54, 2984-2987; cf. this vol., 367).-The reaction between Cu" salts and dithio-acids is, e.g.: $4(\cdot S \cdot CH_2 \cdot CH_2 \cdot CO_2H)_2 + 10CuSO_4 + 9H_2O =$

 $5SCu \cdot CH_2 \cdot CH_2 \cdot CO_2Cu + 3SO_3H \cdot CH_2 \cdot CH_2 \cdot CO_2H +$

10H₂SO₄; the Cu₂ salt of the thiol acid and the sulphonic acid (as Ba salt) are isolated. In the reaction between $(S \cdot CH_2 \cdot CH_2 \cdot CO_2H)_2$ and $CuSO_4$ and $Cu(ClO_4)_2$, the amount of Cu_2 salt isolated depends on the acidity, temp., concn., and presence of O_2 . C. J. W. (b)

Oxidation of a-thiolpropionic acid by hydrogen peroxide. A. SCHÖBERL and M. WIESNER (Ber., 1932, 65, [B], 1224-1226).-Oxidation of α-thiolpropionic acid by a small excess of H_2O_2 in acid solution occurs slowly and appears to depend on the presence of heavy metal catalysts, whereas the change is very rapid in alkali carbonate solution. In acid medium an acid mixture of indefinite m.p. is obtained from which homogeneous r- $\alpha\alpha$ -dithiodipropionic acid, m.p. 148-150°, is isolated through the K salt. With an excess of H_2O_2 at a higher temp., H_2SO_4 and α -sulphopropionic acid result. H. W.

Syntheses from Chinese castor oil. C. H. KAO and S. MA (Sci. Rep. Nat. Tsing Hua Univ., 1932. A, 1, 129-134).-The oil (1 litre), which has a high acid val. but otherwise normal consts., affords heptaldehyde (I) (250 c.c.) and undecenoic acid (about 100 g.) when distilled in vac. (I) is reduced by Zn dust and aq. AcOH to heptyl alcohol, b.p. 176° (corr.); the bromide, b.p. 178.5° (corr.), is converted by NaCN in 80% EtOH into octonitrile, b.p. 204° (corr.), and thence (EtOH-H₂SO₄) into Et octoate, b.p. 208° (corr.). Et n-heptylmalonate, b.p. 154-156°/14 mm., is converted by the usual method into Et nonoate, b.p. 227.5° (corr.). H. B.

Rate of hydrolysis of cyclic acetals. I. R. LEUTNER (Monatsh., 1932, 60, 317-352).-Replacement of H by Me in the carbonyl component increases and in the alcoholic component diminishes the rate of hydrolysis of cyclic acetals. The stability of the 5-membered ring is least and increases through the 6- to the 7-membered ring, the increase being regular with the const. factor 6. The tendency towards formation is therefore greatest with the 7-membered ring. The tensions of the 5-, 6-, and 7-membered

rings are in the ratio 1:0.2:0.03. The formals and acetals follow closely the fundamental laws of acetal hydrolysis; this is not the case with acetone acetals. The following compounds are described : formaldehyde dimethyleneacetal, b.p. 73-75°, from ethylene glycol (I), CH₂O, and syrupy H₃PO₄; acetaldehyde dimethyleneacetal, b.p. $82-83^{\circ}$, from (I) and $C_{2}H_{2}$ in presence of $HgSO_{4}-H_{2}SO_{4}$; acetone dimethyleneacetal, b.p. 91-92°, from (I), COMe2, p-C6H4Me·SO3H, and Na₂SO₄; acetone methyldimethyleneacetal, b.p. 93°, from propane- $\alpha\beta$ -diol and C_2H_2 ; formaldchyde trimethyleneacetal, b.p. 105°, from propane-ay-diol (II), trioxymethylene, and H_3PO_4 ; acetaldehyde tri-methyleneacetal, b.p. 107°, from (II), C_2H_2 , $HgSO_4$, and H₂SO₄; acetone trimethyleneacetal, b.p. 95° (not homogeneous), from (II), COMe₂, Na₂SO₄, and p- C_6H_4Me ·SO₃H; acetaldehyde tetramethyldimethyleneacetal, b.p. 128-130°, from pinacol, MeCHO, and conc. HCl; acetaldehyde tetramethyleneacetal, b.p. 125-127°, from paracetaldehyde, butane-ad-diol, and conc. HCI. H. W.

Synthesis of carbon chains. IV. Condensation of chloral hydrate with p-nitrophenylhydrazine and acetic acid. A. STEPANOV and A. KUSIN (Ber., 1932, 65, [B], 1239-1242).-The products of the action of CCl3 CH(OH)2 on p-NO2 ·C6H4 ·NH ·NH2 in 50% AcOH depend very greatly on the experimental conditions. After 10 min. at 100° with dil. solutions, 3: 5-dihydroxy-1-p-nitrophenylpyrazol-4-one-p-nitrophenylhydrazone, m.p. 228°, is isolated. It gives an Ac, decomp. 185-195°, and an Ac, derivative, decomp. 244°. The mechanism of H. W. the reaction is discussed.

[Constitution of] the ammonium sulphideformalin precipitate. C. G. LE FEVRE and R. J. W. LE FÈVRE (J.C.S., 1932, 2087-2088).-Delépine's formulæ (A., 1899, i, 410) for the substances, m.p. 198° (I) and 176° (this vol., 627), are improbable, since methylthioformaldine with $KMnO_4$ or HNO_3 gives $CH_2(SO_3H)_2$, whereas (I) yields only H_2SO_4 and a little R. S. C. (?) trimethylenesulphone.

Semicarbazone formation. J. B. CONANT and P. D. BARTLETT.—See this vol., 916.

Preparation of keten by catalytic fission of acetone. E. BERL and A. KULLMANN (Ber., 1932, 65, [B], 1114-1121).-Passage of COMe₂ through an empty hard-glass tube at 705° gives keten (I) in 25% yield. With porous earthenware at 695-710° the yield is 24-27%; with Willstätter's granular Al₂O₃ at 665° and with purified quartz at 650-710° it is 35%. Bauxite, $ZnO + Al_2O_3$, and ZnO + CuO are ineffective. SiO₂ gel has marked condensing action. Asbestos or pumice, soaked in MgSO₄, MnSO₄, Cr₂(SO₄)₃, or Al₂(SO₄)₃ solutions and then dried and ignited, affords contacts which initially yield substances containing S. After this initial phase, high yields of (I) can be obtained only by using a large excess of COMe₂. The contact appears more efficient when prepared from more dil. solutions. With 2% Al₂(SO₄)₃ at 465°, 45% of (I) is obtained with a reaction ratio 20:1. The best results are observed with V_2O_5 , ThO₂, CrO₂ and Al₄C₃ on pumice, whereby the yield is increased to 75%. All catalysts require to be "broken in " before attaining

their max. efficiency. The gradual improvement is attributed to the removal as Fe(CO)₅ of Fe present originally in the pumice. Ageing of the contact, caused by deposition of C, can be overcome by ignition in air. In all cases the optimal temp. of reaction is 670-680°. Further increase in the yield of (I) is rendered difficult by the accentuated decomp. induced by higher concn. of (I). This can be repressed only by use of a large excess of COMe₂, which protects the (I) from further decomp. A further source of loss lies in the tendency of (I) to polymerise. The re-condensed COMe₂ invariably contains marked amounts of polymerisate, which remains as a resin on evaporation. The yields of (I) calc. on the CH_4 evolved ($COMe_2 = CH_2:CO + CH_4$) are approx. 10% higher than those calc. by titration with alkali hydroxide. The difference is attributed to the formation of polymerides. H. W.

ψ-Halogens. XX. Triacetyl- and diacetylmethane. L. BIRCKENBACH, K. KELLERMANN, and W. STEIN (Ber., 1932, 65, [B], 1071–1079).—Tri-acetylmethane, b.p. $104^{\circ}/19$ mm. (K, decomp. about 180°; Cs, decomp. about 170°; Ag salts), is prepared by the action of AcCl on Na acetylacetonate in Et₂O or of AcCl and AlCl₃ on acetylacetone in CS2. Hydrolysis with H₂O and NaOH follows the respective courses : CHAc₃+H₂O=AcOH+CH₂Ac₂ and CHAc₃ +2NaOH=2NaOAc+COMe2. The Ag salt is transformed by the requisite halogen in Et_2O at -10° into triacetylmethyl chloride, m.p. 20.3°, bromide, m.p. 47.9°, and iodide, m.p. 44.9°. Hydrolysis with H₂O leads to CHAc, and hypohalogenous acid and thence to trihalogenomethane. With NaOH, KI, and KCN reac-tion occurs : 3CAc₃Hal+7NaOH=7NaOAc+2COMe₂ + CHHal₃; CAc₃Hal + 2KI = KCAc₃ + KHal + I_2 ; CAc₃Hal + KCN = KCAc₃ + CNHal. Electrolysis of CHAc₃ and its salts affords oxidising anodic solutions, indicating the primary production of ψ -halogens. The optical behaviour of CHAc₃ and its salts establishes the existence of ketonic and enolic forms; the equilibrium mixture contains only two components. Nef's observation of the existence of a non-acidic component in the product of the action of AcCl on CHNaAc₂ (see above) is due to the necessity of a large excess of KOH for the dissolution of CHAc₃. The Ag salt of CH₂Ac₂ yields diacetylmethyl chloride, b.p. 152°/708 mm., bromide, m.p. 23–24°, and iodide, m.p. 31°. They are hydrolysed by H_2O and NaOH respectively to CH₂Ac₂ and HOHal, whence CHHal₃ and COMe₂, NaOAc, and CHHal₃. KI and KCN react with elimination of I and production of CNHal, respectively. SO₂ reduces quantitatively to CH_2Ac_2 and Hal'. With $Cu(OAc)_2$ in C_6H_6 or AcOH the salts $Cu(CCIAc_2)_2$, $Cu(CBrAc_2)_2$, and $Cu(CIAc_2)_2$, decomp. above 180°, are produced. H. W.

Precipitation of sugars and polyhydroxy-compounds by metallic hydroxides in alkaline solution. I. General character of the precipitation. P. FLEURY and J. COURTOIS (J. Pharm. Chim., 1932, [viii], 16, 97-109).—Considerable pptn. occurs when various heavy metals, best Fe, are used in 10% solution in presence of NaOH (I), Ba(OH)₂, or aq. NH₃ [best (I)]. Acetates are more efficient than nitrates. Sometimes the ppt. redissolves in excess of alkali. Methods of analysis and decomp. of the ppt. are described. R. S. C.

Molisch reaction. II. H. BREDERECK (Ber., 1932, 65, [B], 1110—1113; cf. this vol., 145).— α -Naphthol and 5-hydroxymethylfurfuraldehyde in presence of 10% NaOH at 100° afford di-1-hydroxy-4naphthyl-5-hydroxymethyl-2-furylmethane (I), +Et₂O, m.p. 148° after softening at 136°, +H₂O, m.p. about 178° after slow decomp. above 135° (Ac derivative, m.p. 180° after softening at 162—163°). With conc.



 H_2SO_4 at 17°, (I) affords the monosulphonic acid (II; X=SO₃H, Y=H), whereas at 100° the disulphonic acid (II; X=Y=SO₃H) is obtained. In the Molisch reaction the pentose or hexose is converted into furfuraldehyde or 5-hydroxymethylfurfuraldehyde, which condenses with α -naphthol to the triarylmethane derivatives. This is oxidised and then sulphonated by the H_2SO_4 to a degree dependent on the temp. attained at the zone of contact of acid and regent, thus giving the observed dye. H. W.

Fenton's reaction. IV. A. T. KÜCHLIN.—See this vol., 917.

Optical crystallographic description of the phenylosazones and other derivatives of sugars. V. H. MORRIS (J. Amer. Chem. Soc., 1932, 54, 2843—2846).—The optical properties of the phenylosazones of glucose, galactose, arabinose, xylose, and maltose, and of K H saccharate, fructosephenylmethylosazone, mannosephenylhydrazone, mucic acid, arabinosediphenylhydrazone, and CdBr₂ xylonate have been determined with the petrographic microscope by the immersion method. Vals. of n_{α} , n_{β} , and n_{γ} , the optical character, optic axial angle, sign of elongation, optical orientation, and crystal habit are given. The above phenylosazones can be identified by immersion in liquids with definite refractive indices. F. W. Z. (b)

Synthesis of d-talose from d-galactose. T. KOMADA (Bull. Chem. Soc. Japan, 1932, 7, 211– 216).—Acetobromogalactose and Zn dust in cold 50% AcOH give galactal triacetate, b. p. 138—140°/0·2—0·3 mm. [absorbs 1 mol. of Br or H₂ (in abs. Et₂O in presence of Pt-black)], hydrolysed by Zemplén's method (not by NH₃-MeOH) to impure galactal, m.p. 95—100° (decomp.). This with BzO₂H in CHCl₃ at 0° gives d-galactose and d-talose, separated by crystallising the phenylmethylhydrazones from MeOH and regeneration of the sugars by PhCHO. R. S. C.

Oxidation products of fructose in ammoniacal solution by methylene-blue and atmospheric oxygen at room temperatures. J. PARROD (Compt. rend., 1932, 195, 285–286).—An aq. solution containing fructose (1 mol.), methylene-blue free from Zn (0.4 mol.), and NH₃ (16 mols. 20%) with air at room temp. during 1 month affords 4-methoxyglyoxaline, d-4-arabinotetrabutoxyglyoxaline, and the *amide*, m. p. 214°, of glyoxaline-4-carboxylic acid. Absence of methylene-blue affects the reaction mainly by altering the proportions of the products of oxidation. J. L. D.

Dye of Papaver rhœas. II. L. SCHMID and R. HUBER (Monatsh., 1932, 60, 285–294).—The blossoms are extracted with AcOH and the dyes are pptd. with Et₂O-HCl. EtOH is added to the solid dissolved in H₂O, and the filtrate treated with Et₂O. Separation of the freely-sol. red dye from the sparingly-sol. darker compound is effected by EtOH, after which the residue is freed from mineral matter etc. by means of MeOH-HCl and Et₂O followed by 0.3% HCl and AcOH, whereby the substance C₂₆H₂₉O₁₃Cl,2H₂O is isolated. Hydrolysis of the glucoside with cold, dil. HCl affords 1 mol. of pentose, 1 mol. of hexose, and the aglucone C₁₅H₁₁O₄Cl, which resembles closely the anthocyanidins. It is converted by molten KOH into protocatechuic acid; the phenolic component could not be identified. H. W.

Inulin and inulinase. XII. H. PRINGSHEIM and P. OHLMEYER (Ber., 1932, 65, [B], 1242-1248).-The results described previously (A., 1931, 941) are vitiated by the presence in A. niger of mannitol which does not pass into solution until the enzyme is extracted with the buffer solution $(p_{\rm H} 3.8)$ and thus appears among the products of the hydrolysis of inulin. The "difructose anhydride acetate " is identified as mannitol acetate. Adsorption of inulinase is best effected with Willstätter's $Al(OH)_3$ B and elution with phosphate buffer $(p_{\rm H} 6.8)$, or preferably with aq. NH₃. The purified enzyme is much more efficient than the crude extract in the hydrolysis of inulin. The inulinase unit is defined as that amount of enzyme which hydrolyses 150 mg. of inulin to the extent of 30% in 1% solution during 3 hr. at 37°. With the purified enzyme inulin is hydrolysed to the extent of 95%. The difference between the results of titration with Fehling's solution and hypoiodite indicates the presence of a small amount of glucose, usually about 1.5% of the inulin. Removal of 83% of the fructose in the cryst. form from the hydrolysate and examination of the residue confirms this val. The presence of at least 3% of glucose, as found after acid hydrolysis, could not be demonstrated. Whilst it is possible that glucose is present in the non-hydrolysed inulin residue, it is probable that enzymic hydrolysis does not follow the same course as acid hydrolysis. H. W.

Action of sodium triphenylmethyl on inulin in liquid ammonia. L. SCHMID and R. FALKE (Monatsh., 1932, 60, 295—304).—p-Benzhydryltetraphenylmethane, m.p. 226—227° (identified also as the carbinol, $OH \cdot CPh_2 \cdot C_6H_4 \cdot CPh_3$, m.p. 219—220°), is obtained by the action of NaCPh₃ on inulin in liquid NH₃. Although the carbohydrate is quantitatively recovered unchanged, the hydrocarbon is not obtained in good yield in its absence. It cannot be prepared from CPh₃ or NaCPh₃ in liquid NH₃ and inulin cannot be replaced by sol. starch. H. W.

Glycogen. II. Methylation and acetylation. G. K. HUGHES, A. K. MACBETH, and F. L. WINZOR (J.C.S., 1932, 2026-2031; cf. A., 1924, i, 1046).-- The results of Haworth et al. (A., 1930, 72) on the methylation of glycogen triacetate are confirmed. Six treatments of glycogen with Me₂SO₄ and aq. NaOH give a product (OMe 36%), which on repeated methylation (as before) affords a product (OMe 40.8%), hydrolysed by 1.5% MeOH-HCl to (mainly) 2:3:6-trimethylmethylghucoside and a dimethylmethylghucoside. Repeated methylation in presence of COMe₂ gives, however, a product containing 44% OMe, but methylation proceeds much less readily than with glycogen triacetate. Glycogen and methylghycogen (OMe about 36%) could not be depolymerised in glycerol at 190° and 200-210°, respectively.

Glycogen is acetylated readily by Ac₂O and conc. H₂SO₄ at room temp., but "treated" glycogen (pptd. from a boiling aq. solution by EtOH) is similarly acetylated only with difficulty. On the other hand, "treated" starches (potato, rice, wheat, maize) are acetylated more readily than the original materials (which also react at different rates). In all the experiments, depolymerised EtOH-sol. triacetates, m.p. 150—155° (hydrolysed by MeOH-HCl to α - and β methylglucosides), are produced. H. B.

Polymorphism of substances of high mol. wt. IV. Attempted explanation of the isomerism of polysaccharides (cellulose, starch). J. R. KATZ and A. WEIDINGER (Rec. trav. chim., 1932, 51, 842– 846).—The different forms of starch and cellulose are definite chemical isomerides with different constitutional formulæ. The difference probably lies in the spatial arrangement of the atoms in the $C_6H_{10}O_5$ units. D. R. D.

Chain length of natural celluloses and of acetylxylan from deciduous trees. E. SCHMIDT, K. MEINEL, W. JANDEBEUR, and W. SIMSON [with K. BETZ, R. SCHNEGG, and M. HECKER] (Cellulosechem., 1932, 13, 129-139).-Cellulose from different sources contains 0.28% CO₂H independently of whether it has been isolated by treatment with ClO₂ and dil. NaOH or whether, as with cotton cellulose, this treatment has been unnecessary. The scission products of the skeleton substance of wood consist of 78.4% of cellulose (I) and 21.6% of de-acetylated xylan (II), corresponding with the ratio $3C_6H_{10}O_5$ to $1C_5H_8O_4$. The CO_2H content of the mixture is 0.66%, of which 0.22% is in (I) and 0.44% in (II). The calc. CO_2H content of the latter is thus 2.05%, and that found after separating it from (I) with 5% NaOH is 1.86%. Conductometric titration also indicates 0.28% CO2H in (I). It is concluded that the chains of natural (I) and of acetylxylan (III) contain 96 and 16 units, respectively, or multiples of these. It is probable that in wood (I) and (III) are combined to form an ester and the proportion $3C_6H_{10}O_5$ to $1C_5H_8O_4$ suggests that the actual chain length of (III) is 32 units, containing 2CO₂H. A. G.

Wood cellulose. I. Methylation of the α -cellulose. III. The depolymerised celluloses of wood and cotton. III. "Resistant portions." D. J. BELL (Biochem. J., 1932, 26, 590-597, 598-608, 609-614).—I. The max. OMe contents attained in 5 specimens of wood celluloses were $36\cdot3-39\cdot1\%$ against $44\cdot3\%$ reached in a specimen of standard cotton cellulose treated under the same conditions.

Both cotton and wood celluloses when fully methylated are partly sol. in CHCl_3 ; $[\alpha]_{\text{D}}$ in CHCl_3 cotton -10° , Thiriena pulp (wood) $+2\cdot5^\circ$. The methylated wood celluloses each contained a fraction incompletely methylated and completely resistant to hydrolysis. These isolated resistant fractions of about 28% OMe content could not be methylated above 32% OMe. The non-resistant portions are constructed wholly of glucose residues having free OH groups in positions 2, 3, and 6.

II. Triacetates of different wood a-celluloses prepared under standard conditions, showed sp. rotations varying from -19° to 0° . Simultaneous deacetylation and methylation led to the formation of fully methylated depolymerised cellulose (OMe 39.2%), $[\alpha]_{p} = -2.3^{\circ}$ in CHCl₃. The empirical composition was the same as that of the corresponding intact cellulose. Cleavage of the above methoxide yielded 2:3:6trimethylmethylglucoside and a resistant portion with 29.9% OMe. The cleavage products of the depolymerised and methylated cellulose, but not of the intact cellulose, contained a small amount of 2:3:4:6-tetramethylglucose. Acetylation also effected depolymerisation, the trimethyl-depolymerised cellulose showing $[\alpha]_p - 1 \cdot 2^\circ$ in CHCl₂. Cleavage of this material was complete and no tetramethylglucose was found. Cleavage of depolymerised cotton methylated to the extent of 38.6% OMe was complete, no resistance being encountered; a small amount of tetramethylglucose was found in this case. There is definite relationship between optical activity in CHCl₃ of wood cellulose acetates and the proportion of resistant material from corresponding methylated intact celluloses.

III. The fractions of wood celluloses cannot be methylated beyond a stage at which their composition corresponds with that of a dimethylcellulose. Their Ac derivatives seem to be identical. The resistant material from the cleavage products of fully methylated depolymerised wood cellulose possesses properties very similar to those of the resistant portions of the corresponding intact methylated cellulose. Cotton cellulose methylated to 30% of OMe yields an Ac derivative with properties which are not common to the acetates of the "resistant portions." The cleavage products of the Ac derivatives of the latter are a mixture of 2:3:6-trimethylglucoside, dimethylmethylglucosides, and monomethylmethylglucosides. In the case of Thiriena-pulp cellulose the mixture of dimethylmethylglucosides consists mainly of the 2:6- and 3:6- with a little of the 2:3-dimethylmethylglucosides. There are indications of the presence of 6-monomethylmethylglucoside in the residual material. S. S. Z.

Reaction between diethylamine and ethylene oxide. W. H. HORNE and R. L. SHRINER (J. Amer. Chem. Soc., 1932, 54, 2925–2930).—Dry NHEt₂ does not react with $(CH_2)_2O$. β -Diethylaminoethyl alcohol (I), b.p. 42—44°/8 mm., 163°/760 mm. [p-nitrophenylurethane, m.p. 59—60° (corr.); hydrochloride, decomp. 200—210°], results in 75% yield when $(CH_2)_2O$ is passed into MeOH–NHEt₂ at 45—60°. The highboiling fractions from the prep. of (I) contain β -(β diethylaminoethoxy)ethyl alcohol, b.p. 92—95°/7 mm. [p-nitrophenylurethane hydrochloride, m.p. 152—153° (corr.)] [also formed from $(CH_2)_2O$ and (I) in MeOH], β -($\beta\beta'$ -diethylaminoethoxyethoxy)ethyl alcohol, b.p.123— 128°/7 mm. [p-nitrobenzoate, m. p. 121.5—122° (corr.)], and the diethylamino-alcohols,

NEt₂·[CH₂·CH₂O]_n·CH₂·CH₂·OH, where n=3 and 4, b.p. 164—172⁵/7 mm. and b.p. 190—200[°]/7 mm., respectively. C. J. W. (b)

Syntheses of glucopeptides of d-glucosamine (N-glycyl- and N-d-alanyl-d-glucosamine). M. BERGMANN and L. ZERVAS (Ber., 1932, 65, [B], 1201-1205).-Glucosamine tetra-acetate and benzylcarbonatoglycyl chloride in presence of CHCl₃ and pyridine at -10° afford N-benzylcarbonatoglycyl- β -d-glucosamine tetra-acetate, m.p. 165° (corr.), hydrolysed by NaOMe in anhyd. CHCl₃ to N-benzylcarbonatoglycyl-d-glucosamine (I), m.p. 181° (corr.), decomp. 193° , $[\alpha]_{10}^{20}$ $+40.0^{\circ}$ in MeOH (also prepared directly from glucosamine hydrochloride). Catalytic hydrogenation of (I) in presence of Pd-black and MeOH gives N-glycyld-glucosamine hydrochloride, darkening above 170° , $[\alpha]_{D}^{18}$ +29.7° in H₂O (equilibrium val.). N-Benzylcarbonatod-alanyl-β-d-glucosamine tetra-acetate, m.p. 172° (corr.), similarly yields N-benzylcarbonato-d-alanyl-d-glucos-amine, m.p. 232° (corr.), and d-alanyl-d-glucosamine hydrochloride, decomp. about 155° after softening at 150° , $[\alpha]_{D}^{18} + 40.9^{\circ}$ in $H_{2}O$ (equilibrium val.). H. W.

Kinetics of the degradation of polymerichomologous chains. Rate of hydrolysis of derivatives of amino-acids. W. KUHN, C. C. MOLSTER, and K. FREUDENBERG (Ber., 1932, 65, [B], 1179— 1183).—Measurement of the rate of hydrolysis of glycine anhydride (I), glycylglycine, di- and tri-glycylglycine by N-NaOH at 20° and by 0·1N-NaOH at 20° and 34° in the case of (I) are recorded. The rate of alkaline hydrolysis of the peptides of glycine increases with increasing no. of members. The tetrapeptide suffers fission mainly at the central linking. H. W.

General method for the synthesis of peptides. M. BERGMANN and L. ZERVAS [with, in part, O. F. LEINERT] (Ber., 1932, 65, [B], 1192—1201).—The NH₂ group of the NH₂-acid is protected by the introduction of the CH₂Ph·O·CO· group, which can be removed, without rupture of the peptide linking, by catalytic hydrogenation in open vessels :

 $CH_2Ph \cdot O \cdot CO \cdot NH \cdot CHR \cdot CO_2H \longrightarrow PhMe +$

CO₂H·NH·CHR·CO₂H \longrightarrow CO₂+·NH₂·CHR·CO₂H. Benzyloxycarbonyl chloride (I), which decomposes when distilled into CH₂PhCl and CO₂, is obtained in sufficient purity by addition of CH₂Ph·OH to COCl₂ in PhMe at 0°, removal of excess of COCl₂ by dry N₂ or CO₂ and of solvent below 60°. Glycine, (I), and 4N·NaOH afford N-benzylcarbonatoglycine, m.p. 120° (corr.), transformed by PCl₅ in anhyd. Et₂O into the corresponding chloride, m.p. 43° (decomp.). The following are analogously prepared : N-benzylcarbonato-dl-alanine, m.p. 114—115° (corr.); -d-alanine, m.p. 84°, [α]]ⁿ -14·3° in AcOH (corresponding, noncryst. chloride); -dl-serine, m. p. 125° (corr.); NN-dibenzylcarbonato-1-cystine, m.p. 123° (corr.), [α]ⁿ₁° +91·7° in AcOH, whence the corresponding chloride, m.p. 67—68°, and dibenzylcarbonato-1-cystyldiglycine Et ester, m.p. 166° (corr.); N-benzylcarbonato-d-glutamic acid, m.p. 120°, [α]ⁿ₁° -7·1° in AcOH (NaOH replaced

by MgO in prep.), whence by means of Ac_2O at 100° , the corresponding anhydride, m.p. 94° , $[\alpha]_{D}^{19} - 44 \cdot 1^{\circ}$ in AcOH, which, in anhyd. CHCl₃ with NH₃ in Et₂O, affords N-benzylcarbonato-d-isoglutamine, m.p. 175° (corr.), transformed (H₂, spongy Pd, MeOH) into *d*-iso-glutamine, $[\alpha]_{12}^{22} + 21 \cdot 1^{\circ}$ in EtOH. N-Benzylcarbonatod-glutamine, $[\alpha]_{15}^{\mu}$ + 21 1 in Booth, i. N-Benzylcarbonato-l-aspartic acid, m.p. 137° (corr.). N-Benzylcarbonato-l-aspartic acid, m.p. 116°, $[\alpha]_{15}^{\mu}$ + 9.6° in AcOH, gives the corresponding anhydride, m.p. 84°, $[\alpha]_{15}^{\mu}$ -39.8° in AcOH, and thence N-benzylcarbonato-l-isoasparagine, m.p. 164° (corr.), $[\alpha]_{15}^{18}$ +6.9° in AcOH, and 1-iso-asparagine (+1H₂O), $[\alpha]_{15}^{18}$ +15.5° in 0.1N-HCl. N-Benzylcarbonato-1-asparagine, m.p. 165° (corr.), [a]¹⁹ +7.6° in AcOH, and its Me ester, m.p. 150° (corr.), $[\alpha]_{10}^{\infty} - 2 \cdot 0^{\circ}$ in AcOH, and its *inte* ester, in.p. 150 (coll.), *[\alpha]_{10}^{\infty} - 2 \cdot 0^{\circ} in AcOH, are described.* N-*Benzylcarbon-ato-l-phenylalanine* has m.p. 103°. N-*Benzylcarbon-ato-l-tyrosine*, m.p. 101°, $[\alpha]_{10}^{\infty} + 11 \cdot 1^{\circ}$ in AcOH (*Et* ester, m.p. 78°, $[\alpha]_{10}^{\infty} - 4 \cdot 7^{\circ}$ in EtOH), -d-*arginine*, m.p. 175° (corr.), $[\alpha]_{10}^{\infty} - 9 \cdot 2^{\circ}$ in 0 $\cdot 5N$ -HCl, and -l-*histidine*, m.p. 209° (corr.), are described. Glycine anhydride, (U) and 2N NaOH give hencylcarbonated lowed charges (I), and 2N-NaOH give benzylcarbonatoglycylglycine, 178°. Benzylcarbonato-d-glutamic anhydride m.p. and Et2 d-glutamate in anhyd. CHCl3 afford Et2 N-137° benzoylcarbonato-d-glutamyl-d-glutamate, m.p. (corr.), hydrolysed to the free acid, m.p. about 176° (corr.) after softening at 145°, whence d-glutamyl-dglutamic acid, m.p. 205° (corr.), $[\alpha]_{p}^{18} + 19.9°$ (as hydrochloride in H₂O), which is readily hydrolysed by pancreas extract. 1-Tyrosine Et ester hydrochloride and benzylcarbonato-l-aspartic anhydride in pyridine at room temp. give benzylcarbonato-1-asparagyl-1-tyrosine Et ester, m.p. 203° (corr.), whence the free acid (+1H₂O), m. p. 110°, and 1-asparagyl-1-tyrosine, decomp. about 230°, $[\alpha]_{b}^{s} + 60.1^{\circ}$ (as hydrochloride in H₂O). H. W.

Syntheses of derivatives of amino-acids. K. FREUDENBERG, H. EICHEL, and F. LEUTERT (Ber., 1932, 65, [B], 1183-1191).-Aminoacetonitrile is converted by HCl-EtOH into Et \beta-amino-a-iminoethyl ether hydrochloride; the free base, b.p. 42-43°/13 mm., is converted by NH3-EtOH into aminoacetamide dihydrochloride. Similarly, benzamidoacetonitrile affords the non-cryst. Et β -benzamido- α -iminoethyl ether (hydrochloride, decomp. about 134° when rapidly heated) and benzamidoacetamidine hydrochloride, m.p. 184°. 2-Cyanothiophen and HCl-EtOH give the imino-ether C4H3S·C(:NH)·OEt,HCl, decomp. 123-126° according to the rate of heating, and thence the amidine, C4H3S·C(:NH)·NH2,HCl, m.p. 176° (slight Thiophenamidoacetonitrile, m.p. 129decomp.). 130°, from 2-thiophenoyl chloride, aminoacetonitrile sulphate, and dil. NaOH in presence of C₆H₆, yields successively Et β -2-thiophenamido- α -iminoethyl ether hydrochloride, decomp. 117-120°, and thiophenamidoacetamidine hydrochloride, decomp. about 275°. Chloroacetamidoacetonitrile (I), m.p. 90-91°, affords Et β -chloroacetamido- α -iminoethyl ether hydrochloride, decomp. 122°. (I) and NaN₃ in boiling aq. EtOH give azidoacetamidoacetonitrile, b.p. 148—153°/0·3 mm.; azidoacetonitrile has b.p. 53°/12 mm. p-Toluenesulphonamidoacetonitrile, m.p. 136°, is converted through the imino-ether hydrochloride into p-toluenesulphonamidoacetamidine hydrochloride, decomp. about 185°. α -Azidopropionyl chloride, glycine, and N-

NaOH yield a-azidopropionylglycine, reduced by Al-Hg in aq. NH₃ to dl-alanylglycine, m.p. 224° (2-naphthalenesulphonyl derivative, m.p. 141-142°). Pha-azidopropionate, b.p. 76°/0.2 mm., from the chloride and PhOH in pyridine, is reduced by Al-Hg in moist Et₂0 to Ph a-aminopropionate hydrochloride, m.p. 131°. CH₂N₃·COCl and Et lactate in presence of CHCl₃ and pyridine yield Et a-azidoacetoxypropionate, b.p. 79°/ 0.2 mm. p-Azidoacetoxybenzoic acid, m.p. 160° after softening at 157°, azidoacetylsalicylic acid (II), m.p. 104°, and a-azidoacetoxypropionic acid, (III), m.p. 52° are prepared from the requisite acid and CH₂N₃·COCI in CHCl3-pyridine. Reduction of (II) with Al yields non-cryst. products, whereas hydrogenation (spongy Pt in MeOH) yields a compound, m.p. 164-166°, which is not the expected glycylsalicylic acid. (III) and H_2 in presence of H_2O and spongy Pt give α aminoacetylpropionic acid, m.p. 161° (trihydrate, m.p. 148°). Azidoacetic anhydride, b.p. 110°/0.2 mm., is obtained from CH₂N₃·CO₂Ag and CH₂N₃·COCl in anhyd. EtOH. Glycylglycine is prepared from glycine anhydride and 10% NH₃ at 100°. H. W.

Synthesis of α -amino- $\beta\gamma$ -dihydroxy-n-butyric acid. H. O. L. FISCHER and L. FELDMANN (Ber., 1932, 65, [B], 1211—1214).—Unimol. glyceraldehyde in anhyd. MeOH is treated successively with HCN and NH₃. The aminonitrile is hydrolysed by conc. HCl. α -Amino- $\beta\gamma$ -dihydroxy-n-butyric acid, decomp. 215— 216° (corr.) after softening at about 180°, is isolated as the Cu salt. α -Phenylcarbamido- $\beta\gamma$ -dihydroxy-nbutyric acid, m.p. 163° (corr., decomp.) after softening, and α -2-naphthalenesulphonamido- $\beta\gamma$ -dihydroxy-nbutyrolactone, m.p. 177° (corr.), are described. H. W.

Action of sulphite on cystine. H. T. CLARKE (J. Biol. Chem., 1932, 97, 235–248).—Cystine in NaOH with Na₂SO₃ gives cysteine and S-cysteinesulphonic acid, isolated as the Na salt after removal of cysteine with Cu_2SO_4 as the substance

 $6C_3H_6O_2NSCu, 2Cu_2SO_3, Cu_2SO_4$. The NH_4 salt is obtained by evaporation of cystine in aq. NH_3 with $(NH_4)_2SO_3$. Alkaline cystine gives a little benzylcysteine by prolonged action of CH_2PhCl , but gives 60-80% in the presence of Na_2SO_3 after 5 hr. The above salts give H_2SO_4 and cysteine with hot HCl, Na_2SO_3 with NaOH, BaS_2O_3 by prolonged action of $Ba(OH)_2$, and H_2SO_4 and cysteic acid with Br. The rotation of alkaline cystine solution is partly stabilised by excess of Na_2SO_3 , and depends on the concn. of NaOH and Na_2SO_3 owing to the reversibility of the above reaction. The variations of colour intensity with time are recorded for some colour reactions with cystine (this vol., 206). A. A. L.

Preparation and properties of the normal barium salt of *l*-cystine. C. J. B. THOR and R. A. GORTNER (J. Amer. Chem. Soc., 1932, 54, 3009–3011). —The *Ba* salt, darkens at about 250°, $[\alpha]_p$ -61·9°, of *l*-cystine is prepared in 96·5% yield from Ba(OH)₂ and cystine in H₂O at 0° and (after filtering) subsequent addition of 95% EtOH. The salt is partly decomposed by boiling with H₂O. C. J. W. (b)

Compounds of carbamide and urethane with acids and phenols. N. A. PUSHIN and I. I. RI-KOVSKI (Monatsh., 1932, 60, 438-448).—Thermal analysis shows that carbamide (I) yields the following compounds: $CO(NH_2)_{2,2}AcOH$, m.p. 41°;

CO(NH₂)₂,2CH₂Cl·CO₂H, m.p. 37°;

CO(NH₂)₂,CHCl₂·CO₂H, m.p. 63·5°;

 $CO(NH_2)_{2,0}$ - $C_6H_4(OH)_{2,0}CO(NH_2)_{2,0}CH_2Cl+CO_2H, m.p. 40° (decomp.); <math>CO(NH_2)_{2,2}CHCl_2+CO_2H, m.p. 47.5°$ (decomp.). With 2 : 4-dinitrophenol (I) does not give a compound but forms solid solutions with a max. concn. of 60 mol.-% (I). Towards strong acids, (I) functions as a monacid base, but as a diacid base towards weak acids; with acids of medium strength, both types of compound are possible. Urethane-does not combine with AcOH, but yields compounds of the unimol. type with mono-, di-, and tri-chloroacetic acid. In the series AcOH, mono-, di-, and tri-chloroacetic acid the stability of the equimol. compound with (I) or urethane increases with the no. of Cl atoms in the acid mol. H. W.

Iodometric titration of semicarbazide. P. D. BARTLETT (J. Amer. Chem. Soc., 1932, 54, 2853— 2858).—Semicarbazide (1 mol.) reacts quantitatively with 4 atoms of I in dil. aq. solution. The reaction is bimol.; its rate is proportional to the non-ionised fraction of the semicarbazide up to $p_{\rm H}$ 5, but is considerably accelerated at $p_{\rm H}$ 7. At $p_{\rm H}$ 7 reaction is rapid enough to provide a suitable titration method. The basicity $(pK_{\rm A})$ of semicarbazide, determined potentiometrically, is 3.66 at 24° and 4.40 at 0°.

C. J. W. (b)

Transformations of cyanogen. Polymerisation and action of potassium carbonate and sodamide. A. PERRET and A. KRAWCZYNSKI.—See this vol., 820.

Asymmetric synthesis with the aid of catalysts. II. G. BREDIG and M. MINAEFF.—See this vol., 967.

Behaviour of aliphatic diazo-compounds with derivatives of metals. I. Mercuri-organic derivatives and mercuric salts with diazomethane. Reaction of mercuric chloride with diphenyldiazomethane. L. HELLERMAN and M. D. NEWMAN (J. Amer. Chem. Soc., 1932, 54, 2859-2869).—HgCl₂ and a mol. equiv. of diazomethane in Et_2O give N_2 and a quant. yield of Hg chloromethyl chloride, CH2Cl·HgCl (I), m.p. 131° (corr.), decomposed by conc. NaOH with the formation of Hg; with 2 equivs. of diazomethane there results Hg di(chloromethyl), Hg(CH₂Cl)₂, (II), m.p. 37-40°, converted by EtOH-HgCl₂ into (I) and HgCl, and by EtOH-conc. HCl into (I) and MeCl. p-C₆H₄Me·HgCl and Et_2O -diazomethane give $Hg(C_6H_4Me)_2$ and (II), whilst HgPhCl affords HgPh2; in the last case, an intermediate liquid product (HgPh·CH2Cl?), converted by EtOH-HCl into (I), is produced. $CH_2Ph\cdot HgCl$ gives Hg benzyl chloromethyl, liquid, converted by EtOH-HCl into PhMe and (I), and by HgCl₂ into HgCl, $CH_2Ph\cdot HgCl$, and (I). HgI₂ and 1 or 2 mol. equivs. of diazomethane give a small quantity of (probably) Hg di(iodomethyl), m.p. 82-84°. Diazo-methane does not react with Hg(CN)₂, HgPh₂, or Hg p-ditolyl. Diphenyldiazomethane and HgCl₂ in Et₂O give (probably) the amorphous chlorodiphenylmethylmercuric chloride, CPh₂Cl·HgCl, which decomposes in moist air into COPh₂, HCl, and HgCl, and in moist Et₂O into HgCl and (·CPh2Cl)2. Aliphatic diazo-compounds

react also with other types of Hg compounds and with certain salts and org. derivatives of metals other than Hg. An electronic interpretation of the reaction is given. Minute quantities of (I) and (II) cause a dermatitis of the skin; (II) is a powerful vesicant. C. J. W. (b)

Synthesis of derivatives of amino-acids containing phosphorus. E. AUBEL and W. S. REICH (Compt. rend., 1932, 195, 183—185).—Et α -aminopropionate and Br in abs. EtOH at low temp. give impure Et N-bromoaminopropionate (1), decomp. 200°. Pb H phosphite and EtI at 400° give Et₂ H phosphite, which with Na in Et₂O gives H₂ and Et₂ Na phosphite (II). (1) and (II) form alanine-N-phosphorous acid, CO₂H·CHMe·NH·PO(OH)₂, purified by the Ba salt. Et glutamate gives similarly the Ba salt of the N-phosphorous acid. R. S. C.

Esters of arsenious acid. P. PASCAL and A. DUPIRE (Compt. rend., 1932, 195, 14-16).-The following are prepared by heating together vitreous As₂O₃, the appropriate alcohol, and a hydrocarbon (e.g., C_6H_6 , PhMe, $C_6H_4Me_2$) to entrain and remove the H₂O produced, if necessary under reduced pressure (cf. J.C.S., 1908, 93, 1364): Pra, b.p. 96°/10 mm.; Bu^α, b.p. 145°/15 mm.; Bu^β, b.p. 125°/15 mm.; sec.butyl, b.p. 109°/15 mm.; isoamyl, b.p. 159°/12 mm.; δ-methyl-β-amyl, b.p. 160°/11 mm.; glycol, b.p. 184°, 6 mm.; methoxyethyl, b.p. 160°/10 mm.; ethoxyethyl, b.p. 195°/10 mm.; butoxyethyl, b.p. 266°/10 mm.; chloroethyl, b.p. 170°/8 mm.; cyclohexyl, b.p. 209°/ 5 mm.; 4-methylcyclohexyl, b.p. 225°/10 mm.; glyceryl, b.p. 110°/2 mm.; benzyl, b.p. 290°/35 mm., and cinnamyl arsenites. EtOH and McOH were not esterified under the conditions used. Vals. of $n_{\rm D}$ and $M[\omega]$ are given. H. A. P.

Mercuration of compounds containing the reactive methylene group by mercuric acetate. K. G. NAIK and R. P. PATEL (J. Indian Chem. Soc., 1932, 9, 185—192).—Acetoacetarylamides [and $CH_2Ac\cdotCO_2Et$ and $CH_2(CO_2Et)_2$] and $Hg(OAc)_2$ in MeOH give di(acetoxymercuri)acetoacetarylamides, NHAr·CO·CAc(Hg·OAc)_2 (I), whilst malonamarylamides [and $CH_2(CO\cdotNH_2)_2$] afford hydroxymercuriacetoxymercurimalonamarylamides,

 NHAr ·CO·C(CO·NH₂)(Hg·OH)(Hg·OAc) (II). Compounds of type (I) are converted by 10% H₂SO₄ into sulphatodimercuriacetoacetarylamides,

NHAr·CO·CAc<HgHg>SO₄, whilst type (II) and aq. NaOH give the di(hydroxymercuri)-derivatives, converted by H₂SO₄ into di(hydroxymercuri)sulphatodi-

mercuridi(malonamarylamides), [NHAr·CO·C(CO·NH₂)(Hg·OH)Hg·]₂SO₄; both types are decomposed by 0.25N-HCl (with regeneration of the amide), H₂S, and KI (original amide and KOH produced). The following are described : di(acetoxymercuri)acetoacet-anilide, m.p. 204° (decomp.), -o-toluidide, m.p. 184°, -m-toluidide, m.p. 194° (decomp.), -p-toluidide, m.p. 181—182°, - α -naphthylamide, m.p. 200° (decomp.), - β -naphthylamide, m.p. 197°, -1 : 3 : 4xylidide, m.p. 192°, -1 : 4 : 5-xylidide, m.p. 204°, and -m-nitroanilide, decomp. above 200°; Et di(acetoxymercuri)acetoacetate, m.p. 300°; Et di(acetoxymercuri)malonate, m.p. 300° (decomp.); hydroxymercuriacetoxymercurimalonam-anilide, decomp. 300°, -o-toluidide, decomp. above 270°, -m-toluidide, m.p. 300° (turns yellow above 260° and brown above 290°), -p-toluidide, becomes reddish-brown above 280°, -a-naphthylamide, m.p. 278° (decomp.), -β-naphthylamide, m.p. 275° (decomp.), -1:3:4-xylidide, m.p. 270° (decomp.) (yellow above 250°), and -1:4:5-xylidide, becomes yellow above 260° and brown at 275°; hydroxymercuriacetoxymercurimalonamide, m.p. 300° [converted by Br into CBr₂(CO·NH₂)₂]; sulphatodimercuriacetoacetanilide, m.p. 300° (brown at 240°), -o-toluidide, turns brown above 240°, and -p-toluidide, m.p. 300° (brown above 250°); Et sulphatodimercuriacetoacetate, becomes yellow above 200° and reddish-brown at 230°; di(hydroxymercuri) sulphatodimercuri - di(malonamanil ide), becomes yellow above 250° and brown at 265°, and -di(malonamide), decomp. 300°. Malonam-1:3:4-, m.p. 166°, and -1:4:5-, m.p. 197°, -xylidides are prepared by a modification of Whiteley's method (J.C.S., 1903, 83, 24). H. B.

Isomerisation of hexamethylene to methylpentamethylene and dimethyltetramethylene under the influence of aluminium chloride or bromide. N. D. ZELINSKI and M. B. TUROVA-POLLAK (Ber., 1932, 65, [B], 1171—1174).—Treatment of cyclohexane with AlCl₃ or AlBr₃ and dehydrogenation of the product by Pt-C gives methylcyclopentane and C₆H₆ (absorbed by fuming H₂SO₄) and dimethylcyclobutane containing small amounts of a saturated hydrocarbon. AlBr₃ dehydrogenates 1:2dimethylcyclobutane to 1:2-dimethyldicyclo-[0:1:1]butane, which adds H with production of 1:2:3trimethylcyclopropane. H. W.

Polymerisation of cyclic hydrocarbons. II. Constitution of dimeric $\Delta^{1:3}$ -cyclohexadiene. K. ALDER and G. STEIN. III. α - and β -Tricyclopentadienes. K. ALDER and G. STEIN [with J. REESE and W. GRASSMANN] (Annalen, 1932, 496, 197—203, 204—251; cf. A., 1931, 473).—II. Partial reduction (H₂, Pd, EtOH) of dicyclohexadiene (I) gives the dihydro-derivative (II), b.p. 107—108°/16 mm., oxidised by KMnO₄ in COMe₂ to the liquid β -2-keto-3 : 6-endoethylenecyclohexylpropionic acid (Me ester oxime, m.p. 85—86°), which is dehydrated by boiling Ac₂O to the lactone (III), m.p. 68—69°.



Alkaline hydrolysis of (III) regenerates the keto-acid, whilst oxidation with HNO_3 in AcOH gives *cis*-hexahydroterephthalic acid, thus confirming the structure (II, with double linking between **) assigned to (I) by Hofmann and Damm.

III. The suggestion (A., 1931, 473) that tricyclopentadiene results by 1 : 4-addition of cyclopentadiene to dicyclopentadiene is supported by the following reactions with analogously constituted substances. Butadiene and 3 : 6-endomethylene- Δ^4 -tetrahydrophthalic anhydride (IV) in C₆H₆ at 140—150° give the anhydride (V; R=H), m.p. 208° (free acid, m.p. about 190°); an analogous anhydride (free acid, m.p.

151°) is similarly prepared from isoprene. transtrans- $\alpha\delta$ -Diphenylbutadiene and (IV) at 145° afford the anhydride (V; R=Ph), m.p. 290° (corresponding



 Me_2 ester, m.p. 170—171°), whilst anthracene and (IV) at 170° give an *adduct*, not melted at 355° (corresponding Me_2 ester, $C_{25}H_{24}O_4$, m.p. 230°). *cyclo*-Pentadiene (1 mol.) and (IV) in C_6H_6 at 140—150° yield the *anhydride* (VI), m.p. 178°, which with $\alpha\delta$ -diphenylbutadiene affords the *anhydride* (VII), m.p.



301°. cycloPentadienc (2 mols.) and (IV) give the anhydride (VIII), m.p. 280°, and other additive compounds [including (VI)].

pounds [including (\hat{VI})]. Reduction (H₂, Pd, H₂O) of (VI) (as Na salt) affords cis-1:4:5:8-diendomethylenedecahydronaphthalene-2:3-dicarboxylic acid (IX), m.p. 174° (decomp.) (anhydride, m.p. 159—160°), rearranged by conc. HCl at 180—200° to the trans-isomeride, m.p. 247°. Bromination (Hell-Volhard) of (IX) gives a Br_2 -derivative (anhydride, m.p. about 173°) and (by dehydrogenation) unsaturated material; the latter is oxidised (KMnO₄-COMe₂) to cis-4:7-endomethylenehexahydrohydrindene-1:3-dicarboxylic acid (X), m.p. 217° (anhydride, m.p. 154°; Me_2 ester, m.p. 74°), a small amount of which is converted by conc. HCl at 200° into the trans-isomeride (+H₂O) (XI), m.p. 226° (Me_2 ester, m.p. 96°). Bromination of (X) gives a little (trans-) Br-derivative, m.p. 245° [reduced by Zn dust and AcOH to (XI)], and a product which when oxidised (KMnO₄-COMc₂) affords a saturated hydroxy-acid, C₁₂H₁₀O₅, m.p. 240° (decomp.), and unsaturated acids; energetic oxidation (KMnO₄-COMe₂) of the latter yields cyclopentanc-1:3-dicarboxylic acid.

The (α -)tricyclopentadiene (XII), m.p. 68° (lit. 60°) (modified prep. given), of Staudinger and Bruson (A., 1926, 719) forms an *adduct*, m.p. 206—208°, with α 8-diphenylbutadiene and is partly reduced (H₂, Pd, MeOH) to the 14 : 15-*dihydro*-derivative (XIII), b.p. 145—146°/13 mm., m.p. 36° (cis-1 : 2-*dibromide*, m.p. 107°), which is reduced further to tetrahydro-a-tricyclopentadiene, m.p. 49° (lit. 43°). Energetic oxidation of (XIII) with KMnO₄ in COMe₂ gives a mixture of (X), the cis-acid (XIV; R=H), m.p. 183° [*anhydride*, m.p. 151°; *Me*₂ ester, m.p. 46°, hydrolysed by MeOH-NaOMe to the trans-acid, m.p. 186°





73° (acetate, m.p. 128—129°); acetate anhydride, m.p. 204°], which when heated passes into the corresponding γ -lactonic acid, m.p. 206° (Me ester, m.p. 130—131°). The production of (X) from (XIII) and (IX) shows that rings B - E of (XII) and the corresponding rings of (VI) [(IX) in text] are structurally and sterically identical. The formulated arrangement of rings D and E of (XII) is confirmed by the degradation (above) of (X) to cyclopentane-1:3-dicarboxylic acid.

During the prep. of (XII), an isomeride (termed β -tricyclopentadiene) (XV) is also produced. A mixture, b.p. 137—145°/15 mm., of (XII) and (XV) treated with PhN₃ gives the additive compound, m.p. 196°, of (XV) and that (loc. cit.) of (XII), whilst partial reduction affords (XIII) and $dihydro-\beta$ -tri-cyclopentadiene (XV), m.p. 88–89° (regenerated from its cis-, m.p. 124°, and trans-, m.p. 106°, -1:2-dibromides), separable through their dibromides. Further reduction of (XVI) yields tetrahydro-β-tricyclo-pentadiene, m.p. 99–100°, whilst oxidation (KMnO₄-COMe₂) gives a cis-β-dicarboxylic acid, C₁₅H₂₀O₄ [isomeric with (XIV; R=H)], m.p. 207° [anhydride, m.p. 110-111°; Me2 ester, m.p. 108-109°, hydrolysed by MeOH-NaOMe to the trans-acid, m.p. about 223° $(Me_2 \text{ ester}, \text{ m.p. } 57^\circ)]$, which when treated successively with Br and red P, aq. EtOH-KOH, KMnO₄, dil. H₂SO₄, and KMnO₄ affords (X), thus showing that (XII) and (XV) are stereoisomerides and that the atoms C_6 to C_{15} of both compounds possess the same spatial configuration. (XII) and (XV) represent the two possible cis-unions of ring A to C_4 and C_5 , and are considered to be formed by the addition of *cyclopentadiene* to two dicyclopentadienes. The configurations assigned to the dibromides of (XIII) and (XVI) are from measurements of dipole moments; dihydrodicyclopentadiene dibromide, m.p. 66°, is a cis-compound.

Tetracyclopentadiene and PhN_3 give an additive compound, m.p. 222°. H. B.

Compound of nitrobenzene and *m*-dinitrobenzene, $2PhNO_2,m-C_6H_4(NO_2)_2$. K. LEHMSTEDT (Ber., 1932, 65, [B], 1218—1219).—Determinations of the temp. of solidification of mixtures of $PhNO_2$ and $m-C_6H_4(NO_2)_2$ confirms the existence of the compound $2PhNO_2,m-C_6H_4(NO_2)_2$. The results of Hammick and others (this vol., 228) are attributed to untrustworthy experimental procedure based on measurement of m.p. H. W.

Structure of the bromination product of o-nitrotoluene. D. L. YABROFF (J. Amer. Chem. Soc., 1932, 54, 3011-3012).—In the action of Br on $o \cdot C_6H_4$ Me·NO₂, oxidation-reduction occurs first and the anthranilic acid formed is then brominated to the 3:5-Br₂-derivative; continued action of Br on this gives $s \cdot C_6H_2$ Br₃·NH₂. C. J. W. (b)

Action of reducing agents on iodonitro-compounds. C. D. NENITZESCU and D. A. ISACESCU (Bul. Soc. Chim. România, 1932, 13, 89—93).— $\omega\omega$ -Iodonitrotoluene (I) and 20% aq. NaHSO₃ give aciphenylnitromethane and phenylhydroxamic acid. *p*-Chloro- $\omega\omega$ -iodonitrotoluene (II) affords similarly aci-*p*-chlorophenylnitromethane (III), m.p. 87—88° (lit 64°). 9-Iodo-9-nitrofluorene (IV) gives aci-9nitrofluorene (V). (I) and NHPh·NH₂ give ω -nitrobenzaldehydephenylhydrazone, and (II) gives the corresponding p-*Cl*-compound, m.p. 130°; with *p*nitrophenylhydrazine (II) gives p-*chloro-\omega-nitrobenz*aldehyde-p-nitrophenylhydrazone, m.p. 158—160°, also obtained from diazotised *p*-NH₂·C₆H₄·NO₂ and (III). (IV) gives with NHPh·NH₂ the *NHPh·NH*₂ salt, m.p. 198°, and with N₂H₄ the N₂H₄ salt, m.p. 168°, of (V), whilst with NH₂OH,HCl $\alpha\beta$ -dinitro- $\alpha\beta$ -di-diphenyleneethane is formed. The following mechanism of the reactions is suggested : CHIPh·NO₂ \longrightarrow CHIPh[NH(OH):O] (A) \longrightarrow CHPh:N(OH):O, and

 $(A) \longrightarrow CHIPh·NO \longrightarrow CHPh(OH):N·OH.$

R. S. C.

Splitting of the sulphonic group from the aromatic ring by electrolytic reduction. M. MATSUI and G. SAKURADA (Mem. Coll. Sci. Kyoto, 1932, A, 15, 181–188).—SO₃H groups attached to an aromatic nucleus may frequently be reduced to H at a Pb (or Hg) cathode in NaOH solution. Optimum conditions for removing the SO₃H groups of various compounds are as follows. Unless otherwise stated, the solution (usually 2-3%) in 10% aq. NaOH was electrolysed with c.d. 4.0 amp. per sq. dm. (area of electrodes 60 sq. cm.). PhSO₃H in 20% NaOH at 15°, 60.0% reduction after 3 hr. o-Sulphobenzoic acid in 5% NaOH at 19° and 2.0 amp. per sq. dm., 77% after 6 hr. Metanilic acid in 20% NaOH at 25°, 37.0% after 2 hr. m-Sulphobenzoic acid in 5% NaOH at after 2° m. Supprovention and in $0_{/0}$ rate in $5_{/0}$ NaOH at 25° , $38_{/0}^{\circ}$ after 1.5 hr. *p*-Sulphobenzoic acid in $5_{/0}^{\circ}$ NaOH at 25° and 2.0 amp. per sq. dm., $77_{/0}^{\circ}$ after 2 hr. $1-C_{10}H_7$ ·SO₃H in $10_{/0}^{\circ}$ NaOH with $20_{/0}^{\circ}$ EtOH at 55° , $52_{/0}^{\circ}$. $2-C_{10}H_7$ ·SO₃H in $10_{/0}^{\circ}$ NaOH with $50_{/0}^{\circ}$ EtOH at 25° , $14.0_{/0}^{\circ}$. *a*-Naphthol-4- and -5-sulphonic acids, $10_{/0}^{\circ}$. Naphthionic acid at 60° , $81_{/0}^{\circ}$ after 4 hr. α-Naphthylamine-5-sulphonic acid at 65° and 2.5 amp. per sq. dm., 73% after 4 hr. β -Naphthylamine-5-sulphonic acid at 16-45°, 12% after 2.5 hr. Sulph-anilic, *p*-phenol-, α -naphthol-2-, β -naphthol-6-, α naphthylamine-6- and -7-, β -naphthylamine-6-, 6-amino- β -naphthol-4-, 8-amino- α -naphthol-3: 6-di-, and naphtholdi-sulphonic acids were not appreciably reduced. D. R. D.

Benzenesulphonyl fluoride derivatives. W. DAVIES and J. H. DICK (J.C.S., 1932, 2042-2046) .-o-Chlorosulphonylbenzoyl chloride (I) and ZnF2 in C₆H₆ or light petroleum give a little o-sulphobenzoic anhydride, whilst the p-dichloride (II) similarly (or with ZnCl₂) affords pp'-bischlorosulphonylbenzoic anhydride, m.p. 197°. (Î) is completely hydrolysed by boiling aq. 70% KF, whereas (II) yields p-fluorosulphonylbenzoic acid. Chlorination of o-C6H4Me·SO2F at 140-175°/57 hr. causes partial elimination of S (probably thus : $\mathrm{RCl} + \mathrm{SO}_2 \mathrm{ClF} \longleftarrow \mathrm{RSO}_2 \mathrm{F} + \mathrm{Cl}_2 \longrightarrow$ $RF+SO_2Cl_2$), giving a mixture of ω -chloro-o-toluenesulphonyl fluoride (III), m.p. 69° (also produced in moderate yield by rapid chlorination at 180-200°), the ωω-Cl₂-derivative, and a S-free F-compound (oxidised by $KMnO_4$ to $o \cdot C_6H_4Cl \cdot CO_2H$). Chlorination of $o \cdot C_6H_4Me \cdot SO_2Cl$ at 92—93°/36 hr. gives $o \cdot C_6H_4Cl \cdot CHCl_2$ (73.5% yield), whilst at 110-130°/5.5 hr. in presence of a trace of PCl₃, o-C₆H₄Cl·Me, o-C₆H₄Cl·CH₂Cl, and 6% of ω -chloro-o-toluenesulphonyl chloride, b.p. about 175°/22 mm., m.p. 146°, are produced. Chlorination

of p-C₆H₄Me·SO₂F occurs with practically no loss of S; w-chloro-p-toluenesulphonyl fluoride, b.p. 148- $152^{\circ}/20$ mm., m.p. 56°, is obtained in 62.4% yield at 160–210°/7 hr. (III) and NaI in COMe₂ give ω -iodoo-toluenesulphonyl fluoride, m.p. 85-86°, converted by Ag₂O in aq. EtOH into the ω -hydroxy-derivative, b.p. 128-130°/1 mm. (which could not be oxidised), and the sultone, m.p. 112-113°, of ω-hydroxy-o-toluenesulphonic acid. w-Iodo-p-toluenesulphonyl fluoride, m.p. 106°, is similarly converted into the ω-hydroxyderivative, b.p. 157-160°/1 mm., oxidised (CrO3to *p*-fluorosulphonylbenzoic acid. 0-AcOH) $C_6H_4Me \cdot SO_2F$ and cold CrO_2Cl_2 give impure benzalde-hyde-o-sulphonyl fluoride, b.p. 143—155°/1 mm. (2:4dinitrophenylhydrazone, m.p. 216-218°), oxidised slowly by atm. O_2 to a product, m.p. 65° (decomp.), readily hydrolysed by H_2O at 0° to *o*-sulphobenzoic acid; oxidation of the CHO group by the ordinary methods results in hydrolysis of the SO₂F group. Saccharin and PCl₅ at $120-130^{\circ}$ give o-CN·C₆H₄·SO₂Cl, which with aq. 70% KF and xylene at 100° (bath) affords o-cyanobenzenesulphonyl fluoride, m.p. 88-89°; the CN group of this is not affected by cold acid hydrolytic agents or by HCl, HBr, or HI in Et₂O. o-Nitrobenzenesulphonyl fluoride, m.p. 60°, is prepared from the chloride and 70% KF. One or other of the groups in the above o-substituted benzenesulphonyl fluorides exhibits anomalous behaviour.

H. B.

Directive influence of the alkylsulphonamidoand dialkylsulphonamido-groups. R. L. SHRINER, M. T. GOEBEL, and C. S. MARVEL (J. Amer. Chem. Soc., 1932, 54, 2470—2476).—The directive effect of the mono- and di-sulphonamido-groups in the C_6H_6 ring is predominantly o-p. Nitration of methanesulphonanilide (I) gives the 2 : 4- $(NO_2)_2$ -derivative, m.p. 173·5—174·5° (80·6% yield), hydrolysed to 2 : 4- $(NO_2)_2C_6H_3$ ·NH₂. Dimethanesulphonanilide, m.p. 201—202°, from (I) and MeSO₂Cl in C_6H_6 , is nitrated to 61% of the p-, m.p. 225—228°, 13% of the m-, and 6% of the o-NO₂-derivative; the structure of the p-NO₂-compound is established by synthesis and by hydrolysis. The % of isomerides are determined by hydrolysis and identification of the nitroaniline. C. J. W. (b)

Reduction of arylsulphonic acid salts and derivatives. Phosphorus pentabromide as a reducing agent. A. H. KOHLHASE (J. Amer. Chem. Soc., 1932, 54, 2441—2448).—Arylsulphonic acid salts, heated with PBr₅, are converted into the corresponding arylsulphonyl bromides and diaryl disulphides. The relative yields depend on the nature of the aryl radical; in some cases the disulphide is the only product, whilst in other cases it is formed in very small amounts. The sulphonyl bromide is formed first and is subsequently reduced by the PBr₃ simultaneously formed by the dissociation of PBr₅. The sulphonates are unaffected by PBr₃ alone. Arylsulphonyl bromides are readily reduced by PBr₃; sulphonyl chlorides are reduced with much greater difficulty, whilst neither chloride nor bromide is reduced by PCl₃. Na 2:4:6-tribromobenzenesulphonate $(+1\cdot5H_2O)$, heated for 5—10 min. with crude PBr₅, gives $86\cdot5\%$ of 2:4:6:2':4':6'-hexabromodiphenyl

disulphide; with pure PBr₅, the yield is 13-38%. The disulphide is obtained in 34% yield from 2:4:6tribromobenzenesulphonyl chloride and PBr₃. 1-C₁₀H₇·SO₂Cl does not react with PBr₃; 1-C₁₀H₇·SO₂Br and PBr₃, heated for 15 min., give 28.7% of the disulphide and 19.7% of a-C10H7.SH. 4-Nitro-o-toluenesulphonyl chloride and PBr₃, heated for 30 min., give 85.7% of 3:3'-dinitro-6:6'-dimethyldiphenyl disulphide, m.p. 147·3—148°, whilst PhSO₃Na and PBr₅, heated for 30 min. at 85—90°, give 45% of PhSO₂Br and 3% of Ph_2S_2 (the yield is improved by using PBr_5 and PBr_3). m-NO₂·C₆H₄·SO₃Na and PBr₅, heated for 70 min., give about 25% of m-NO₂·C₆H₄·SO₂Br and 27·4% of the disulphide; a mixture of PBr₅ and PBr₃ gives 57% of the disulphide, but no bromide. Na 3: 5-dinitrobenzenesulphonate does not react with PBr₅; the Ba salt and PCl₅ give 84% of the sulphonyl chloride, which with PBr₃ affords about 60% of 3:5:3':5'-tetranitrodiphenyl disulphide (I), m.p. 175-177.5°. The chloride and PhSNa in C₆H₆ give Ph 3: 5-dinitrobenzenethiosulphonate, m.p. 139-141°, converted by PBr_3 into (I) (85-95% yield). The reaction product from Na 2:4-dibromo-6-nitrobenzenesulphonate and PBr₅ at 150° could not be identified. C. J. W. (b)

Nitration of m-diphenylbenzene and derivatives of nitro-m-diphenylbenzene. C. A. WARDNER and A. Lowy (J. Amer. Chem. Soc., 1932, 54, 2510-2515). -m-C₆H₄Ph₂ and HNO₃ (d 1.5) in Ac₂O at 0-50° give a NO_2 -derivative (I), b.p. 197-198°/1 mm., which may be 4-nitro-1: 3-diphenylbenzene or 2nitro-5'-phenyldiphenyl; with HNO₃ (d 1.42) and H₂SO₄, a (NO_2)₂-derivative (II), m.p. 214°, results. (I) and m-C₆H₄Ph₂ are both nitrated further to a (NO₂)₃-derivative (III), m.p. 204°. Oxidation of (I) with CrO3 in AcOH gives a nitrodiphenylcarboxylic acid, m.p. 227°, whilst (II) gives p-NO₂·C₆H₄·CO₂H; (III) could not be oxidised. Catalytic reduction of (I) gives the NH2-compound, m.p. 64° (hydrochloride; Ac, m.p. 117°, and Bz, m.p. 152°, derivatives). m-Diphenylbenzeneazo-B-naphthol, red, and azo-dyes from the following compounds are prepared : 1 : 8-dihydroxynaphthalene-3: 6-disulphonic acid, reddish-purple; a-naphthol-4-sulphonic acid, bright red; 1:8aminonaphthol-3: 6-disulphonic acid, bluish-purple; β-naphthol-7-sulphonic acid, bright red; 1:8-aminonaphthol-2: 4-disulphonic acid, purple; 3-naphthol-3 : 6-disulphonic acid, light purple. C. J. W. (b)

Action of sulphur on organic compounds. XI. Action of sulphur on dibenzyl. L. SZPERL and M. GRADSZTAJN (Rocz. Chem., 1932, 12, 478–481).— Tetraphenylthiophen and s-tetraphenylbutane are identified amongst the products of reaction of S with dibenzyl. R. T.

Ultra-violet absorption of bismesitylenic hydrocarbons. J. SORDES (Compt. rend., 1932, 195, 247—249).—The ultra-violet absorption of hydrocarbons of the type $[CH_2]_a(C_6H_2Me_3)_2$, where n=0.5, 1, and 2, is independent of the no. of CH_2 groups separating the mesitylene residues. Mesitylacetonitrile affords on hydrolysis mesitylacetamide, m.p. 216°. This with Na and EtOH affords β -mesitylethyl alcohol, m.p. 79° (Ph urethane, m.p. 147°), which with PBr₃ yields β -mesitylethyl bromide, m.p. 74°, acted on by Na to give dimesitylbutane, m.p. 124°. Et γ -mesitylpropionate, b.p. 163—164°/16 mm., is reduced by Na and EtOH to γ -mesitylpropyl alcohol, m.p. 54° (Phurethane, m.p. 102°), which with PBr₃ affords γ -mesitylpropyl bromide, b.p. 163°/18 mm. Na reacts with the bromide to yield dimesitylhexane, m.p. 74°.

J. L. D. Isatogens. IX. Halogen derivatives of 4:6dinitro-1: 3-distyrylbenzene and their transformation into isatogens. P. Ruggli and A. ZIMMERMANN (Helv. Chim. Acta, 1932, 15, 855-878; cf. this vol., 175).—Unless otherwise stated, the following reactions were carried out in pyridine solution. 4:6-Dinitro-1:3-distyrylbenzene (I) and Br (2 mols.) in CHCl₃ give the known 4:6-dinitro-1:3di- $(\alpha\beta$ -dibromo- β -phenylethyl)benzene (II), m.p. 206° (37% yield), and an isomeride (III), m.p. 164° (53% yield). (II), when boiled, gives 4: 6-dinitro-3-styryl--1-[(?)-bromostyryl]benzene (IV), m.p. 196°. (III) similarly loses Br and HBr; the product (V), m.p. 174°, is impure, but contains a little (IV) (with, probably, a tolane derivative), and, in sunlight, gives 6-nitro-2-phenyl-5-styrylisatogen (VI), which is also obtained by illumination of (IV), or, less well, of (II) or (III). (I) and Br (1 mol.) in CHCl₂ give isomeric forms of 4: 6-dinitro-1-($\alpha\beta$ -dibromo- β -phenylethyl)-3styrylbenzene, m.p. 212° (VII), and 184° (VIII). (VII), when boiled, gives (I) and is largely or entirely unchanged by illumination. (VIII) yields (VI) when illuminated, and, when boiled, gives the mixture (V). The preps. of 4:6-dinitro-1: 3-di-($\alpha\beta$ -dichloro- β phenylethyl)benzene (IX) and 4:6-dinitro-1-($\alpha\beta$ -dichloro- β -phenylethyl)-3-styrylbenzene (X) are modified. Illumination of 4:6-dinitro-1:3-di[(?)-chlorostyryl]benzene gives 6-nitro-2-phenyl-5-[(?)-chloro-styryl]isatogen (XI). When boiled, (X) gives 4:6dinitro - 1 - [(?) - chlorostyryl] - 3 - styrylbenzene (XII), lemon-yellow, m.p. 191° (lit. 184°), changed into (V) by illumination. (X) passes in sunlight or, less well, in light from a Hg-lamp, into a copper-brown isomeride of (XII), m.p. 191°, transformed by further illumination in excellent yield into (V), which is obtained in poor yield directly from pure (X) in sunlight. Crude (X) in sunlight gives (V), (I), and a substance, probably 4:6-dinitro-3-styryltolane, m.p. 178-179°. (V) may be most conveniently prepared from (IV) or the crude mixture of (II) and (III). The Br-derivatives [except (VII)], in contrast to the Cl-derivatives, all give the halogen-free isatogen compound. R. S. C.

Orientation in substitution reactions of alkylnaphthalenes. I. Side-chain nitration of 1:4dimethylnaphthalene. R. ROBINSON and H. W. THOMPSON (J.C.S., 1932, 2015-2019).-1:4- $C_{10}H_6Me_2$, m.p. 5·5--6·5° (corr.) (from Mg 4-methyl-1naphthyl bromide and Me₂SO₄), is nitrated in aq. suspension or in Ac₂O or MeNO₂ to ω -nitro-1:4-dimethylnaphthalene, m.p. 107°, oxidised by alkaline $K_2Fe(CN)_6$ or KMnO₄ to 1:4- $C_{10}H_6(CO_2H)_2$ and an ω -nitro(methylnaphthylidene)dimethylnaphthalene,

 $C_{10}H_6\dot{M}e \cdot C(\dot{N}O_2)$: CH· $C_{10}H_6\dot{M}e$, m.p. 203°, and reduced (H₂, PtO₂, EtOH) to ω -amino-1: 4-dimethylnaphthalene [hydrochloride (I), m.p. 285°; Ac derivative, m.p. 142°]. 1: 4- $C_{10}H_6Me_2$ and HNO₃, alone or in AcOH, give a small amount of a mixture, m.p. 150°, of

 $(NO_2)_2$ -compounds, much amorphous material, and an oil, whilst dinitration in Ac₂O affords a $(NO_2)_2$ derivative, m.p. 128°, and a substance, m.p. 174° (decomp.). Mg 4-methyl-1-naphthyl bromide and CH₂O give 4-methyl-1-naphthylcarbinol; the bromide, m.p. 80°, and o-C₆H₄(CO)₂NK at 180—200° afford ω -phthalimido-1: 4-dimethylnaphthalene, m.p. 148° [corresponding phthalamic acid, m.p. 179° (decomp.)], also obtained when (I) is heated with o-C₆H₄(CO)₂O and NaOAc. 1-C₁₀H₇Me, HCN, HCl, and AlCl₃ give a poor yield of 4-methyl- α -naphthaldehyde (semicarbazone, m.p. 237°). 4-Bromo-1-methylnaphthalene, prepared by bromination of 1-C₁₀H₇Me, has b.p. 157— 158°/10 mm., m.p. 5·5—6° (corr.). H. B.

Synthesis of eudalene. G. DARZENS and A. Lévy (Compt. rend., 1932, 194, 2056-2059).-p-iso-Propylbenzyl chloride and Et sodioallylmalonate give Et p-isopropylbenzylallylmalonate, b.p. 172-173°/2 mm.; the free acid, m.p. 142-143°, heated at 180-190°, gives 80% of β -*p*-isopropylphenyl- α -allylpropionic acid (I) and 20% of lactone (II), b.p. 180°/17 mm. Treatment of (I) with cold 84% H₂SO₄ during 5 days gives 20% of (II) and 80% of 1-methyl-7-isopropyl-1:2:3:4-tetrahydro-3-naphthoic acid (III), m.p. 102°, dehydrogenated by S at 230-240° to 1methyl-7-isopropyl-3-naphthoic acid, m.p. 198.5°, the Ca salt of which when heated with $Ca(OH)_2$ in vac. affords 1-methyl-7-isopropylnaphthalene (eudalene), b.p. $152^{\circ}/18$ mm. [picrate, m.p. $92 \cdot 8^{\circ}$ (corr.); styph-nate, m.p. $119 \cdot 8^{\circ}$ (corr.)]. (II) is a mixture of the lactones of β -*p*-isopropylphenyl- α -(β' - and (γ' -hydroxypropyl)propionic acids; the former (γ -lactone) is converted by 84% H₂SO₄ into (III), whilst the latter H. B. $(\delta$ -lactone) is unaffected.

Preparation of 1-chloronaphthalene by direct chlorination of naphthalene. C. B. DE WITT and J. B. EKELEY (Univ. Colo. Stud., 1931, 18, 119—121). —Chlorination is effected at 140° in presence of I or FeCl₃ in an inert (N_2) atm. HCl was removed from the distillation residues by distillation over Al shavings. When FeCl₃ is used as catalyst a trace of H₂O must be present. CH. ABS.

Synthesis of alkyl aromatic hydrocarbons. G. HUGEL and M. LERER (Compt. rend., 1932, 195, 249– 251; cf. A., 1914, i, 396).—Interaction of the Na₂ compound of anthracene with *iso*amyl chloride affords 1:4-diisoamyl-1:4-dihydroanthracene, b.p. 134–138°, and some diisoamylanthracene. Similarly, C₁₀H₈ and Na in liquid NH₃ afford a Na derivative which with Bu^gCl affords 1:4-diisobutyl-1:2:3:4-tetrahydronaphthalene, b.p. 170–175°/16 mm. J. L. D.

Analysis of aromatic two-component systems by means of viscosity and density gradients. A. L. BERNOULLI and E. A. VEILLON (Helv. Chim. Acta, 1932, 15, 810—839).—From published data it is shown that variation of the ratios $\Delta \eta / \Delta$ composition and $\Delta d / \Delta$ composition (viscosity and density "gradients") for mixtures of $C_{10}H_8$ (I) with 1:3:5trinitro-, *m*-dinitro-, and nitro-benzene indicate equimol. compounds in the first two cases and no compound in the last, in agreement with the results of thermal analysis. When η and d are substituted for the gradients, such agreement is not obtained in the above or the following cases. The η and d gradients at several temp. for mixtures of the components indicate the existence of the following compounds, many of which are new and not shown by thermal analysis: p-NO·C₆H₄·NMe₂ (II) and PhOH (III), 1:10,1:4,1:3, and 2:1; (II) and p-toluidine, 1:2, 1:1, and 2:1; (II) and thymol, 1:2,2:3, and 1:1; (I) and (III), 1:6, 1:4, 2:3, 1:1, and 2:1. No compounds are indicated for mixtures of 1-C₁₀H₇·NO₂ with (I) or NHPh₂. Compounds indicated by thermal analysis are always shown by the above methods. A new thermostat is described, the temp. of which is controlled by the b.p. of a liquid under slightly reduced pressure, and details for measuring η and d are given. R. S. C.

Ditolyl series. IV. Resolution into optical antipodes of *dl*-2-chloro-2'-amino-6:6'-dimethyldiphenyl. A. ANGELETTI (Gazzetta, 1932, 62, 376— 380).—The NO₂-compound (this vol., 152) is reduced by SnCl₂ to dl-2-chloro-2'-amino-6:6'-dimethyldiphenyl, m.p. 87—88°, from which the d-tartrates, each of m.p. 138—144° (partly hydrolysed), of l-, $[\alpha]_{10}^{\infty}$ -4·62°, and d-2-chloro-2'-amino-6:6'-dimethyldiphenyl, $[\alpha]_{10}^{\infty}$ +4·12°, are separated. The base does not easily racemise. E. W. W.

Stereochemistry of 2:2'-disubstituted diphenyls. I. Optical resolution of phenyl benzidine-2:2'-disulphonate. M. S. LESSLIE and E. E. TUENER (J.C.S., 1932, 2021–2026).—2-Chloro-5-nitrobenzenesulphonyl chloride, PhOH, and anhyd. Na₂CO₃ at 100° give Ph 2-chloro-5-nitrobenzenesulphonate (I), m.p. 92–93°, reduced to the NH₂-compound, m.p. 75–76°, by SnCl₂ in AcOH-HCl. Na 2-iodo-5-nitrobenzenesulphonate (from p-nitroaniline-2-sulphonic acid) (does not react with Cu in H₂O at 100°) and PCl₅ give 2-iodo-5-nitrobenzenesulphonyl chloride, m.p. 122–123°, yielding the Ph ester, m.p. 128–129°, which with Cu-bronze at 205° forms Ph₂ 4:4'-dinitro-diphenyl-2:2'-disulphonate, m.p. 149–150°, also obtained from (I) and Cu-bronze at 275°. Reduction (SnCl₂ in AcOH-HCl) affords the 4:4'(NH₂)₂-compound (II), m.p. 226–227°, giving the following d-camphorsulphonates: dl-base, [a]₅₇₉₁ +24·3°, 1-base, +15·2°, d-base, +38·1° (all in COMe₂). The d- and 1-isomerides of (II) have m.p. 222–223°, and [a]₅₇₉₁ +28·0° and -24·6° in COMe₂. The existence of separable optically active forms of (II) is in agreement with spatial considerations. R. S. C.

Direction of the carbon valencies in benzene derivatives. D. VORLANDER and A. APEL [with W. GALKA] (Ber., 1932, 65, [B], 1101—1109).—p-Phenetoleazoxybenzoic acid is converted by SOCl₂ into the corresponding *chloride*, m.p. about 140°, which with pyrocatechol in boiling C_6H_6 in presence of pyridine affords p-*phenetoleazoxybenzoylpyrocatechol*, OEt· C_6H_4 · N_2O · C_6H_4 · CO_2 · C_eH_4 ·OH, m.p. I 150°, II 171°, transformed by Ac₂O at 100° into the Ac derivative, m.p. I 126°, II 130° after softening at 121°, and by pyridine and BzCl into the Bz compound, m.p. I 140°, II 144° after softening at 135°. Di-p-*phenetoleazoxybenzoylpyrocatechol* has m.p. I 164°, II 213°. Similarly, resorcinol gives p-*phenetoleazoxybenzoylresorcinol*, m.p. I 169°, II 185° (Ac derivative, m.p. I 135°, II 138° after softening at 129°; Bz compound, m.p. I 127°, II 129° after softening at 122°), and di-p-phenetoleazoxybenzoylresorcinol, m.p. I 184°, II 218° after softening at 179°. Quinol yields p-phenetoleazoxybenzoylquinol, m.p. I 172°, II 225° (decomp.) after softening at 165° (Ac derivative, m.p. I 180°, II 183°), and di-p-phenetoleazoxybenzoylquinol, m.p. I 231° after softening at about 220°, decomp. 240°. As expected, the liquid cryst. properties are most pronounced in the quinol derivatives.

H. W.

Interaction of acetonephenylhydrazone and phenylcarbimide. W. A. CALDWELL, J. CHAPMAN, H. W. GOODWIN, and F. J. WILSON (J.C.S., 1932, 2086—2087).—Acetonephenylhydrazone and PhNCO (I) under various conditions give a mixture of acetone-2:4-diphenylsemicarbazone, m.p. 141° (also formed from COMe₂ and 2:4-diphenylsemicarbazide), and $\alpha\beta$ -di(phenylcarbamyl)phenylhydrazine,

NPh(CO·NHPh)·NH·CO·NHPh, m.p. 208° [also formed from NHPh·NH₂ and (I) (2 mols.) at 100°, or hot (I) and 1:4- or 2:4-diphenylsemicarbazide] (cf. A., 1928, 516). Acetone-*p*-bromophenylhydrazone and (I) in hot C_6H_6 in CO₂ give a little CO(NHPh)₂ and $\alpha\beta$ -di(phenylcarbamyl)-p-bromophenylhydrazine, m.p. 206—207°, also formed from *p*-bromophenylhydrazine and (I). R. S. C.

β-Phenylethylhydrazine. E. VOTOČEK and O. LEMINGER (Coll. Czech. Chem. Comm., 1932, 4, 271– 281).—CH₂Ph·CH₂Cl and N₂H₄,H₂O in EtOH at 100° (bath) give β-phenylethylhydrazine, b.p. 137–139°/ 12—13 mm. [hydrochloride, m.p. about 171° (sinters from 102—103°); oxalyl, m.p. 161—162° (from Et oxalate), Bz_2 , m.p. 144—145°, phenylcarbamyl, m.p. 148°, and phenylthiocarbamyl, m.p. 133° (sinters at 123°), derivatives], which is readily oxidised by 0₂; di-β-phenylethylhydrazine, m.p. 64—65° [hydrochloride, m.p. about 200° (sinters at 130°)], is a by-product. d-Galactose-β-phenylethylhydrazone, m.p. 125°, [α]p —13·76° in MeOH; d-mannose-β-phenylethylhydrazone, m.p. 147—148°, [α]p —4·47° \longrightarrow 8·43° in MeOH, and fructose-β-phenylethylosazone, an oil, are prepared. H. B.

Diazo-resins. II. Z. JOLLES (Atti R. Accad. Lincei, 1932, [vi], 15, 395-397).—Phenylazoxycarbonamide, which is converted into the normal diazonium hydroxide by alkali, gives a resin identical with that obtained from diazotised NH_2Ph (this vol., 841) on prolonged contact with alkali. A resin of the same composition is obtained (1) from nitrosoacetanilide, the additive compound OH·NAr·NH·OH and the diazonium hydroxide forming intermediate stages, and (2) by the action of H_2O_2 on PhN₂Cl (cf. Bamberger, A., 1909, i, 977). T. H. P.

Styphnates of phenols. N. N. EFREMOV (Ann. Inst. Anal. Phys. Chim., Leningrad, 1931, 5, 75– 141).—The following double compounds of styphnic acid and phenols are described : with 1 mol. PhOH, m.p. 115·1° (decomp.), m-nitrophenol, m.p. 113·8° (decomp.), o-, m.p. 113·5°, m-, m.p. 115·7°, and pcresol, m.p. 111°, α -naphthol (unstable), β -naphthol, m.p. 166·3°, o-, m.p. 129°, m-, m.p. 125°, and pdihydroxybenzene (2 mols.), m.p. 142·6°. o- and m-Nitrophenol, picric acid, chloro-2:4:6-trinitrobenzene, 2:4:6-trinitrocresol, nitroquinol, 3- and 4nitropyrocatechol, 2- and 4-nitro-, and 2:4- and 4:6-dinitro-resorcinol do not form compounds. R. T.

Molecular rearrangement in the hydrolysis of chlorotoluenes with alkali. V. E. MEHARG and I. ALLEN, jun. (J. Amer. Chem. Soc., 1932, 54, 2920— 2922).—o- and p-C₆H₄Cl·Me undergo partial mol. rearrangement when hydrolysed with 15% NaOH in presence of Cu at 315—320°. Thus, o-C₆H₄Cl·Me gives 55·4% of mixed phenols, of which 25·3% is *m*-cresol, whilst p-C₆H₄Cl·Me affords 55·5% of phenols containing 38·2% of *m*-cresol. m-C₆H₄Et·OH is probably similarly produced from o-C₆H₄Cl·Et.

C. J. W. (b)

p-Alkylphenolsulphonic acids. C. M. SUTER and E. W. MOFFETT (J. Amer. Chem. Soc., 1932, 54, 2983-2984).—p-C₆H₄Bu·OH and conc. H₂SO₄ at 100° (bath) give (after addition to saturated NaCl) 66% of Na p-butylphenol-2-sulphonate; Na p-propyl-, -amyl-, and -hexyl-phenol-2-sulphonates are similarly prepared in yields of 56, 72, and 83%, respectively. The m.p. of the corresponding p-toluidine salts are 149—150°, 141—143°, 147—149°, and 139—140°, respectively. Only the Pr and Bu derivatives have a detectable disinfectant action; the PhOH coeffs. are 1·8 and 2·4, respectively. C. J. W. (b)

Preparation of 5-bromo-2-methoxybenzyl chloride. R. QUELET (Compt. rend., 1932, 195, 155-156).—p-Bromoanisole, $(CH_2O)_3$, and $ZnCl_2$ in ligroin (freed from aromatic and unsaturated compounds) at 15° yield 5-bromo-2-methoxybenzyl chloride, b.p. 152-153°/15 mm., in 50% yield, and 5:5′-dibromo-2:2′-dimethoxydiphenylmethane. Anisole reacts similarly. R. S. C.

Some dichloro-anisidines and -phenetidines. F. MADESANI (Gazzetta, 1932, 62, 402-410).-2:5-Dichloro-p-nitroanisole is reduced by SnCl₂ to 2:5dichloro-p-anisidine, m.p. 79-80° [hydrochloride, m.p. 225° (decomp.); Bz derivative, m.p. 139°; 2:5-dichloro-4-methoxy-diphenylthiocarbamide, m.p. 166°], of which the Ac derivative, m.p. 190°, is also prepared from p-acetanisidide with $KClO_3$ and HCl. 2:4:5- $C_6H_2Cl_3$: NO₂ treated with KOH and EtOH gives a mixture of 2:5-dichloro-4-nitrophenetole, m.p. 96°, reduced to the phenetidine (A., 1929, 552), and 4:5-dichloro-2-nitrophenetole, m.p. 65°, reduced to 4:5-dichloro-o-phenetidine [hydrochloride, m.p. 221° (decomp.); picrate, m.p. 139°; Ac derivative, m.p. 120°; Bz derivative, m.p. 120°; 3:4-dichloro-6ethoxydiphenylcarbamide, m.p. 140°]. If MeOH is used instead of EtOH, only 2:5-dichloro-4-nitrophenetole is formed. E. W. W.

Action of sulphur on amines. III. Recognition of trithio-o-toluidine as 2:2'-diamino-5:5'ditolyl trisulphide. H. H. HODGSON and H. V. FRANCE (J.C.S., 1932, 1987—1988; cf. *ibid.*, 1914, 105, 952).—5-Bromo-2-nitrotoluene, when boiled with aq. Na₂S₂ and then oxidised with air, gives 2:2'-diamino-5:5'-ditolyl disulphide, m.p. 112° [previously (*ibid.*, 1912, 101, 1693) called dithio-o-toluidine], and the trisulphide (previously called trithio-o-toluidine). The position of the S atom is confirmed by the ready coupling of the diazotised compounds with β -naphthol. R. S. C.

Dihydroretene. G. KOMPPA and H. P. FOGELBERG (J. Amer. Chem. Soc., 1932, 54, 2900-2908).-Dihydroretene (I) and H₂SO₄ (d 1.84) at 66-68° give 69.1% of a monosulphonic acid (designated the Aacid) (+2H2O), m.p. 147-148° [Me, m.p. 98-99°, and Et, m.p. 72.5-73.5°, esters; Na (+H₂O), K (+H₂O), NH_4 , Ba, Ca, and Cu (+2H₂O) salts; chloride, m.p. 91–92° (in some cases a modification, m.p. 82-83°, was obtained); amide, m.p. 193-194°; anilide, m.p. 112-114°]. Reduction of the chloride gives A-dihydroretenesulphinic acid, m.p. 123-130° (Na salt), and then A-thioldihydroretene, m.p. 170-172°. Fusion of the acid with alkali gives A-retenol (A., 1931, 226). Sulphonation of (I) at 200° gives B-dihydroretenesulphonic acid (+2H₂O), m.p. 106- 107° [K (+H₂O), $\hat{N}H_4$, Ba (+H₂O), \hat{Ca} (+6H₂O), and Cu (+5.5H₂O) salts; Me, m.p. 85-86°, and Et, m.p. 78-79°, esters; chloride, m.p. 112-113°; amide, m.p. 189-190°; anilide, m.p. 196-197°], converted by alkali fusion into B-retenol (loc. cit.). Oxidation of the above Et esters gives Et A- (II), m.p. 183-184°, and B- (III), m.p. 169-171°, -retenequinonesulphonates, also formed by oxidation of Et A-, m.p. 137.5-138.5°, and B-, m.p. 114-115°, -retenesulphonates. A-Retenesulphonyl chloride, m.p. 135-136°; A-methoxyretene, m.p. 147-148°; A-, m.p. 177-178°, and B-, m.p. 112°, *benzoyloxyretenes* are described. (II) boiled with 50% KOH for 3 hr. gives a K ketoretenesulphonate and a product, which when fused with KOH affords a methylisopropyldiphenylmonocarboxylic acid, m.p. 160°. (III) and 50% KOH give a ketoretene, m.p. 88-89°, reduced to the corresponding alcohol, m.p. 132-133°. A small amount of a hydrocarbon, C₂₄H₂₀, m.p. 297-298°, occurs with retene in the highest boiling fractions of pine tar. C. J. W. (b)

Nitrosites and nitrosates. II. L. MONTI and D. DINELLI (Gazzetta, 1932, 62, 368—376; cf. A., 1931, 194).—Nitrosites of *iso*safrole and anethole heated in CO₂ or N₂ evolve N₂ and NO, 37—38.8% of the total N being evolved. *cyclo*Hexene treated in AcOH with nitrous fumes (cf. A., 1921, *i*, 553) gives a stable nitrosite, m.p. 150—151°, and nitrosate, m.p. 153° (*piperidine* derivative, C₁₁H₂₀ON₂, m.p. 120°), which at 140—160° evolve respectively 10% and 38% of their total N. The stability of the above compounds is compared. E. W. W.

Diphenyl and its derivatives. IX. Dipicric acid and its [attempted] optical resolution. L. MASCARELLI and B. VISINTIN (Gazzetta, 1932, 62, 358—368).—Dipicric acid [2:4:6:2':4':6'-hexanitro-3:3'-diphenol (A., 1917, i, 558); K_2 salt, m.p. 106°, resolidifies at 112°, decomp. 280°, explodes at 320°; $(NH_4)_2$ salt, decomp. 275—305°] does not give cryst. salts with alkaloids. 1-Menthylamine gives a neutral *dipicrate*, decomp. 258—259°, $[\alpha]_{10}^{20}$ +1·23°, which cannot be resolved. E. W. W.

Constitution of laccol. G. BERTRAND and G. BROOKS (Compt. rend., 1932, 195, OH (I.) $C_{16}H_{29}$ 405-408). — Catalytic hydrogenation (Pt-black) of laccol (I), $C_{22}H_{34}O_2$ (lit. $C_{23}H_{36}O_2$), m.p. 23°, gives tetrahydrolaccol [Ac₂, m.p. 57.6° (corr.), and dipropionyl derivatives]. (I) has the annexed formula. R. S. C. Dehydrogenation of cholesterol and of cholic acid. H. RAUDNITZ, F. PETRŮ, and F. HAUROWITZ (Z. physiol. Chem., 1932, 209, 103—109).—Distillation of cholesterol with Zn dust followed by fractionation of the products afforded $C_{10}H_8$ and chrysene. Similar treatment of cholic acid gave hydrocarbons, $(C_7H_6)_{x}$, m.p. 229—230° and $C_{21 \text{ or } 22}H_{14}$ (golden-yellow), m.p. 277°. J. H. B.

Constitution of cholesterol. Bromo-derivatives of cholesterol. F. PIRRONE (L'Ind. Chimica, 1932, 7, 131—145; cf. this vol., 54).—Cholesterol di-bromide (I), m.p. 106—107°, prepared by Windaus' method (A., 1906, i, 174), is shown, by the action of reducing and dehalogenating agents and of substituting agents, to be neither the 6:6- nor the 7:7-compound, but probably a Br2-additive product in the $\Delta^{6:7}$ -position. A dibromodihydrodicholesteryl obtained by the method of Cloëz (A., 1897, i, 406) is shown similarly to be probably 7:7'-dibromo-6:6'-dihydrodicholesteryl. The Br-derivative, m.p. 74-76°, containing about 9% Br and already obtained by various authors, appears to be 7-bromo-6 : 6'-dihydrodicholesteryl. A second dibromodihydrodicholesteryl, m.p. 98-100°, isomeric with that obtained by the Cloez method from (I), was observed, but attempts to prepare from this an isomeride of cholesterol always vielded the original compound. The action of HCN on (I) yields dicyanocholesterol, m.p. 102-103°. Study of the action of Cu, Zn, KOH, etc. on the Brderivatives confirms the presence of the double indene linking in the 6:7-position of nucleus II of chole-T. H. P. sterol.

Necergosterol. H. H. INHOFFEN (Annalen, 1932, 497, 130–139).—Necergosterol (I), $C_{27}H_{40}O$ (cf. Windaus and Borgeaud, A., 1928, 425: Bonstedt, A., 1930, 84) [3:5-dinitrobenzoate, m.p. 218—220° (corr.), $[\alpha]_{16}^{m}$ —13° in CHCl₃; acetate dibromide, m.p. 179—181° (corr.)], is oxidised by HNO₃ (d 1.4) to 1:2:3:4- $C_{6}H_{2}(CO_{2}H)_{4}$, whilst ergopinacol (loc. cit.) is similarly oxidised to toluenetetracarboxylic acid (II) (this vol., 611). When the pinacol is heated in decahydronaphthalene (or Ac₂O), CH₄ is eliminated and (I) (or its acetate) results; the formation of (I) from ergosterol (III) involves the loss of 1 C. Ozonolysis of (I) gives α -methylisovaleraldehyde, showing that the change (III) \longrightarrow (I) does not involve the unsaturated side-chain. The production of (II) from (III) (loc. cit.) appears to involve migration of Me. H. B.

Choleic acids. H. SOBOTKA and A. GOLDBERG (Biochem. J., 1932, 26, 555—568).—Choleic acids have been synthesised from deoxycholic acid with aliphatic acids and their co-ordinative valencies established by the determination of their acid equivs. and by the study of their m.p. and thawing point diagrams. The co-ordination no. of succinic acid is 2, of adipic acid 3, of pimelic, suberic, azelaic, sebacic, and enneamethylenedicarboxylic acids 4, and that of decamethylenedicarboxylic, brassylic, dodecamethylenedicarboxylic, brassylic, dodecamethylenedicarboxylic, hexadecamethyleneand octadecamethylene-dicarboxylic acids 6. The co-ordination no. of isomeric butyric and valeric acids is 2 with the exception of n-butyric and n-valeric acids, which display a max. co-ordinative valency of 4. Crotonic acid combines with deoxycholic acid in the mol. ratio of 3:1. Butyric acid and Et butyrate form two choleic acids each depending on the method of synthesis with mol. ratios 4:1 and 2:1. A second EtOH-choleic acid of mol. ratio 2:1 is formed at elevated temp. S. S. Z.

Choleic acids. IV. Keto-enol tautomerism and co-ordination compounds. H. SOBOTKA and J. KAHN (Biochem. J., 1932, 26, 898—904).—Coordination compounds consisting of 3 mols. of deoxycholic acid and 1 mol. of a tautomeric substance (benzoylacetone, Et acetoacetate, acetylacetone, or anthrone) were prepared and analysed. Whilst the tautomeric compounds in the free state contain varying proportions of keto-form, they are completely enolised when bound in choleic acids. Anthronetetracholeic acid contains the acholic component in the keto-form. There is evidence of rapid and complete mol. dissociation when these choleic acids are dissolved. S. S. Z.

Mechanism of chemical reactions. III. Hydrogenation and specific hydrogenation with combined hydrogen. K. KINDLER and W. PESCHKE (Annalen, 1932, 497, 193—200).—Cinnamic acid is reduced by Pd-black and boiling tetrahydronaphthalene (I) to $CH_2Ph\cdot CH_2\cdot CO_2H$; *p*- $C_6H_4Cl\cdot CH_2\cdot CH_2\cdot CO_2H$, $CH_2Ph\cdot CH_2\cdot CN$, and furylpropionic acid are similarly obtained from *p*-chlorocinnamic acid, cinnamonitrile, and furylacrylic acid, respectively. Reduction (H₂, Pd-black, EtOH) of β -phenylethylidene- β -phenylethylamine gives di-(β phenylethyl)amine (II); the use of Pd-black and (I) affords PhEt (about 60%), also formed similarly from (II) and $CH_2Ph\cdot CH_2\cdot NH_2$. Benzylidene- β -phenylethylamine and *N*-benzyl- β -phenylethylamine are reduced by Pd-black and (I) to PhEt and PhMe, whilst $CH_2Ph\cdot NH_2$ and N(CH₂Ph)₃ give PhMe. H. B.

Derivatives of 2-methylanthracene prepared by means of oxalyl chloride. D. BUTTESCU (Bul. Chim. Soc. Române Stiin., 1929, **31**, 103—107).— 2-Methylanthracene-10-carboxylic acid, m.p. 197°, 9-chloro-2-methylanthracene-10-carboxylic acid, yellow, m.p. 198° (I), and 9:10-dichloro-2-methylanthracene, golden-yellow, m.p. 211° (II), are formed when a mixture of 2-methylanthracene, AlCl₃, and CS₂ is run into a mixture of $H_2C_2O_4$ and PCl₅ which has been kept in ice for 5—6 days. (I) and (II) are oxidised by CrO₃ in AcOH to 2-methylanthraquinone.

D. R. D.

Constitution of Städeler's tyrosinesulphonic acid. F. R. CONKLIN and T. B. JOHNSON (J. Amer. Chem. Soc., 1932, 54, 2914—2917).—Sulphonation of tyrosine with 6 mols. of conc. H_2SO_4 at 95—100° gives 90% of the 3-sulphonic acid, chars and decomp. rapidly above 280° (cf. Städeler, Annalen, 1860, 116, 91) (amorphous Ba, Na, and K salts), which does not react with KCNO or PhNCO. The structure of the acid is established by the formation of 3 : 5-dinitrotyrosine by the action of HNO₃. Deamination of the acid by MeI and KOH causes degradation of the greater part; a small quantity of the K salt of 4-hydroxy-3-sulphocinnamic acid was isolated.

C. J. W. (b)

Preparation of benzoylacetic ester and its homologues. J. B. DORSCH and S. M. MCELVAIN

J. Amer. Chem. Soc., 1932, 54, 2960-2964).-α-Benzoylalkyl cyanides are prepared by heating 1 mol. each of BzOEt and NaOEt at 80° until the mixture is homogeneous, slowly adding 1.25 mols. of the alkyl cyanide during 2 hr., and then heating at 110-120° (Me or Et) or 140-160° (Pr or Bu) for 10 hr. Benz $oylacetonitrile, \alpha\text{-}benzoylpropionitrile, b.p.\,128{--}130^\circ/$ 3 mm., α-benzoylbutyronitrile, b.p. 134-135°/3 mm., and α -benzoylvaleronitrile, b.p. 139—140°/3 mm., are thus prepared in approx. 60% yield. The cyanides with EtOH-HCl give the corresponding imino-ether hydrochlorides, hydrolysed to the corresponding esters in 64-74% yield. Hydrolysis of the imino-ethers with EtOH containing the theoretical amount of H_2O gives (except with CH_2Bz CN) considerable quantities of the amides; a-benzoyl-propionamide, m.p. 145-146°, -butyramide, m.p. 148—149°, and -valeramide, m.p. 157—158°, are new. Details are given of the direct condensation of BzOEt and EtOAc to $CH_2Bz \cdot CO_2Et$ in 37% yield; EtCO_2Et and PrCO_2Et give 10 and 10% give 19 and 4%, respectively, of the corresponding C. J. W. (b) keto-ester.

Mechanism of the condensation of phthalic anhydride and glycerol. J. SAVARD and S. DINER (Bull. Soc. chim., 1932, [iv], 51, 597—615).—The above substances react rapidly at 160° to give glyceryl H₂ diphthalate: This with excess of glycerol forms a neutral diglyceryl diphthalate, with excess of phthalic anhydride gives glyceryl H₃ triphthalate, and with neither reagent in excess undergoes internal esterification. Velocity coeffs. valid for the first 50 hr. are given for the three last reactions. A. A. L.

Stereochemistry of diphenyl. XXIII. Optically active 2'-nitro-2:5-dimethoxydiphenyl-6'carboxylic acid and the mutarotation of its salts. H. C. YUAN and R. ADAMS. XXIV. Preparation and properties of 2: 2'-difluoro-6: 6'-dimethoxydiphenyl-3: 3'-dicarboxylic acid. B. C. BECKER and R. ADAMS (J. Amer. Chem. Soc., 1932, 54, 2966-2973, 2973-2982).-XXIII. 1-Iodo-2: 5-dimethoxybenzene, Me 2-bromo-3-nitrobenzoate, and Cu at 260-300° give (after hydrolysis) a little 2'-nitro-2:5-dimethoxydiphenyl-6'-carboxylic acid, m.p. 141-142°, which gives brucine (+H₂O), m.p. 158-160°, $[\alpha]_{15}^{ss} -167^{\circ} \longrightarrow +3\cdot2^{\circ}$ in CHCl₃, cinchonine, m.p. 198—204°, $[\alpha]_{15}^{ss} -135^{\circ} \longrightarrow +57^{\circ}$ in CHCl₃, and strychnine, m.p. 220—223°, $[\alpha]_{15}^{ss} -23\cdot1^{\circ}$ in CHCl₃, salts. Decomp. of the brucine salt with dil. HCl at 0° affords the 1-acid, m.p. 141-142°, which racemises extremely readily (the half-val. period is 10.8 min. at 28° and 274 min. at 0°). The above final rotations are identical with those of equiv. quantities of the dl-acid and the alkaloid. The Na salt of the l-acid racemises less readily in H₂O (but more readily in EtOH) than the acid in org. solvents.

XXIV. 2-Iodo-3-fluoroanisole (prep. of intermediates described) and Cu at 180-200° give 2:2'-difluoro-6:6'-dimethoxydiphenyl, m.p. 135-136°, which with AcCl and AlCl₃ in CS₂ affords the 3:3'-Ac₂ derivative, m.p. 138-139.5°, oxidised by NaOCl to 2:2'-difluoro-6:6'-dimethoxydiphenyl-3:3'-dicarboxylic acid, m.p. 285-289° (decomp.) (brucine, morphine, guinine, strychnine, and cinchonine salts, none of which shows mutarotation or gives an optically active acid

on decomp.). 3-Fluoroanisole, b.p. 158°/743 mm., from *m*-anisidine, could not be converted into the 2-NO₂-derivative by sulphonation and nitration. 6-Methoxy-m-4-xylidine and Br in AcOH give the hydrobromide, m.p. 187° (decomp.), of 5-bromo-6methoxy-m-4-xylidine (Ac derivative, m.p. 147-148°), convertible into 5-bromo-4-fluoro-6-methoxy-m-xylene, b.p. 125°/15 mm., which does not form a Grignard reagent, does not undergo the Ullmann reaction, and could not be nitrated. 4-Fluoro-6-nitro-m-xylene, b.p. 133°/30 mm., 234°/750 mm., from the nitroxylidine, is reduced to the $6-NH_2$ -derivative, m.p. 57-58° (Ac derivative, m.p. 133—134°), which is brominated to 5-bromo-6-fluoro-m-4-xylidine (I), m.p. 56° (Ac derivative, m.p. 170-171°; hydrobromide, de-comp. 220°), and is nitrated to 6-fluoro-2- (II), m.p. 88-89° (Ac derivative, m.p. 148-149°), and 6-fluoro-5., m.p. 72—74° (Ac derivative, m.p. 193—194°), -nitro-m-4-xylidines. Nitration of (I) gives 5-bromo-6-fluoro-2-nitro-m-4-xylidine, m.p. 105.5—106°, also prepared by brominating (II), convertible into 4-chloro-5-bromo-6-fluoro-2-nitro-m-xylene, m.p. 113.5-114°. 6-Fluoro-m-4-xylenol, m.p. 44-45°, 5-Br-derivative, m.p. 75-76°, are described. , and its

C. J. W. (b)

Quinovic acid. IV. H. WIELAND and K. KRAUS (Annalen, 1932, 497, 140-159; cf. A., 1931, 1158). -Pyroquinovic acid (I) is converted by ZnCl₂ in AcOH at 130° into a lactone, C₂₉H₄₄O₂, m.p. 262°, decomp. slightly at 280°, also formed similarly from pyroanhydroquinovic acid, m.p. 188°. The bromohvdroxylactone, C₂₉H₄₅O₃Br, previously obtained (A., 1930, 600) from (I), is reduced by Zn dust and AcOH to (I) and oxidised by CrO₃ in cold AcOH to a bromoketolactone (II), $C_{29}H_{43}O_3Br$, m.p. 172° (decomp.), and a bromolactonedicarboxylic acid (III), $C_{29}H_{43}O_6Br$, m.p. 205° (decomp.) [also produced by further oxidation of (II)]. Oxidation in more conc. solution gives (III) and a neutral compound, $C_{29}H_{39}O_6Br$ or $C_{25}H_{35}O_4Br$, m.p. 188°, which is reduced by Zn dust and AcOH In p. 138, which is reduced by an energy of the probability of the pr m.p. 193° (sinters at 187°), whilst (III) similarly gives a tricarboxylic acid, $C_{29}H_{42}O_6$, m.p. 288° (decomp.) (Me₃ ester, m.p. 146-147°), which passes at $300^\circ/$ 12 mm. into (mainly) a cycloketocarboxylic acid (IV), 12 mm. into (malify) a cyclokelotarobught acta (17), $C_{28}H_{40}O_3$ (+COMe₂), m.p. 178°, (+ $\frac{1}{3}$ AcOH), m.p. 165° (decomp.) (*Me* ester, m.p. 161°), a *ketolactone*, $C_{28}H_{40}O_3$, m.p. 254—256°, and a *dilactone*, $C_{28}H_{42}O_4$, decomp. about 268°. (IV) is probably a *cyclopent*-anone derivative and is oxidised (CrO₃-AcOH) to a *ketolactonemonocarboxylic acid* (V), $C_{28}H_{40}O_5$, decomp. 293° [Me ester, m.p. 213° (previous sintering)], prob-

ably thus >CH·CO· \longrightarrow >CO CO₂H; by-products are a lactone, C₂₈H₃₈O₄, m.p. 232° (decomp.) (passes at 280° into a neutral substance, C₂₇H₃₈O₂, m.p. 193°), and a compound, C₂₅H₃₄O₄, m.p. 286—288° (decomp.). Clemmensen reduction of (V) gives a lactonic acid, C₂₈H₄₂O₄, m.p. 280—286° (decomp.), whilst thermal decomp. affords a lactone, C₂₇H₄₀O₃, m.p. 242°. (V) and Br in AcOHgive a Br₃-derivative, m.p. 267° (decomp.), reduced by Zn dust and AcOH to (V), decomp. 307°, converted by pyridine into a dibromoketolactone, $C_{27}H_{36}O_3Br_2$, m.p. 266° (decomp.), and transformed by MeOH-KOH into an unsaturated lactone, $C_{27}H_{34}O_3$, m.p. 278° (decomp.) (darkens at 258°) [Br-derivative, m.p. 238° (decomp.)]. This lactone is oxidised (CrO₃-AcOH) to a compound, $C_{27}H_{34}O_6$, m.p. 232—233°. Dehydrogenation of (I) with Se at 200—350° gives a hydrocarbon, $C_{20}H_{16}$, m.p. 280—285°. Possible structures for (I) and quinovic acid are suggested. H. B.

Salts of phenolphthalein. W. M. DEHN (J. Amer. Chem. Soc., 1932, 54, 2947—2951).—Additive compounds (salts) (+2 or more mols. of H_2O) of phenolphthalein (I) and bases are prepared. Most of the hydrated salts are colourless but become coloured by loss of H_2O , which is effected by heat, pressure, friction, or certain solvents; such loss of H_2O is probably a dehydration of the carbinol to the quinonoid form. The colours of dehydrated salts, containing either chromogenic or non-chromogenic metals, differ widely. The probable cause of the colour of salts of (I) is the quinonoid chromophore. Hydration and dehydration are important influences effecting changes in colour. Isomerisation, neutralisation, addition, hydrolysis, and ionisation are concerned but precede, or are incidental to, the transformation of colourless carbinol forms into the coloured quinonoid form. (I) and NH₂ in COMeEt give the colourless NH₄ salt [(I),NH₄OH]; KOH in COMeEt gives the colourless K salt, whilst in 95% EtOH, there results the red K salt (+H₂O). The red Na₂, the red and colourless Ca, and the *piperidine* salts are also prepared. Analyses are given of the additive compounds of 2 mols. of (I) with 1 mol. of Ba(OH)₂ (+4H₂O); Sn(OH)₂(?) (+4H₂O); Cu(OH)₂ (+3H₂O); Co(OH)₂ (+3H₂O); Mn(OH)₂ (+3H₂O); Cd(OH)₂ (+3H₂O), and Zn(OH)₂ (+3H₂O). C. J. W. (b)

Reactions between hexamethylenetetramine and phenolic compounds. I. Preparation of 3- and 5-aldehydosalicyclic acids. J. C. DUFF and E. J. BILLS (J.C.S., 1932, 1987).—Salicylic acid and hexamethylenetetramine in boiling H_2O give 3- and 5-aldehydosalicylic acids (improved method of separation). *m*- and *p*-Hydroxybenzoic acids give resins. R. S. C.

Reimer-Tiemann reaction. R. N. SEN and S. K. RAY (J. Indian Chem. Soc., 1932, 9, 173— 179).—The use of a 1:3 mixture of $CHCl_3$ (CCl_4) and EtOH in the Reimer-Tiemann reaction increases the yield of aldehyde (acid). When the Na aryloxide is insol. addition of a little pyridine is often advantageous. Aq. pyridine can replace aq. NaOH in the reaction between PhOH and $CHCl_3$; $o - OH \cdot C_6H_4$ ·CHO (10% yield) is the sole product. The following preps. are reported : o- and $p \cdot OH \cdot C_6H_4$ ·CHO from PhOH; o- and $p \cdot OH \cdot C_6H_4$ ·CO₂H from PhOH and CCl_4 ; 3- and 5-nitrosalicylaldehydes from o- and p-NO₂·C₆H₄·OH, respectively; 2-nitro-4-hydroxybenzaldehyde from $m \cdot NO_2 \cdot C_6H_4 \cdot OH$; 3-bromo-2- and -4-hydroxybenzaldehyde (semicarbazone, m.p. 195— 196°) from $o - C_6H_4Br \cdot OH$; 5-bromosalicylaldehyde (semicarbazone, decomp. 297°) from $p - C_6H_4Br \cdot OH$; 3- and 5-bromosalicylic acids from o- and p- C_6H_4Br ·OH, respectively; 5-chloro-salicylaldehyde and -salicylic acid from p- C_6H_4Cl ·OH; 6-aldehydophenol-2-sulphonic acid, not melted at 250°, from o-OH· C_6H_4 ·SO₃H; 2-hydroxy-5-aldehydocinnamic acid [Ag salt; phenylhydrazone, m.p. 236° (decomp.); semicarbazone, m.p. 275°] (converted by warm conc. H_2SO_4 into 6-aldehydocoumarin) from o-coumarie acid; 2-hydroxy-5-carboxycinnamic acid, decomp. 186° and then m.p. 210° (Ag salt), from o-coumaric acid and CCl₄; 2-, b.p. 233° (semicarbazone, m.p. 242°), and 4-, m.p. 108—110° (semicarbazone, m.p. 191°), -hydroxy-6-methyl-3-isopropylbenzaldehydes from thymol; 5- and 7-aldehydo-8-hydroxyquinoline; 2-hydroxy-1-aldehydoanthraquinone, m.p. above 300°, from 2-hydroxyanthraquinone; thiosalicylic acid from PhSH and CCl₄. Reaction is inhibited by NO₂, Cl, Br, and SO₃H groups. H.B.

Suppression of the ketonic function and theories held to interpret this phenomenon. R. CORNUBERT and G. SARKIS (Compt. rend., 1932, 195, 252-254).-The belief that steric effects suppress the ketonic reactions of aa'-tetra-substituted cyclohexanones is shown to have little foundation. 2:2:6:6-Tetra-alkylcyclohexanones usually afford no oximes or Grignard compounds in Et₂O, but react easily in Bu₂O. They are reduced by Na in EtOH to sec. alcohols. 2:2:6:6-Tetramethylcyclohexanone slowly affords an oxime but no semicarbazone, whereas 2:2:6:6-dibenzylcyclohexanone affords a semicarbazone but no oxime. 2-Methylcyclohexanone immediately affords a H sulphite compound, whereas the $2: 6-Me_2$ derivative does not. J. L. D.

Phenacyl esters of oleic acid series. W. KIMURA (J. Soc. Chem. Ind. Japan, 1932, 35, 221– 224B).—The following are prepared in almost quant. yield by interaction of the Na salt of the acid with the appropriate phenacyl bromide in aq. EtOH : pphenylphenacyl oleate, m.p. 61°, erucate, m.p. 76°, and cetoleate, m.p. 72.5° ; p-chlorophenacyl oleate, m.p. 40°, erucate, m.p. 56°, and cetoleate, m.p. 54.5°; and p-bromophenacyl oleate, m.p. 46°, erucate, m.p. 62.5°, and cetoleate, m.p. 60.5°. H. A. P.

Transposition of benzoyl group in phenols. A. PIERONI (Gazzetta, 1932, 62, 387–393).—By the action of BzCl and AlCl₃ the following are obtained: from *p*-chlorophenol (in CS_2), *p*-chlorophenyl benzoate and 5-chloro-2-hydroxybenzophenone; from PhOH (in CS_2), 4-hydroxybenzophenone and 4-benzoyloxybenzophenone, m.p. 112.5°; from 4-hydroxybenzophenone (at 100–150°), 4-hydroxy-3-benzoylbenzophenone, m.p. 105°; from resorcinol (in CS_2), its dibenzoate and 4-Bz derivative; from resorcinol dibenzoate (at 100–150°), 2:4:6-tribenzoylresorcinol, also obtained, with 6-benzoylresorcinol, when BzCl is omitted from the reaction mixture. E. W. W.

Condensation of benzotrichloride with phenols. R. N. SEN and S. K. RAY (J. Indian Chem. Soc., 1932, 9, 181—184).—CPhCl₃ (I) and PhOH in aq. EtOH– NaOH at 100° (bath) give about 5% of o-hydroxybenzophenone. α -C₁₀H₇·OH and (I) similarly give 16% of the 2-Bz, m.p. 114°, and 4-Bz, m.p. 162—164° (lit. 164—165°), derivatives, whilst β -C₁₀H₇·OH affords 20% of its 1-Bz derivative, m.p. 174°. o-Coumaric acid and (I) give 30% of 2-hydroxy-5-benzoyl-cinnamic acid(?), m.p. 188° [Ag salt; phenylhydrazone, m.p. 120° (decomp.)]. Nitrophenols do not react with (I). H. B.

Isomeric deoxybenzanisoins. J. S. BUCK and W. S. IDE (J. Amer. Chem. Soc., 1932, 54, 3012— 3013).—Further details (cf. A., 1931, 732) are given for the prep. of anisyl benzyl and Ph *p*-methoxybenzyl ketones and the oximes of the latter, in view of Jenkins' criticism (this vol., 516). C. J. W. (b)

Constitution of benzils. A. BURAWOY (Ber., 1932, 65, [B], 1068—1071).—The introduction of positive groups has a similar chemical and optical effect on benzils (dicarbonyl compounds) and on aldehydes and ketones (monocarbonyl compounds). The existence of two forms of 4:4'-dibenzyloxy-, 2:2'-dimethoxy-, and 4:4'-dihydroxy-benzil can be explained by the assumption of an isomerism between ketonic and peroxide forms, but the hypothesis is arbitrary (cf. Schönberg and Bleyberg, A., 1923, i, 116; Brass and others, A., 1930, 1589). H. W.

Optical method for the study of reversible organic oxidation-reduction systems. Ι. Benzoquinones. W. H. HUNTER and D. E. KVALNES (J. Amer. Chem. Soc., 1932, 54, 2869-2881).-The oxidising strength of a series of quinolbenzoquinone systems is determined by using an optically active system, viz., 2: 5-dimethylquinol- and p-xyloquinone-d-camphorsulphones, as a standard. Quinol-d-camphorsulphone (2-d-camphorsulphonyl-quinol), m.p. 159–160°, $[\alpha]_{3461}^{37}$ +46.55° in C₆H₆ (di-acetate, m.p. 119–122°, $[\alpha]_{3461}^{37}$ +17.5° in EtOH); 2:5dichloroquinol-d-camphorsulphone, m.p. 169-173°, $[\alpha]_{\text{stel}}^{\pi}$ +29.99° in C_6H_6 ; 2:6-dichloroquinol-d-cam-phorsulphone, m.p. 104-106°, $[\alpha]_{\text{stel}}^{\pi}$ +35.4° in C_6H_6 ; 2:5-dibromoquinol-d-camphorsulphone, m.p. 172– 173°, $[\alpha]_{34a1}^{37}$ +19.6° in C₆H₆; 2:6-dibromoquinol-d-camphorsulphone, m.p. 108–112°, $[\alpha]_{3461}^{37}$ +37.9° in C₆H₆, and 2:5-dimethylquinol-d-camphorsulphone, C_6H_6 , and 2:5-attending quarter determined with the second s C_6H_6 (prepared by oxidation of the quinol with PbO₂ or Ag_2O in Et_2O); p-xyloquinone-d-camphorsulphone, m.p. 148—151°, $[\alpha]_{i,iei}^{r_{i}} + 223°$ in C_6H_6 ; α -naphtha-quinone-d-camphorsulphone, m.p. 144—148°, $[\alpha]_{i,iei}^{r_{i}}$ +237.3° in C_6H_6 , are described. The optically active quinols show no change in rotation even after several days; the rotations of the active quinones fall slowly, but the error thereby introduced is small and does not affect the comparative results, since the observed equilibrium points, using various quinones, are reached in approx. the same length of time. The following vals. are the equilibrium consts., conversions, and benzoquinone equivs. (mols. of benzoquinone necessary to give the same conversion as is given by 1 mol. of the quinone in question), respectively: p-xyloquinone, 0.00059, 2.4, 0.03; toluquinone, 0.00437, 6.2, 0.10; benzoquinone, 0.114, 25.2, 1.00; chloro-, 0.669, 45.0, 3.7; bromo-, 0.853, 48.0, 4.4; 2:6-dichloro-, 1.09, 51.2, 5.2; 2: 6-dibromo-, 1.43, 54.5, 6.3; tetrachloro-, 1.27, 53.0, 5.8; tetrabromo-, 1.69, 56.5, 7.0; 2: 5-dichloro-, 1.73, 56.8, 7.1; 2: 5-dibromobenzoquinone, 9.04, 75.0, 20.5. Me lowers and a halogen group raises the conversion val. of the parent compound; a Me group is more effective than a halogen atom. The successive introduction of like groups causes the conversion vals. to change consistently in the same direction, the first group being the most effective. The position of the groups is also of importance. The results are compared with electrochemical data. C. J. W. (b)

Laboratory and technical preparation of chloranil. R. SCHULOFF and R. POLLAK (Chem.-Ztg., 1932, 56, 569—570).—Chloranil can be obtained from pentachlorophenol by methods and with yields as follows : with Cl_2 in $ClSO_3H$ at $S0^\circ$ (90%); with Cl_2 in $ClSO_3H$ and 10% oleum at $S0^\circ$ (10%), or at 120° (90%); with $ClSO_3H$ and 65% oleum at 100° (almost 100%); with Cl_2 in 10% oleum alone (small); with Cl_2 in 65% oleum at 120° (60%); with 10—65% oleum and Cl_2 in presence of FeCl₃ or NaCl at 120° (50—75%); or with 10% oleum and HCl at 120°, followed by Cl_2 at 120—130° (90%). Trichlorophenol, 10% oleum, FeCl₃, and Cl_2 followed by $ClSO_3H$ give 90% yield of chloranil, or followed by HCl and SO₃ a 75% yield. Benzoquinone dissolved in conc. HCl and treated with Cl_2 at room temp. gives tetrachloroquinol, but at the b.p. also chloranil, which is obtained almost quantitatively when the former is heated with conc. HCl and Cl_2 . Benzoquinone or quinol in conc. HCl boiled under reflux with Cl_2 gives chloranil almost quantitatively. E. W. W.

Sulphonation of synthetic anthraquinone. Direct preparation of anthraquinone-2-sulphonic acid from o-benzoylbenzoic acid. A. BERETTA and M. GALLOTTI (Annali Chim. Appl., 1932, 22, 272— 290).—o-Benzoylbenzoic acid dissolved in oleum (25% SO_3) and sulphonated with further oleum (67% SO_3) gives 32% of anthraquinone-2-sulphonic acid, 18% of a mixture of anthraquinone-2 : 6- and 2 : 7-disulphonic acids, and 50% of anthraquinone. These as isolated are sufficiently pure for most technical uses. E. W. W.

Basic character of α -methoxyanthraquinones. K. C. ROBERTS (J.C.S., 1932, 1982—1984).—1: 2-Dimethoxyanthraquinone (I) gives a stannichloride, B,SnCl₄, volatile at 150° in vac. The 1: 4-isomeride (II) gives a red hydrochloride, a chloroplatinate, B,H₂PtCl₆, retaining H₂O at 110° in vac., a chlorostannate, B,H₂SnCl₆, and a diperchlorate, but a stannichloride, B,SnCl₄. The 1: 5-isomeride (III) gives similar salts, but the chloroplatinate is B,H₂PtCl₆,8H₂O (after drying at room temp.). The 1: 8-isomeride (IV) gives a chlorostannate, B,H₂SnCl₆, chloroplatinate, B,H₂PtCl₆,12H₂O (after drying in vac. at 110° over P₂O₅), and a perchlorate, B,HClO₄ (also existing as trihydrate). Titration indicates the following order of basicity: (IV)>(II)>(III)>1-methoxythioxanthone>1-methoxyxanthone>(I), 1: 3-dimethoxy- and 1-methoxy-anthraquinone. The salts described above are highly coloured and are assigned co-ordination formulæ. R. S. C. Manufacture of 1:2:5:6-diphthaloylnaphthalene and halogen-substitution products thereof. I. G. FARBENIND. A.-G.—See B., 1932, 672.

Manufacture of condensation products of the anthraquinone series [amino-1:4-dianthraquinonylaminoanthraquinones]. A. CARPMAEL. From I. G. FARBENIND. A.-G.—See B., 1932, 672.

Strophanthin. XXVI. Dehydrogenation of strophanthidin. W. A. JACOBS and E. E. FLECK (J. Biol. Chem., 1932, 97, 57-61; cf. this vol., 748). —The hydrocarbon $C_{18}H_{16}$ (cf. A., 1931, 606) is shown to have the formula $C_{16}H_{14}$, and m.p. 125-126° [picrate, m.p. 138-140°; quinone, m.p. 208-210° (quinoxaline derivative, m.p. 187-188°)]. It is not identical with the known dimethylphenanthrenes.

A. A. L.

Determination of santonin. O. FERNÁNDEZ and L. SOCIAS (Anal. Fís. Quím., 1932, 30, 477–478).— To a stirred EtOH solution (0.5%) of santonin is added a 1% solution of 2 : 4-dinitrophenylhydrazine in 10% H₂SO₄. After 48 hr. (in the dark) the pptd. santonin-2 : 4-dinitrophenylhydrazone, m.p. 267–268° (decomp.), is collected, washed with 45% EtOH, and dried at 106°. H. F. G.

Partial synthesis of thujone (tanacetone). L. RUZICKA and D. R. KOOLHAAS (Helv. Chim. Acta, 1932, 15, 944—948).—Et α -thujaketonate (from the Ag salt), CH₂Cl·CO₂Et, and NaOEt give *Et*₂ thujaketoglycid-dicarboxylate (I), b.p. 129—139°/0·2 mm., which with cold aq. 1·48N-KOH (not NaOH-EtOH) yields a neutral oil, b.p. 105—110°/0·1 mm. and homothujacamphoraldehydecarboxylic acid (II), b.p. 138—146°/ 0·16 mm. (semicarbazone, m.p. 178°), oxidised by cold,

$$\begin{array}{c} \text{CO}_{2}\text{Et} \cdot \text{CH}_{2} \cdot \text{CPr}^{\beta} \cdot \text{CH}_{2} \cdot \text{CH} \cdot \text{CMe} \cdot \text{CH} \cdot \text{CO}_{2}\text{Et} \\ & \\ \text{CH}_{2} & 0 & (I.) \\ \text{CO}_{2}\text{H} \cdot \text{CH}_{2} \cdot \text{CPr}^{\beta} \cdot \text{CH}_{2} \cdot \text{CH} \cdot \text{CHMe} \cdot \text{CHO} \\ & \\ & \\ \text{CH}_{2} & (II.) \end{array}$$

alkaline KMnO₄ to the corresponding dicarboxylic acid, a resin. The Ag salt thereof with EtI gives Et_2 homothujacamphorate, b.p. 103—107°/0·1 mm., which, when heated for 0·5 hr. (not longer) with Na in C₆H₆ (not xylene), yields the dicyclic keto-ester, converted by boiling aq. Ba(OH)₂ into β -thujone [identified as semicarbazone, p-nitro- (m.p. 148—150°) and 2:4dinitro-phenylhydrazone, m.p. 114—115°] and other products. R. S. C.

Attempted synthesis of Δ^4 -carene. L. RUZICKA [with J. ZEPER and P. NEBBELING] (Helv. Chim. Acta, 1932, 15, 957—959).—Carylamine, MeI, and NaOEt in boiling EtOH give an inactive, monocyclic hydrocarbon, C₁₀H₁₆, b.p. 65—67°/12 mm. With MeI and NaOMe in cold MeOH an oil is formed, which, when treated with Ag₂O in H₂O and then distilled in a high vac., yields a monocyclic hydrocarbon, C₁₀H₁₆, b.p. 178—182°/755 mm., reduced (PtO₂-H₂) to a hydrocarbon, C₁₀H₂₀. It is presumed that formation of unstable Δ^5 -carene precedes ring fission, the different result by the xanthate method (A., 1927, 882) being due to the intermediate alcohol undergoing Walden inversion in the present case.

R. S. C.

Action of Japanese camphor on the heart. IV. allo-p-Ketocamphor ("Vitacamphor "). K. TAMURA, G. KIHARA, and M. ISHIDATE (Proc. Imp. Acad. Tokyo, 1932, 8, 213—216).—Mild oxidation of p-hydroxycamphor with Na₂Cr₂O₇ gives p-ketocamphor (I) (Bredt, A., 1924, i, 408) (formed solely by more drastic oxidation) and allo-p-ketocamphor (II) (A., 1931, 358), m.p. 200—203°, $[\alpha]_{10}^{10}$ +70·6° and +92·1° in EtOH (according to temp. of oxidation); (II) passes into (I) when heated with AcOH. (II) is an intermediate in the degradation of Japanese camphor in the animal body. (II) is readily absorbed from subcutaneous tissue; after absorption, it acts principally on the heart and central nervous system. H. B.

of Polyterpenes. LXX. Synthesis pimanthrenequinone. LXXI. Oxidative degradation of d-pimaric acid. L. RUZICKA and H. WALDMANN (Helv. Chim. Acta, 1932, 15, 907-914, 915-923; cf. this vol., 749).-LXX. p-Tolualde-hyde, Na succinate, and Ac₂O at 110° give a poor yield of y-p-tolylisocrotonic acid, m.p. 111-112°, affording at 300° 7-methyl-a-naphthol (I). p-Tolualdehyde, Et₂ bromosuccinate, and activated Zn in hot C_6H_6 give a product, which, when treated with PBr₃ in C_6H_6 and then with NPhMe₂ at 190°, yields Et₂ α -p-tolyl- Δ^{α} -propene- $\beta\gamma$ -dicarboxylate, m.p. 195–196° (decomp.), which does not form (I) when distilled. γ -p-Tolyl-n-butyric acid (prepared by Clem-mensen reduction of γ -keto- γ -p-tolyl-n-butyric acid) and SOCl₂ give the acid chloride, b.p. 130°/11 mm., which with AlCl₃ in CS₂ affords 1-keto-7-methyl-1:2:3:4-tetrahydronaphthalene, transformed into (I) in 45% yield by S and CuS at 190-200°, but only in poor yield by Se at 280-300°. (I) with Me₂SO₄ and NaOH gives the Me ether, m.p. 42-43.5°, b.p. 140°/10 mm., which with succinic anhydride and AlCl₃ in cold C_6H_6 affords γ -(4-methoxy-6-methylnaphthoyl)propionic acid, m.p. 175-176°, reduced (Clemmensen) to y-(1-methoxy-7-methyl-4-naphthyl)butyric acid (II), m.p. 142° (Me ester, m.p. 62-63°, b.p. about 165°/ 0.5 mm.). (II) and SOCl₂ give the acid chloride, which, when distilled, gives a 50% yield of 1-keto-9methoxy - 7 - methyl - 1 : 2 : 3 : 4 - tetrahydrophenanthrene, m.p. 118-119°, b.p. 190-193°/0.7 mm. (semicarbazone). This with MgMeI affords a mixture of tert. alcohol and unsaturated hydrocarbon, which with Se at 290-300° and later at 260° forms 9-methoxy-1:7dimethylphenanthrene (50% yield), m.p. 126-127°, b.p. about 165°/0.7 mm., oxidised by CrO₃ in hot AcOH to pimanthrenequinone (identified as quinoxaline derivative). 9-Methoxyphenanthrene is similarly oxidised to phenanthrenequinone. β -(2:5-Dimethylbenzoyl)propionic acid, m.p. 81-82°, is reduced (Clemmensen) to γ -(2: 5-dimethylphenyl)butyric acid, b.p. 177-179°/11 mm. (90% yield), the acid chloride, b.p. 142-143°/11 mm., of which leads to 1-keto-5:8dimethyl-1:2:3:4-tetrahydronaphthalene, b.p. 145° 10 mm. (semicarbazone, m.p. 228°), giving with S 5: 8-dimethyl-a-naphthol (Me ether, m.p. 68°, b.p. about 150°/11 mm.).

[With G. B. R. DE GRAAFF.] α -Naphthyl Me ether, succinic anhydride, and AlCl₃ in CS₂ give β -(4-methoxynaphthoyl) propionic acid, m.p. 171°, oxidised by NaOBr to 4-methoxynaphthoic acid. This proves the constitution of the products of the above reactions.

LXXI. d-Pimarie acid (I) (modified prep.) with HNO₃ under certain conditions gives the acids $C_{11}H_{16}O_6$ (II) and $C_{12}H_{18}O_6$, previously (A., 1931, 736) obtained from abietic acid, and with O₃ in CCl₄ yields CH₂O. The amorphous by-products obtained in the prep. of dihydroxy-d-pimarie acid (III) with KMnO₄ (equiv. to 23 O atoms) give (II). (III) with CrO₃ (equiv. to 20) in AcOH at 50–60° gives a dibasic acid, $C_{19}H_{28}O_4$, m.p. 260–261° (with a product, m.p. 246–247°, possibly the same acid impure), reduced catalytically (PtO₂) to an acid, $C_{19}H_{30}O_4$, m.p. not sharp, 210–220°, and yielding pimanthrene with Se at 350°. These and previous results indicate that (I) has one of the annexed formulæ, the second ethylenic linking being at one of the positions indicated in



heavy type. The isoprene chains from which (I) and abietic acid are built up differ only in one respect, and both are unsymmetrical. R. S. C.

Furan-3-aldehyde (3-furfuraldehyde). H. GIL-MAN and R. R. BURTNER (J. Amer. Chem. Soc., 1932, 54, 3014).—Furan-3-aldehyde, b.p. $144^{\circ}/732$ mm. (phenylhydrazone, m.p. 149.5°), prepared by way of 3-furoyl chloride, does not give a coloration with NH₂Ph,AcOH. C. J. W. (b)

Amino-acids. II. N-Benzoylfurylalanine. V. DEULOFEU (Anal. Fís. Quím., 1932, 30, 456-459)... N-benzoylfurylalanine, m.p. 149-150° (lit. 163°), identical with that obtained by reducing N-benzoylfurylaminoacrylic acid, has been prepared by direct benzoylation. H. F. G.

Comparison of the directive powers of elements having consecutive atomic numbers. III. Nitration of halogeno-2-phenylbenzopyrylium salts. (MRS.) C. G. LE FÈVRE and R. J. W. LE FÈVRE (J.C.S., 1932, 1988-1992).-Salicylidene-pchloroacetophenone, m.p. 151° (decomp.), obtained from salicylaldehyde and p-chloroacetophenone, gives with HCl and HClO₄ 4'-chloro-2-phenylbenzopyrylium perchlorate, m.p. 193°; salicylidene-p-bromoacetophenone, m.p. 133°, 4'-bromo-2-phenylbenzopyrylium perchlorate, m.p. 243—245°; 5-chloro-, m.p. 170—171°, 5-bromo-, m.p. 162—163°, 3:5-dichloro-, m.p. 183— 184°, and 3: 5-dibromo-salicylideneacetophenone, m.p. 168°; 6-chloro-, m.p. 240°, 6-bromo-, m.p. 248-250°, 6:8-dibromo-, m.p. 257-259°, and 6:8-dichloro-2phenylbenzopyrylium, m.p. 249-250°, perchlorates are similarly prepared. Nitration of the benzopyrylium salts yields 90-100% of the corresponding m-NO2derivatives, which have also been synthesised from the corresponding m-nitroacetophenones: 4'-chloro-(+xH₂O), m.p. 180–190° (nitration product, m.p.225– 226°, reacts almost 100% with $C_5H_{11}N$), 4'-bromo-3'nitro-2-phenyl- (+xH₂O), m.p. 180–190° (nitration product, m.p. 239–240°); 6-chloro-, m.p. 233·5°, and 6-bromo-2-m-nitrophenyl-benzopyrylium perchlorate, m.p. 228°. p-Chloro-acetophenone is nitrated to 4-chloro-, m.p. 99–101°, and p-bromo- to 4-bromo-3-nitroacetophenone, m.p. 117–118°. 6-Chloro-4'nitro-, m.p. 252–253°, is different from the nitration product of 6-chloro-2-phenylbenzopyrylium perchlorate. 4'-Chloro-, m.p. 179–181°, 4'-bromo-, m.p. 173– 176°, 6-chloro-, m.p. 160–161°, 6-bromo-, m.p. 158– 159°, 6:8-dichloro-, m.p. 187–188°, and 6:8-dibromo-2-phenylbenzopyrylium ferrichlorides, m.p. 185°, have been prepared. 3:4':5-Trichlorosalicylideneacetophenone, m.p. 211–212°, is described.

F. R. S.

Developments in the chemistry of anthocyanins. G. M. ROBINSON and R. ROBINSON (Nature, 1932, 130, 21).—Mainly a summary of recent work. The authocyanin, proposed name gesnerin, occurring in the orange-red flowers of *Gesnera fulgens* and *G. cardinalis*, is a 5-saccharide of 4': 5:7-trihydroxyflavylium chloride. Hirsutin, malvin, and cyanin chlorides, which have been synthesised, and peonin and pelargonin chlorides all bear 2 glucose residues separately attached to the 3 and 5 O atoms. L. S. T.

Preparation of di- and isomeric tetra-chlorodioxans. C. L. BUTLER and L. H. CRETCHER (J. Amer. Chem. Soc., 1932, 54, 2987-2992).-The work of Böeseken et al. (A., 1931, 1162) on the structure of dichlorodioxan (I) is confirmed; (CH, OH), is identified as the dibenzoate amongst the hydrolysis products. Treatment of the hydrolysis product of (I) with $CO(NH_2)_2$ gives glycoluril (70% yield), from which hydantoin is prepared in 67% yield; dichloro-dioxan is a practical source of glyoxal for reactions of this type. (I) and warm EtOH give 71% of diethoxydioxan. Dioxan could not be brominated. Four tetrachlorodioxans, b.p. 93-95°/11-12 mm., and m.p. 57-58°, 59-60°, and 143-144°, are prepared by chlorination of crude (I). The hydrolysis products indicate that the first two are as- and the last two (obtained in small yield) s-Cl₄-derivatives.

C. J. W. (b)

1:3-Dioxins. II. 1:3-Benzdioxin and its derivatives. F. CALVET and M. C. CARNERO [with D. L. MOSQUERA] (Anal. Fis. Quim., 1932, 30, 445-455).-1: 3-Benzdioxin (I) (A., 1929, 573), m.p. 12-13°, on nitration yields NO_2 - and $(NO_2)_2$ -derivatives and picric acid, the heterocyclic ring being therefore relatively stable. Oxidation with KMnO₄ in COMe₂ yields 4-keto-1: 3-benzdioxin, which is readily hydrolysed to salicylic acid and CH₂O. Br in the cold gives 6-bromo-1: 3-benzdioxin, excess of Br at higher temp. a compound, $C_8H_5O_3Br$; the former is oxidised to 6-bromo-4-keto-1: 3-benzdioxin. Conc. acids rupture the heterocyclic ring of (I), yielding amorphous products, probably resulting from condensation between CH2O and PhOH. 6-Amino-1:3-benzdioxin, m.p. 68°, has been isolated; Ac derivative, m.p. 128-130°: the Br- and Br2-derivatives have m.p. 124° and 130-132°, respectively.

Condensation of p-nitrophenol with CH2O yields, in addition to 6-nitro-1: 3-benzdioxin, di-(6-nitro-1: 3-benzdioxinyl)methane, m.p. 218-220°, which on oxidation yields the corresponding benzophenone derivative, m.p. above 310°. H. F. G.

Rotenone. XXII. New data in confirmation of the structure of rotenone. L. E. SMITH and F. B. LAFORGE (J. Amer. Chem. Soc., 1932, 54, 2996-3000; cf. this vol., 401).—Anhydro-derivatives, m.p. 160°, 149°, and 164°, are obtained from derritol, isoderritol, and dihydroderritol, respectively, by the action of P_2O_5 in xylene. These are insol. in alkali but give colorations with FeCl₃ and afford the corre-sponding acetates, m.p. 146°, 158°, and 138°, respectively. Acetyldihydroderritol Me ether has m.p. 98°. Dihydrorotenonic acid yields a Ac_2 derivative, m.p. 119°. The mechanism of the formation of the anhydroderritols proposed by Butenandt (A., 1928, 1017) is correct. These reactions afford confirmation of the derritol formula previously proposed (loc. cit.). Rotenone, isorotenone, and dihydrorotenone give Ac derivatives, m.p. 135°, 144°, and 209-211°, respectively, which are enol acetates; one of the Ac groups in diacetyldihydrorotenonic acid is of this type. Acetyldihydrorotenone is reduced catalytically to dihydrodeoxyrotenone, m.p. 168°. The methylderritols do not yield anhydro-derivatives.

C. J. W. (b) Deguelin. IV. Structure of deguelin and tephrosin. E. P. CLARK (J. Amer. Chem. Soc., 1932, 54, 3000–3008; cf. A., 1931, 1298).—Reactions are discussed which lead to a formula for deguelin (1). Catalytic reduction of (I) gives a dihydro-derivative,



m.p. 173-174°, oxidised by K₃Fe(CN)₆ to dehydrodihydrodeguelin. The mother-liquor from the oxidation of dchydrodeguelin (II) with KMnO₄ (after removal of 2-hydroxy-4:5-dimethoxybenzoic acid) contains a small quantity of rissic acid and nicouic acid, $C_{12}H_{12}O_8$ [10²2 g. from 50 g. of (II)], m.p. 196° (decomp.) (Me₃ ester, m.p. 120-121°) (one of the products of decomp. at the m.p. is α -hydroxyisobutyric acid; decomp. in boiling NH₂Ph gives resorcinol). Nicouic acid is formulated as a-3-hydroxy-2: 4-dicarboxyphenoxyisobutyric acid. Tephrosindicarboxylic acid when heated in boiling Ph₂O for 0.5 min. gives a-hydroxyisobutyric acid and tephrosinmonocarboxylic acid, m.p. 268-269° (decomp.) (Ac derivative, m.p. 230°, decomp. 250-255°), oxidised by alkaline H_2O_2 to rissic acid, and hydrolysed by 10% EtOH-KOH to tephrosic acid, m.p. 196°. C. J. W. (b) Acetyltephrosin has m.p. 200°.

[Metallic derivatives of thiophen.] W. STEIN-KOPF (Ber., 1932, 65, [B], 1248).—In reply to Krause and Renwanz (this vol., 762) it is pointed out that 2-bromothiophen can be prepared in 45% yield from thiophen and CNBr. H. W.

Preparation and properties of substituted 2-methylthiophens. A. F. SHEPARD (J. Amer. Chem.

Soc., 1932, 54, 2951-2953).-2-Methyl-5-ethylthiophen, b.p. 159.8—160.4° (corr.)/760 mm., f.p. -68.6° to -68.4°, results in 40% yield when the semicarbazone of 2-methyl-5-acetothienone is heated with moist powdered KOH. α -Ethyl-lævulic acid and $P_2S_5(?)$ give 20% of 2-methyl-4-ethylthiophen, b.p. 162—164°/760 mm., f.p. -60° to -59°, whilst β -methyl-lævulic acid and P_2S_5 give 20% of 2:3-dimethylthiophen, b.p. 140·2—141·2°/760 mm., f.p. -49.1° to -48.9°, [5-chloromercuri-derivative, m.p. 218.5-219.5° (corr.)]. C. J. W. (b)

Preparation of tin methyl dipyridine iodide, Preparation of the methyl dipyrtum active tin diquinoline chloride, and tin diquinoline bromide. G. DIMITRIOU (Praktika, 1929, 4, 140– 143; Chem. Zentr., 1932, i, 1375–1376).—The compounds $MeSnI_3, 2C_5H_5N$, $SnCl_4, 2C_9H_7N$, and $SnBr_4, 2C_9H_7N$ have been prepared. L. S. T.

Valency isomerism of salts of pyridine and related compounds. A. HANTZSCH and A. BURA-wox (Ber., 1932, 65, [B], 1059-1068).—Contrary to Meisenheimer (A., 1921, ii, 364) and Lifschitz (A., 1931, 349, 840), evidence is adduced that the colourless and coloured forms of org. halide salts, particularly those of the pyridinium series, are valency isomerides. The hypothesis of ionic deformation explains the phenomena less satisfactorily, whilst the arguments of Lifschitz cannot be maintained. The tendency towards the formation of ψ -salts does not increase, as assumed, from chloride to iodide but decreases; it is also present in the nitrates and trichloroacetates. The intense colour of pyridinium ψ -iodides is not a characteristic property of ψ -salts but is attributable to the proper absorption of the homopolar united I atom. The ψ -salts of the pyridinium and quinolinium series are not constituted with the acid residue united directly to N but have the quinolide constitution, NMe or NMe, with the acid residue

in direct union with a C atom.

Н.

H. W.

Synthesis of isonipecotinic [piperidine-4-carboxylic] acid. V. HANOUSEK and V. PRELOG (Coll. Czech. Chem. Comm., 1932, 4, 259-270).--- \$\$ Dichlorodiethyl ether and CHNa(CO₂Et)₂ in EtOH give Et tetrahydropyran-4: 4-dicarboxylate (45% yield) together with $Et \gamma$ -(β -ethoxyethoxy)propane- $\alpha\alpha$ -dicarb-oxylate, b.p. 146—147°/high vac. [the free acid (Ba salt; amide, m.p. 138-139°) is decarboxylated to γ-(β-ethoxyethoxy)butyric acid, b.p. 151-153°/high vac.], and yyy'y'-tetracarbethoxydipropyl ether, b.p. 187-192°/high vac. [converted by MeOH-NH₃ into the tetra-amide, m.p. 226° (decomp.)]. Tetrahydropyran-4-carboxylic acid and conc. HBr at 100° give az-dibromopentane-y-carboxylic acid (I), m.p. 58-59° (unstable amide, m.p. 77-78°), the Et ester, b.p. 153°/ 7-8 mm., of which is converted by successive treatment with MeOH-NH₃ at 130°, aq. Ba(OH)₂, CO₂, dil. H_2SO_4 , Ag_2O , and H_2S into isonipecotinic acid [hydrochloride, m.p. 293° (decomp.); Me ester hydrochloride, m.p. 169° (corr.)]. Vac. distillation of (I) gives α-(β-bromoethyl)butyrolactone, b.p. 151-153°/6-7 mm. az-Dichloropentane-y-carboxylic acid has m.p. 54-55°. H. B.

2:6-Dihydroxy-3- β -phenoxyethyl-4-methylpyridine. K. MATEJKA, R. ROBINSON, and J. S. WATT (J.C.S., 1932, 2019—2021).—The K derivative of Et α -cyano- β -methylglutaconate reacts with β phenoxyethyl bromide or iodide [the latter (improved prep.) gives better yield] to form mainly Et γ -cyano- γ phenoxyethyl- β -methylcrotonate, b.p. 170—172°/0·2 mm., hydrolysed by HCl to 2:6-dihydroxy-4-methyl-3- β -phenoxyethylpyridine, m.p. 161°, and some (probably) anhydro-2:6-dihydroxy-4-methyl-3-(β -hydroxyethyl)-pyridine, m.p. 249—250°. F. R. S.

Structure of isatide. W. C. SUMPTER (J. Amer. Chem. Soc., 1932, 54, 2917—2918).—5-Methyldioxindole and isatin give the same 5-methylisatide as is obtained from 5-methylisatin and dioxindole (Wahl and Faivret, A., 1926, 960), indicating that the unsym. quinhydrone formula (Heller and Lauth, A., 1929, 451) for isatide is untenable. The isatin-pinacol formula (cf. Kohn, A., 1912, i, 800; 1916, i, 607) is probably correct. C. J. W. (b)

4-Anilinoquinaldine derivatives. O. G. BACKE-BERG (J.C.S., 1932, 1984-1986).-Condensation of 4-chloroquinaldine or its 8- or 6-OMe- or 8- or 6-OEtderivatives with NH₂Ph, o- or p-anisidine, or o- or p-phenetidine gives 4-chloro-8-methoxy-, m.p. 89° [+1 H_2O , m.p. 83° ; picrate, m.p. 191° (decomp.)], 4-hydroxy-8-ethoxy-, m.p. 197° [+2H2O; hydrochloride, m.p. 264° (decomp.); picrate, m.p. 211°], 4-chloro-8ethoxy-, m.p. 44° [+1H₂O, m.p. 61°; picrate, m.p. 193° (decomp.)]; 4-0-, m.p. 203° [hydrochloride, m.p. 252° (decomp.); picrate, chars 276°], 4-p-anisidino-, m.p. 209° [hydrochloride, m.p. 286° (decomp.); picrate, m.p. 223° (decomp.)]; 4-o-, m.p. 171° [hydrochloride, m.p. 143°; picrate, chars 274°], 4-p-phenetidino-, m.p. 182° [hydrochloride, m.p. 277° (decomp.); picrate, m.p. 223°]; 4-anilino-, m.p. 268° (picrate, m.p. 189°), 4-0-, m.p. 198° (picrate, m.p. 192°), and 4-p-anisidino-, m.p. 234° (picrate, m.p. 187°), 4-o-, m.p. 191° [hydrochloride, m.p. 210° (decomp.); picrate, m.p. 174°], and 4-p-phenetidino-8-methoxy-, m.p. 228° [hydrochloride, m.p. 245° (decomp.); picrate, m.p. 188°]; 4-o-, m.p. [hydrochloride, m.p. 274° (decomp.); picrate, 193° m.p. 233° (decomp.)], and 4-p-anisidino-, m.p. 203° [hydrochloride, m.p. 292° (decomp.); picrate, m.p. 274° (decomp.)], 4-o-, m.p. 172° [hydrochloride, m.p. 238° (decomp.); picrate, m.p. 229°], and 4-p-phenetidino-6-methoxy-, m.p. 223° [hydrochloride, m.p. 282° (decomp.); picrate, m.p. 251° (decomp.)]; 4-anilino-, m.p. 245° (picrate, m.p. 191°), 4-0-, m.p. 203° (picrate, m.p. 163°), and 4-p-anisidino-, m.p. 211° (picrate, m.p. 174°), 4-o-, m.p. 143° [hydrochloride, m.p. 147° (decomp.); picrate, m.p. 164°], and 4-p-phenetidino-8ethoxy-, m.p. 209° [hydrochloride, m.p. 240° (decomp.)]; 4-anilino-, m.p. 223° [hydrochloride, m.p. 311° (decomp.); picrate, m.p. 227°], 4-o-, m.p. 158° [hydrochloride, m.p. 255° (decomp.); picrate, m.p. 200°], and 4-p-anisidino-, m.p. 194° [hydrochloride, m.p. 281° (decomp.); picrate, m.p. 221°], and 4-o-phenetidino-6-ethoxy-2-methylquinoline, m.p. 177° [hydrochloride, m.p.279° (decomp.); picrate, m.p. 219°]. The picrates of the following have been prepared : 4-hydroxy-8methoxy-, m.p. 217°, -6-methoxy-, m.p. 202°, and -6-ethoxy-, m.p. 205°; 4-chloro-6-methoxy-, m.p. 210° (decomp.), and -6-ethoxy-, m.p. 209°; 4-anilino6-methoxy-, m.p. 269° (decomp.); and 4-p-phenetidino-6-ethoxy-2-methylquinoline, m.p. 217°.

F. R. S. Linear dinaphthacridone quinone. J. PAJAK (Rocz. Chem., 1932, 12, 507-517).-2-Amino- β naphthoic acid condenses with 2-hydroxy-1:4naphthaquinone to yield the corresponding naphthaquinoneaminonaphthoic acid, m.p. 272°, which when heated with H₃PO₄ at 170° gives dinaphthacridone-



quinone (I), m.p. 410° (Ac and Ac₂ derivatives of the corresponding quinols, m.p. 305° and 160°). Sulphonic acids

of (I) and of its NO₂-derivatives are described.

R. T. Creatine and creatinine. I. Acyl derivatives of creatinine. H. R. ING. Their electrometric titration. R. A. KEKWICK and G. M. RICHARDSON (J.C.S., 1932, 2047-2055).—Benzylideneacetylcreatinine (I) forms a K salt, the slightly acidic properties being due to the lactam group; the K salt gives with MeI, benzylideneacetylmethylcreatinine, m.p. 129-130°, hydrolysed by acid to benzylidenedimethylhydantoin, and (I) must be therefore

 $\underbrace{ \text{CHPh:C-NMe}_{\text{CO-NH}} \text{C:NAc. Creatinine and Ac}_2\text{O, at} }_{\text{CO-NH}}$ 60-65°, yield acetyl-, m.p. 124-125° [hydrochloride, m.p. 185-186° (decomp.); picrate, m.p. 170-172° (decomp.); K salt], and at 100°, form diacetyl- m.p. 164-165° (picrate, m.p. 139-140°), and triacetyl-creatinine, m.p. 63-65°. Benzoylation of creatinine gives only one monobenzoyl-, m.p. 193-194° (lit. m.p. 187°; K salt), and tribenzoyl-creatinine. Creatinine and diphenoxyphosphoryl chloride when anhyd. yield diphenoxyphosphorylcreatinine, m.p. 127-128° (Na salt), which exhibits phenolic properties, and when not completely dry, creatinine diphenoxyphosphate, m.p. 158-159°, results. Monoacyl derivatives of creatinine have been shown to exhibit phenolic properties due to enolisation of the ·CH₂·CO· group. Electrometric titrations of mono- and di-acetyl-, benzoyl-, and benzylideneacetyl-creatinine are re-F. R. S. corded.

N-Substituted derivatives of barbituric acid. B. HEPNER and S. FRENKENBERG (Rocz. Chem., 1932, 12, 500—506).—The following analgesics have been prepared by condensing s-phenylmethylcarbamide or p-ethoxyphenylcarbamide with the corresponding substituted malonic acid: 3-phenyl-1-methylbarbituric acid, m.p. 118—122° (5-Et, m.p. 81°, 5-Pr, m.p. 106°, 5-allyl-, m.p. 107—108°, 5-Pr^g, m.p. 91°, 5:5-Et₂, m.p. 87°, 5:5-Pr₂, m.p. 89°, 5:5-diallyl-, m.p. 96·5°, 5-phenyl-5-ethyl, m.p. 104°, and 5-allyl-5n-propyl derivative, m.p. 97°), 3-p-ethoxyphenylbarbituric acid, m.p. 121° (5-Pr, m.p. 208°, 5:5-Pr₂ derivative, m.p. 150°). Diethylmalonyl-N-phenyl-N'methylthiocarbamide, m.p. 110°, is obtained from s-phenylmethylthiocarbamide and diethylmalonyl chloride. R. T.

Reactions of alloxan. G. Rossi and G. SCANDEL-LARI (Gazzetta, 1932, 62, 351–357).—Alloxan after prolonged heating with *p*-toluidine yields a *compound*, $C_{18}H_{20}O_4N_4$, decomp. above 150°; with *m*-phenylenediamine a compound, $C_{10}H_{10}O_4N_4$, and with anthranilic acid a compound, $C_{11}H_7O_5N_3$, are formed; each of these contains $\cdot NH_2$. A compound, $C_{10}H_5O_5N_4$, decomp. 245°, with *p*-nitroaniline does not diazotise. With either carbamide or biuret a compound, $C_8H_{12}O_8N_8$, m.p. 146—147° (cf. A., 1912, i, 589), is formed. E. W. W.

Organic derivatives of tellurium, arsenic, and tin sulphides. L. DEBUCQUET and L. VELLUZ (Compt. rend., 1932, 195, 50—51; cf. A., 1931, 1071). —The following compounds are prepared by dissolving the appropriate oxide in an excess of aq. (?) piperazine or piperidine, and passing in H₂S until pptn. is complete: TeS₂,C₄H₁₀N₂,H₂S, As₂S₃,C₄H₁₀N₂,H₂S, As₂S₅,3(C₄H₁₀N₂),3H₂S, and SnS₂,C₄H₁₀N₂,H₂S (from piperazine), and As₂S₃,2(C₅H₁₁N),H₂S (from piperidine). They are decomposed by dil. acids with formation of H₂S and the metallic (or metalloidal) sulphide, and are regarded as salts of the thio-acids H₂TeS₃, H₂As₂S₄, H₆As₂S₈, and H₂SnS₃. H. A. P.

Pyrimidines. CXXIX. Synthesis of 2-thioorotic acid. T. B. JOHNSON and E. F. SCHROEDER (J. Amer. Chem. Soc., 1932, 54, 2941—2945).— 2-Thiouracil-4-aldehyde and aq. KOH give 4-hydroxymethyl-2-thiouracil (I), m.p. 259° (decomp.), and 2-thio-orotic acid (II), decomp. 338—339°. (II) is desulphurised by CrO_3 or alkaline H_2O_2 (but not by $CH_2Cl\cdot CO_2H$) to orotic acid (III), whilst (I) and aq. $CH_2Cl\cdot CO_2H$ give 4-hydroxymethyluracil (IV). Uracil-4-aldehyde and aq. KOH give (III) and (IV). The Na salt of (I) with EtI and CH_2PhCl give 2-ethyl-, m.p. 168°, and 2-benzyl-, m.p. 156°, -thiol-4-hydroxymethyluracils, respectively. Similarly, (II) yields 2-ethyl- and 2-methyl-thiolorotic acids, m.p. 248° and 255°, respectively. The prep. of the 2-CH₂Ph derivative (cf. Bachstez, A., 1931, 495) is also described. C. J. W. (b)

Preparation of indolenines and synthesis of [a substance with] the so-called eserine structure. T. HOSHINO (Proc. Imp. Acad. Tokyo, 1932, 8, 171—174).—Mg 3-methylindolyl iodide and MeI give about 40% of 3:3-dimethylindolenine and small amounts of 1:3-dimethylindole and an I-containing substance. Mg 2-methylindolyl iodide and MeI afford 2:3:3-trimethylindolenine (I) and 2:3-dimethylindole; with $CH_2PhCl, 3:3$ -dibenzyl-2-methylindolenine (II), m.p. 59°, and 3-benzyl-2-methylindole result. (I) and (II) (accompanied by 1:3-dibenzyl-2-methylindole) are also prepared from MeI and Mg 2:3-dimethyl- and CH_2PhCl and Mg 3-benzyl-2-methyl-indolyl iodides, respectively.

respectively. [With K. TAMURA.] The product from β -3-indolylethylamine (1 mol.) and MgMe(Et)I (4 mols.) with Me Me Me H₂ m.p. 72—73° (Ac₂ derivative, m.p. H₂ 142—143°); cryst. (m.p. 142°) and non-cryst. by-products are also formed. Similarly, β -2-methyl-3indolylethylamine is converted into

9-methyldinordeoxyeseroline (III; R=Me) (70% yield), m.p. 78—79° (Ac₂ derivative, m.p. 148—149°), which with MeI gives the hydriodide, m.p. 181°, of 9-methyldeoxyeseroline, m.p. 85—86°. H. B.

Action of acetoacetic ester on benzeneazo- β naphthylamine. G. B. CRIPPA and M. LONG [with U. MOLIGNONI] (Gazzetta, 1932, 62, 394—401).— These when heated with conc. HCl at 180° and further heated with C_5H_5N give the *Et* ester, m.p. 96°, of a substance which is (I) 3-methyl- $\alpha\beta$ -naphthoquinoxaline-2-carboxylic acid or (II) $\alpha\beta$ -naphthoquinoxaline-3-acetic acid, m.p. 206°. Of these (II) is preferred, since oxidation by alkaline KMnO₄ yields a substance, m.p. 146°, which is apparently 6-carboxy-5-o-carboxyphenylpyrazine-2-acetic acid. By-products of the condensation are, in the Et₂O extract, N-phenyllutidonecarboxylic acid, m.p. 268—269° (converted by heat into phenyl-lutidone), a substance, m.p. 218°, which is not N-anilino-C-methyl-1: 2-naphthoglyoxaline (new m.p. 236°), and products of m.p. 320° and 230°. E. W. W.

Electrometry of cyanines. E. CALZAVARA (Bull. Soc. Franç. Phot., 1932, 19, 15—16).—The alkyloiodides of the cyanines can be electrometrically titrated with $AgNO_3$. Intermediate complexes of cyanine and $AgNO_3$ are formed, but are quickly decomposed by further $AgNO_3$. The method is tedious. J. L.

Alkaloids of Anabasis aphylla. V. N-Aminoanabasine and racemic anabasine. A. ORÉKHOV and S. NORKINA (Ber., 1932, 65, [B], 1126—1130; cf. this vol., 405).—l-Anabasine is slowly racemised when neutralised with H_2SO_4 and heated with H_2O at 200°, thereby becoming partly resinified and yielding dlanabasine [picrate, m.p. 212—213°; picrolonate, m.p. 237—239°; Bz derivative, m.p. 94—95°; NO-derivative, b.p. 186—192°/9 mm., and its picrate, m.p. 129—130°, and picrolonate, m.p. 173—174° (decomp.]]. dl-N-Aminoanabasine, b.p. 145—146°/7 mm., yields a picrate, m.p. 214—215°, picrolonate, m.p. 238—239°, and Bz derivative, m.p. 170—171°. Reduction of *l*-N-nitrosoanabasine with Zn dust and dil. AcOH and subsequent distillation of the product affords a mixture of dl-N-amino- and l-N-amino-anabasine, b.p. 146—147°/9 mm. [picrate, m.p. 186—187°; picrolonate, m.p. 189—190°; Bz derivative, m.p. 150—151°, $[\alpha]_{17}^{in}$ —31·1° in EtOH (also +0.5C₆H₆)]. *l*-N-Aminoanabasine does not suffer marked diminution in $[\alpha]_b$ when distilled in vac. After 9 distillations under atm. pressure [b.p. about 280° (partial decomp.)] $[\alpha]_0$ decreases from -103° to -37°. H. W.

Rotatory power of quinine in alcoholic solution. C. LAPP (Compt. rend., 1932, 195, 243—245).—The variation of $[\alpha]_D$ for quinine with the conen. depends on the loose union of quinine with solvent mols. From viscosity measurements, the approx. no. of EtOH mols. associated with 1 mol. of quinine is determined. J. L. D.

Dimethylmorphine (methylcodeine). E. CHER-BULIEZ and A. RILLIETT (Helv. Chim. Acta, 1932, 15, 857—862).—Anhyd. codeine (I) and CH₂PhCl at 50° give codeine benzylochloride, $+4H_2O$ (giving with 5% Na-Hg a 40% yield of codeine), which with Me₂SO₄ and cold NaOH, followed by aq. KI, yields O-methylcodeine benzyloiodide, m.p. 181°, unstable when dried (corresponding picrate, stable), affording with 5% Na-Hg (not Al-Hg) O-methylcodeine (II) in 40% over-all yield. (II) is unchanged by $H_2C_2O_4$ at 150°. With Pd-black at 165° in vac. (I) is entirely decomposed, but (II) is unaffected. R. S. C.

7-Aminodihydrothebainone. New method of oxygen ring closure of alkaloids of the thebainone type. H. KONDO and S. IKAWA (Ber., 1932, 65, [B], 1214—1217).—Dihydrocodeinone and amyl nitrite in CHCl₃ at -15° are converted by conc. HCl into 7oximinodihydrocodeinone, decomp. about 230—240° after softening at 200—210°, reduced (Pd-H₂) to 7aminodihydrothebainone, decomp. about 235—245° after softening at 206° [oxime, m.p. about 215—220° (decomp.) after softening at 199°]. 7-Amino-4benzyldihydrothebainone (I), m.p. 183—185° (decomp.) after softening at 180°, from the base, CH₂PhCl, and KOH in EtOH, is transformed by NaNO₂ and N-H₂SO₄ into 7-hydroxydihydrocodeinone, m.p. 195— 197° (decomp.) after softening at about 180° [oxime, m.p. 178—180° (decomp.) after softening at 172°], also obtained from (I), AgNO₂, and HCl-MeOH. H. W.

Strychnos alkaloids. LXVII. Relationship of the brucine- to the strychnine-sulphonic acids. Oxidation of quaternary brucinium salts. H. LEUCHS, G. SCHLEMPP, and W. BAUR (Ber., 1932, 65, [B], 1121—1125).—Direct oxidation of brucinesulphonic acid I with CrO_3 (=310) or conversion of strychninesulphonic acid I into the NO_2 - and NH_2 derivative and oxidation of the latter with CrO_3 (=240) affords diketonucinesulphonic acid I hydrate, $C_{17}H_{19}O_5N_2$ ·SO₃H, $[\alpha]_{20}^m$ —82·3°/d, and carboxyaponucinesulphonic acid I, $C_{16}H_{19}O_4N_2$ ·SO₃H, $[\alpha]_{20}^m$ —185°/ d. The C_{17} is converted into the C_{16} acid by H_2O_2 . It is thus shown that the SO₃H group cannot be attached to the benzenoid nucleus and the structural and steric relationship of the strychnine- and brucinesulphonic acid I is established.

The substance $C_{21}H_{21}O_7N_3Me\cdot SO_3H$, obtained from N-methylcacotheline and Na_2SO_4 , is converted by successive treatment with CrO_3 and $HClO_4$ into the N-methoperchlorates of the Wieland and Hanssen acid $C_{17}H_{22}O_6N_2Me\cdot ClO_4$ and $C_{16}H_{20}O_4N_2Me\cdot ClO_4$, respectively. They are also obtained by oxidation of brucine dimethosulphate, from carboxyaponucine through the methylbetaine, and from the Ag salt of the Wieland acid and MeI. H. W.

Strychnos alkaloids. LXVIII. Non-acidic products of the oxidation of brucine with permanganate and oxidation of brucinonic acid by chromic acid to the amino-acid, $C_{13}H_{16}O_5N_2$. Structural formulæ of brucine and strychnine. H. LEUCHS [with, in part, W. BAUR] (Ber., 1932, 65, [B], 1230—1239).—The following substances have been isolated in small amount as by-products of the oxidation of brucine with KMnO₄: $C_{22}H_{24}O_7N_2$, from which is derived the semicarbazone $C_{22}H_{25}O_6N_6$, m.p. 228° (decomp.); $C_{23}H_{26}O_7N_2$ (+4H₂O), m.p. 240°[Ac derivative, m.p. 290° (decomp.)]; $C_{21}H_{22}O_6N_2$; $C_{21}H_{24}O_6N_2$, m.p. 289—292° after softening, $[\alpha]]_5^{3*}$ +30.7°/d in AcOH; $C_{23}H_{24}O_7N_2$, m.p. 265—282° (decomp.), $[\alpha]_5^{*}$, -28°/d in AcOH. Oxidation of the non-cryst. resin remaining after isolation of the products described above with CrO₃ affords the NH_2 -acid (I), not molten below 305°, $[\alpha]_{16}^{18}$ -210·5°/d in 0·1N-



darkening at about 220°), reduced by SO₂ to the quinol, $C_{21}H_{20}O_8N_2$ (+2H₂O), which yields an *Et ether*, $C_{23}H_{24}O_8N_2$, m.p. about 285° (decomp.) after softening at 270°. Similarly, brueinolic acid affords the quinone, $C_{21}H_{20}O_8N_2$, m.p. 230—235° (decomp.) when rapidly heated [monosemicarbazone, m.p. 185—190° (decomp.)], and the quinol $C_{21}H_{22}O_8N_2$, m.p. 267° (decomp.) after softening (Ac₃ derivative, m.p. 259°). Likewise, dihydrobrucinonic acid gives the quinone, $C_{21}H_{20}O_8N_2$, and the quinol, $C_{21}H_{22}O_8N_2$. The acid



(I) as accompanied by a second NH_2 -acid, $C_{13}H_{16}O_5N_2$, $[\alpha]_{\rm D} -23^{\circ}$ (R=H or OMe). which is neutral in reaction, stable to KMnO₄, and resistant to hydrogenation. It is derived only from the resin, not from homogeneous brucinonic acid. 2:3-Diketonucidine in H_2O at 5—20° is converted by Br into bromodiketonucidine hydrate isolated as the perchlorate $C_{17}H_{21}O_4N_2Br$,HClO₄, $[\alpha]_{11}^{21} +98^{\circ}/d$. The constitution (II) is assigned to strychnine and brucine for reasons explained fully in the original. H. W.

Substituted dihalogenophenylarsines. F. F. BLICKE, L. D. POWERS, and G. L. WEBSTER (J. Amer. Chem. Soc., 1932, 54, 2945—2947).—The following arsines are prepared from the halogen acid and the arylarsine oxides : *m*-nitro-, m.p. 53—54° (lit. 46—47°); p-benzoyl-, m.p. 118—120°, and 4-pphenoxybenzoyl-, m.p. 83—85°, -phenyldichloroarsines; o-, m.p. 52—54°, and m-nitro-, m.p. 63—64°; o-iodo-, m.p. 71—72°; o-, m.p. 84—85°, and p-methoxy-, m.p. 40—41°; p-carboxy-, m.p. 161—162°; p-benzoyl-, m.p. 116—118°, and 4-p-phenoxybenzoyl-, m.p. 105— 106°, -phenyldibromoarsines; o-, m.p. 83—84°, and m-, m.p. 64—65°, -nitro-; o-iodo-, m.p. 97—98°; o-, m.p. 74—76°, and p-, m.p. 38—40°, -methoxy-; o-, m.p. 115—117°, and p-, m.p. 92—93°, -benzoyl-, and 4-p-phenoxybenzoyl-, m.p. 127—128°, -phenyldi-iodoarsines. C. J. W. (b)

Interaction of diarylarsinyl iodides, diarylstibinyl iodides, and dihalogenophenylarsines with the piperidine salt of *N*-pentamethylenedithiocarbamic acid. F. F. BLICKE and U. O. OAKDALE (J. Amer. Chem. Soc., 1932, 54, 2993—2996).—Equiv. quantities of $AsPh_2I$ and the piperidine salt (I) of N-pentamethylenedithiocarbamic acid in warm C_6H_6 give N-pentamethylene-S-diphenylarsinyldithiourethane, m.p. 114—115°; N-pentamethylene-S-di- α -naphthylarsinyl-, m.p. 214—215°; -diphenylenearsinyl-, m.p. 155—158°; -6-iodophenoxarsinyl, m.p. 105—106°; -diphenylstibinyl-, m.p. 124—127°, and -di-p-tolylstibinyl-, m.p. 123—124°, -dithiourethanes are similarly prepared. Unlike the triarylmethyl analogues, these substances do not undergo spontaneous decomp. in solution, to form (AsR₂)₂ and (SbR₂)₂. AsPhI₂ and (I) give phenylarsinylene N-pentamethylenedithiocarbamate, m.p. 173—174°. (I) is suggested as a reagent for the identification of small quantities of alkyl- and aryl-dihalogenoarsines. C. J. W. (b)

New phosphine oxides and phosphinic acids with pyrrole and indole nuclei. Q. MINCOIA (Gazzetta, 1932, 62, 333-342).—Magnesylmethylindole treated with POCl₃ in Et₂O, followed by addition of ice and extraction with Et₂O, gives a small residue of $tri-\alpha$ -methyl-N-indolylphosphine oxide, PR₃O, m.p. 140-142°, in the Et₂O extract tri-2methyl-3-indolylphosphine oxide, m.p. 170°, and in the mother-liquors di-2-methyl-3-indolylphosphinic acid, PR₂O₂H, m.p. 159-160° (NH₄ and Pb salts). Magnesylindole similarly gives tri-3-indolylphosphine oxide, m.p. 138-140°, and di-3-indolylphosphinic acid, m.p. 190° (Ag salt), whilst magnesylpyrrole yields di-2pyrrylphosphinic acid and a black insol. product.

E. W. W. Antimonial derivatives of pyrrole and indole. Q. MINGOIA (Gazzetta, 1932, 62, 343-350).—p-Aminophenylstibinic acid (A., 1928, 80; prep. improved) is diazotised and coupled with pyrrole etc. to give the following azo-p-phenylstibinic acids: 2pyrrole-, black and insol. in most solvents (NH_4 and Pb salts); 3-indole- (NH_4 and Ag salts); 2-methyl-3-indole- (Ag salt); 3-methyl-2-indole- (Pb salt).

E. W. W.

Lipins and substances analogous to lecithin. G. SOLAZZO (L'Ind. Chimica, 1932, 7, 704—714, 865—873).—A summary of the literature on : classification of lipins; synthesis of lecithin; composition, prep., physiological importance, and content in animal tissues and organs, of cephalin, sphingomyclin, cuorin, phrenosin, cerasin, and protagon. T. H. P.

Identification of norvaline in the fission products of proteins. E. ABDERHALDEN and K. HEYNS (Z. physiol. Chem., 1932, 209, 27–32).— NMe₃ with α -bromo-*n*-valeric acid gives N-trimethylnorvaline (I), m.p. 219° (chloroaurate, m.p. 173— 174°), and with α -bromoisovaleric acid, N-trimethylvaline (II), m.p. 125° (chloroaurate, m.p. 239°). Since (I) is formed more rapidly than (II) the reaction may be used for isolating and identifying norvaline in mixtures of NH₂-acids. J. H. B.

Clupein. IV. K. DIRR and K. FELIX (Z. physiol. Chem., 1932, 209, 5—11; cf. this vol., 529). —The partial hydrolysate of clupein Me ester hydrochloride gave a cryst. *dipicrate*, decomp. 185°, then 275°, probably of arginylarginine. The hydrochloride of the latter formed non-cryst. *Me* and *Et* esters. J. H. B. Physico-chemical behaviour of polypeptides of various structures. E. ABDERHALDEN and E. HAASE (Helv. Chim. Acta, 1932, 15, 717-721).— Partly a lecture. The following observations appear to be new. The particle size of *penta*-1- α -aminobutyryl-1- α -aminobutyric acid, which is entirely, and of the pentapeptide, which is partly, colloidal in H₂O, increases with time. The colloidal particles are negatively charged. Higher peptides retain H₂O of crystallisation tenaciously, which may vitiate analyses of proteins. The di-, tri-, and tetra-peptides from l- α -aminobutyric acid have $[\alpha]_{0}^{20-20}$ -7.03°, -46.04°, and -86.3°, respectively, and the nearly const. differences may be significant. R. S. C.

Determination of carbon and hydrogen in organic substances by a dry method. D. BUT-TESCU (Bul. Chim. Soc. Române Stiin., 1929, 31, 109—117).—The combustion is conducted in the ordinary way, except that oxidation is effected by passing the vapour, mixed with air or O_2 , over heated Pt-asbestos. Combustion is complete in <1 hr. D. R. D.

Detection of oxygen in liquid organic compounds. T. ESTREIOHER (Z. anal. Chem., 1932, 89, 126-128).—Wüstner's method (this vol., 762) is stated to be untrustworthy. O. J. W.

Analysis of complex gaseous mixtures. M. BUSI (Annali Chim. Appl., 1932, 22, 352-380).-Analysis of complex gaseous hydrocarbon mixtures, particularly unsaturated hydrocarbons, by ordinary methods and by condensation and fractional distillation, is discussed, and apparatus described. Velocity of absorption and solubility of gases in absorbents is studied. E. W. W.

Raman effect as basis of an organic spectrum analysis. I. L. BIRCKENBACH and J. GOUBEAU (Ber., 1932, 65, [B], 1140-1148).-The possibilities of the application of the Raman effect to org. analysis are examined in the cases of the following mixtures; $C_6H_6-CCl_4$; C_6H_6-MeOH ; C_6H_6 , CCl_4 , and MeOH; C_6H_6 -PhMc; o-, m-, and p- $C_6H_4Me_2$. The appar-atus is described. Constancy in the conditions of exposure and use of freshly-distilled specimens are essential. Exposures are made over a range of periods and the intensities of the lines are judged according to the length of exposure after which they first appear. For analytical purposes the strongest and sharpest lines are selected. The spectra of the individual components of the mixture are recorded and selection is made from the lines not common to both substances. The relationship of the intensity of the various lines to the concn. of the components is plotted and the graph is employed in the analysis of the mixtures. Under the most favourable conditions <1% of im-H. W. purity can be measured.

Apparatus for determination of methoxyl groups. W. G. CAMPBELL (Chem. and Ind., 1932, 590—591).—A simple all-glass apparatus is described and illustrated. E. W. W.

Detection of hydroxy-acids. C. H. LIBERALLI (Bol. assoc. brasil. pharm., 1931, 12, No. 10, 24).— A solution of FeCl₃ (10%, 32.4 c.c.) and KCNS (10%, 58.2 c.c.) in H_2O (to 100 c.c.) becomes yellow on addition of a neutral solution of a OH-acid. AcOH and $H_2C_2O_4$ give the same colour, but unlike OH-acids do not permit the return of the original colour on addition of 1 drop of HNO₃. CH. Abs.

Potentiometric determination of benzidine by diazotisation. J. A. ATANASIU and A. I. VELCU-LESCU (Ber., 1932, 65, [B], 1080—1082).—Benzidine is determined potentiometrically by titration in 10%HCl at 60° with 0.1M-KNO₂ using a Pt and Ni electrode. KNO₂ must be added slowly at first, but the change is more rapid towards the close of the reaction. The method is applicable to benzidine sulphate.

H. W.

Polarimetric analysis of ternary systems. A mixture of three sterols. E. KAHANE and J. RABATÉ (Bull. Soc. Chim. biol., 1932, 14, 808—821). —A ternary system containing ergosterol, cholesterol, and zymosterol may be analysed by the application of two equations based on polarimetric determination. H. D.

Determination of 2-phenylquinoline-4-carboxylic acid and salicylic or acetylsalicylic acid in the presence of one another. E. SCHULEK and B. KERÉNYI (Z. anal. Chem., 1932, 88, 401-414).-The mixture is dissolved in the min. of NaOH and any org. base removed by extraction with $CHCl_3$. The aq. layer is treated dropwise with twice its vol. of H_2SO_4 to convert the phenylcinchoninic acid (I) into its sulphuric acid compound, and the salicylic acid is then extracted with Et_2O . The acid layer is treated with an excess of NaOH to decompose the sulphate and, after acidifying with H_2SO_4 , (I) is extracted with Et_2O , the solution evaporated to dryness, the residue heated at 130° to expel any AcOH, and the acid titrated with NaOH. The ethereal salicylic acid solution is neutralised with NaOH, the Et_2O removed, and the acid determined by titration with KBrO₃. For accurate results the details given in the original must be closely followed. A. R. P.

Microchemistry of atophan (2-phenylquinoline-4-carboxylic acid). G. DENIGÈS (Bull. Soc. Pharm. Bordeaux, 1931, 3, 163—168; Chem. Zentr., 1932, i, 1375).—Crystals of atophan obtained by various means are described. Alkali hypochlorite, hypobromite, or I-KI solution gives an amorphous ppt. of halogen derivative. L. S. T.

Volumetric determination of strophanthin. I. E. Novák (Pharm. Ztg., 1932, 77, 774—775).—g- and k-Strophanthin can be determined by oxidation with an excess of 0.1N-KMnO₄ in hot dil. H₂SO₄, followed by back-titration. Both substances use the same quantity of KMnO₄. R. S. C.

Detection and determination of arsenic in organic substances after perchloric acid treatment. E. KAHANE (Compt. rend., 1932, 195, 48— 50).—As is freed from org. matter by treatment with 2 vols. of $HClO_4$: 1 vol. of HNO_3 in place of $HClO_4$ alone (cf. this vol., 71), and is finally obtained as a solution of H_3AsO_4 in H_2SO_4 in which the As may be determined by standard methods. It is claimed that the method is applicable to small quantities of As in org. matter (toxicology) and to organo-As compounds. H. A. P.

Simultaneous determination of mercury and halogens [or arsenic or sulphur] in organic substances. G. ILLARI (Annali Chim. Appl., 1932, 22, 261-272; cf. A., 1930, 101).—The substance is mixed with HNO₃ (d 1·4) and oxidised electrolytically. With Br compounds, the solution is then diluted and electrolysed, the Hg weighed, and the Br (in the main vessel and in a trap) reduced by As₂O₃ and determined as Br'. With Cl, the solution is treated with Na₄P₂O₇ and NH₃ before the second electrolysis (cf. A., 1893, ii, 93). With I, either of these methods may be used. In compounds containing Hg and As, after oxidation and dilution the Hg is removed at 0·05 amp./1·7—1·8 volts, and the As determined as H₃AsO₄. When Hg and S (but not Cl) are present they may similarly be determined, the latter as H₂SO₄. E. W. W.

Determination of copper, cobalt, and nickel in organic substances. A. OKAČ.—See this vol., 922, 924.

Biochemistry.

Graphical registration of the oxygen consumption and the carbon dioxide production by men and animals. G. MANSFELD (Arch. exp. Path. Pharm., 1932, 167, 111).—Suitable apparatus has been devised. W. O. K.

Oxygen affinity of chlorocruorin. H. M. Fox (Nature, 1932, 130, 92).— O_2 pressure curves for chlorocruorin, the respiratory pigment of *Spirographis spallanzanii*, show that [H^{*}] and temp. affect the O_2 affinity in a manner similar to that of mammalian hæmoglobin. The O_2 affinity between 10° and 26° is of the same order of magnitude as that of hæmoglobin in the human body. L. S. T.

Hæmoglobin content of the blood of dairy cattle. H. J. BROOKS and J. S. HUGHES (J. Nutrition, 1932, 5, 35-38).—In 335 determinations the 3 s average val. was 10.96 ± 0.064 g. of hæmoglobin per 100 c.c. of blood. No significant variations were observed in cattle of various ages and breeds, or in day-to-day observations or as a result of prolonged fasting. A. G. P.

Effect of oral administration of amino-acids and intraperitoneal injection of various elements and hydrochloric acid on regeneration of hæmoglobin. H. L. KEIL and V. E. NELSON (J. Biol. Chem., 1932, 97, 115—126).—The following treatments failed to stimulate hæmoglobin regeneration in rats suffering from anæmia on a milk diet: oral administration of 10 mg. of pure Fe daily as FeCl₃; feeding 100 mg. daily of tyrosine, tryptophan, glutamic acid, aspartic acid, or arginine; and intraperitoneal injection of salts of Ni, Zn, Ge, Mn, V, As, Ti, Se, Hg, Rb, and Cr. Injection of 0.005 mg. of Cu daily is sp. in causing hæmoglobin regeneration. A temporary improvement is caused by injection of HCl in rats maintained on milk and FeCl₃. Hæmoglobin formation is also stimulated by intraperitoneal injection of FeCl₃ or ferric citrate and of Fe(OH)₃ with Cu added. A. C.

Renal thresholds for hæmoglobin in dogs. Depression of threshold due to frequent hæmoglobin injections and recovery during rest periods. J. A. LICHTY, jun., W. H. HAVILL, and G. H. WHIPPLE (J. Exp. Med., 1932, 55, 603-615).--The renal threshold for hæmoglobin (the smallest intravenous dose which causes its appearance in the urine) for dogs is 155 mg. per kg. (max. 210, min. 124); repeated daily injections depress the initial level by 46%, and rest periods produce a recovery threshold level. CH. ABS.

 α -Lipase and amylase in the blood of Crustaceæ. Z. GRUZEWSKA (Compt. rend., 1932, 195, 278-280).—The serum-lipase of the crayfish is the most active of the group, whilst the enzyme is absent from the serum of the lobster and turtle. The sera of all the Crustaceæ contain amylase. P. G. M.

Enzymes of leucocytes. VIII. Maltases. R. WILLSTÄTTER and M. ROHDEWALD (Z. physiol. Chem. 1932, 209, 33—37; cf. this vol., 292).—After glycerol treatment, leucocyte residues contain maltase but the extract is inactive, whereas after phosphate elution of the residues the activity is increased although the eluate contains maltase. Grinding the cells with quartz sand renders a part of the maltase sol. Cell residues after glycerol and phosphate treatment lose some of their activity on papain treatment, the solution becoming active. Glycerol inhibits the enzyme, both in sol. and in insol. form ; hence the apparent inactivity of the glycerol extract.

J. H. B.

F. p. of serum and corpuscles. D. A. COLLINS and F. H. SCOTT (J. Biol. Chem., 1932, 97, 189— 213).—In the determination of the f.p. of serum and corpuscles the main sources of error are evaporation during centrifuging and undercooling; loss of CO_2 and the temp. during centrifuging are less important. Elimination of these errors gives results indicating equality of the f.p. and therefore of the osmotic pressures of serum and corpuscles of dog- and oxblood. F. O. H.

Effect of electrolytes on serum-proteins. M. PIETTRE and A. GUILBERT (Compt. rend., 1932, 195, 282-284).—The κ of NaCl solutions is unaffected by the presence of mixed serum-proteins, within the limits 0.1-0.001M. P. G. M.

Dilution of horse-serum in electrolytic solutions. C. ACHARD, A. BOUTARIC, and M. DOLADILHE (Compt. rend., 1932, 195, 196–198).—With the same cation the product of the diluted vol. (l) of 1 c.c. of serum and the opacity (h) of the solution varies inversely as the valency of the anion. In dil. solution the reverse holds good for multivalent cations (H₂O, 5; AlCl₃, 18; ThCl₄, 33). P. G. M.

Phosphorus distribution in chicken blood as affected by the diet. V. G. HELLER, K. R. HUNTER,

and R. B. THOMPSON (J. Biol. Chem., 1932, 97, 127– 132).—Vals. of 108.5 and 114.6 mg. per 100 c.c. have been found for the total blood-P of chickens on diets containing 0.483 and 1.16% P, respectively. These are 3-4 times as great as those of mammals. In contrast to Ca, the P content of the cells is greater than that of the plasma. Inorg. plasma-P represents a very small fraction of the total P. A. C.

Normal relationships of blood- and urinephosphorus. B. S. WALKER (J. Lab. Clin. Med., 1932, 17, 347—353).—The urinary inorg. P in young adults after fasting is normally 0.0256—2.10 mg. per c.c., and the org. P 0—0.195 mg. The correlation coeff. between the blood-inorg. P and the rate of elimination of inorg. PO₄ is 0.416 ± 0.071 . No correlation was observed between the blood-org. P and the rate of excretion of inorg. or org. P. CH. ABS.

Hexosephosphoric acids and blood glycolysis. A. ROCHE and J. ROCHE (Compt. rend., 1932, 195, 340-342).—Erythrocytes, centrifuged with iced H_20 , when added to Na glucose- and fructose-phosphates, lower the reducing power of the hexosephosphates with the production of H_3PO_4 . It is probable that the formation of hexosephosphoric acids is a step in the process of glycolysis in erythrocytes. H. D.

Distribution of sugar between blood-cells and plasma. II. M. JACOBY and H. FRIEDEL (Biochem. Z., 1932, 249, 308—311; cf. this vol., 413).— Blood from rabbits suffering from experimental hyperglycæmia does not differ in the respect concerned from normal blood or from blood to which sugar has been added *in vitro*. W. McC.

Reducing power of glomerular urine and blood-plasma from the frog. A. M. WALKER and E. H. ELLINWOOD (Amer. J. Med. Sci., 1932, 183, 298).—The mean difference in reducing substance content is 2·1 mg. per 100 c.c.; the cerebrospinal fluid contains 13 mg. per 100 c.c. less than the plasma. The glomeruli play no part in phloridzin glycosuria. CH. ABS.

Fructose content of blood. M. H. POWER (Proc. Staff Meetings Mayo Clinic, 1931, 6, 690).— Blood contains only traces of ketose-like substances, probably not fructose. CH. ABS.

Filtration of protein tungstate precipitates from unlaked blood. H. S. H. WARDLAW (Austral. J. Exp. Biol., 1932, 10, 61–63).—Protein is pptd. from unlaked blood by treatment with 8 vols. of 0.6% aq. Na₂WO₄ in 1.5% aq. Na₂SO₄ and 1 vol. of 1.5% aq. Na₂SO₄ in N/3-H₂SO₄. Clear filtrates are obtained. A. C.

Diurnal variations of the cholesterol content of the blood. M. BRUGER and I. SOMACH (J. Biol. Chem., 1932, 97, 23-30).—The mean standard deviation in the cholesterol content of whole blood in 9 patients in the absorptive state was $\pm 8.0\%$ for 24 hr. and $\pm 3.5\%$ during the morning. In a fasting group, 5 normal subjects showed variations in plasmacholesterol similar to those of 4 patients, the mean standard deviation during 4 hr. in the morning being $\pm 3.9\%$. Ingestion of food has little effect on bloodcholesterol. A. C. Determination of ammonia in blood and other biological fluids. O. FOLIN (J. Biol. Chem., 1932, 97, 141–154).—The blood sample, after treatment with $K_2CO_3-K_2C_2O_4$ solution, is aërated by an impinging air stream, and NH₃ is collected in a specially designed absorption tube, and determined by nesslerisation. This method removes the defects of that of Folin and Denis (A., 1912, ii, 703). Vals. of blood-NH₃ below 0.05 mg. of NH₃-N per 100 c.c. have not been observed with this method. A. C.

Physics of blood coagulation. H. LAMPERT (Kolloid-Z., 1932, 60, 3—13).—Blood coagulation depends on the material of the containing vessel, particularly on the degree of adherence of the blood clots to the solid wall. The influence of this surface is less in the case of blood rich in fibrin, such as that of the horse. The separation of serum is due to adhesion at the wall of the vessel and to the retraction of the fibrin coagulum; the amount of serum separating varies with these factors. Amber and certain artificial resins retard the coagulation of blood, in consequence of the wall effect, and are therefore preferable to glass in instruments and apparatus for experiments on blood. E. S. H.

Substances involved in the coagulation of the blood of the newborn. H. N. SANFORD, T. H. GASTEYER, and L. WYAT (Amer. J. Dis. Children, 1932, 43, 58-61).—The blood-prothrombin, -fibrinogen, and -antithrombin are higher than for adults. CH. Abs.

Influence of the base-binding power of hæmoglobin on osmotic hæmolysis. M. H. JACOBS and A. K. PARPART (Amer. J. Med. Sci., 1931, 181, 450– 451).—Fragility tests made without control of temp. and $p_{\rm H}$ are of doubtful val. CH. ABS.

Is osmotic hæmolysis an all-or-none phenomenon? A. K. PARPART (Amer. J. Med. Sci., 1931, 182, 153).—Osmotic hæmolysis produced by hypotonic NaCl solutions is accompanied by complete liberation of hæmoglobin from the cell, both during hæmolysis and at equilibrium. When induced by a penetrating substance of small mol. vol. (e.g., ethylene glycol) it is an "all-or-none" phenomenon; with substances of large mol. vol. (e.g., glycerol) this is so at equilibrium. CH. ABS.

Serological specificity of peptides. K. LAND-STEINER and J. VAN DER SCHEER (J. Exp. Med., 1932, 55, 781—796).—Glycylglycine [p-nitro-, m.p. 217— 218°, and p-amino-benzoyl, darkens at 220° (decomp.), derivatives], glycyl-dl-leucine (p-nitro-, m.p. 179— 180°, and p-amino-benzoyl, m.p. 83—86°, derivatives), dl-leucineglycine (p-nitro-, m.p. 205—206°, and pamino-benzoyl, m.p. 123—125°, derivatives), and dlleucyl-dl-leucine (p-nitro-, m.p. 209—210°, and pamino-benzoyl, m.p. 122—125°, derivatives) differ serologically, their specificity depending chiefly on the structure of the terminal NH₂ group carrying the free CO₂H group. p-Aminobenzoylglycine, m.p. 198— 199°; p-nitrobenzoyl-dl-leucine, m.p. 229—230°; p-aminobenzoyl-dl-leucine, m.p. 182—183°; chloroacetylglycine, m.p. 92—93°; dl-leucyl-dl-a-aminobulyric acid, m.p. 245—246° (p-nitrobenzoyl derivative, m.p. 220—221°); and dl-a-aminobutyryl-dlleucine, m.p. 241—242° (p-nitrobenzoyl derivative, m.p. 182—184°), are described. CH. ABS. Chemo-immunological studies on conjugated carbohydrate proteins. VI. Synthesis of paminophenol α -glucoside and its coupling with protein. W. F. GOEBEL, F. H. BABERS, and O. T. AVERY. VII. Immunological specificity of antigens prepared by combining α - and β -glucosides of glucose with proteins. O. T. AVERY, W. F. GOEBEL, and F. H. BABERS (J. Exp. Med., 1932, 55, 761-767, 769-780).-VI. 3:4:6-Triacetyl- β -glucosyl chloride and Ag p-nitrophenoxide in dry CHCl₃ give 3:4:6-triacetyl-p-nitrophenol α -glucoside, m.p. 148-149°, which with NH₃ in MeOH at 0° affords p-nitrophenol α -glucoside, m.p. 216-217°, and the corresponding β -glucoside, m.p. 164-165°. The α -glucoside is unstable in the presence of OH'. p-Aminophenol α -glucoside has m.p. 185-186°.

VII. Further evidence is adduced in support of the view that the immunological specificity of carbohydrates is determined by their chemical constitution. It is possible to differentiate selectively between the two isomeric glucosides of the same sugar.

CH. ABS.

Iron content of blood-free tissues and viscera. Variations due to diet, anæmia, and hæmoglobin injections. R. P. BOGNIARD and G. H. WHIPPLE (J. Exp. Med., 1932, 55, 653—665).—When the renal threshold is not exceeded by the bloodhæmoglobin little excess Fe is deposited in the kidneys, but with superthreshold doses of blood the Fe content of the epithelium of the convoluted tubules is increased 5-fold. The normal dog has a large reserve store of Fe in the liver, spleen, and marrow. The tissue-Fe (1—2 mg. per 100 g.) is lowest in the pancreas, stomach, jejunum, colon, and urinary bladder. Striated muscle (heart, psoas) contains about 4 mg.; lungs (6—7 mg.) show low vals. (3.7 mg.) in anæmia, corresponding vals. for spleen being 25—50 and 7—15 mg., and for liver 25 mg. and 4—5 mg. CH. ABS.

Composition of rabbit carcases. I. White Angoras. W. K. WILSON and S. MORRIS (J. Agric. Sci., 1932, 22, 453-459).—The H_2O , protein, fat, ash, and carbohydrate contents of male and female rabbits are recorded. Females have a notably larger proportion of fat. A. G. P.

Egg-yolk proteins. T. H. JUKES and H. D. KAY (J. Nutrition, 1932, 8, 81–101).—A review with extensive bibliography. A. G. P.

Isolated cell and tissue constituents. I. Isolation of cell nuclei from calf's heart-muscle. M. BEHRENS (Z. physiol. Chem., 1932, 209, 59—74).— The tissue is frozen in liquid air, dried in vac. below 0°, ground, and the constituents are separated by centrifuging after suspension in liquids of suitable sp. gr. In this manner cell nuclei of calf's heartmuscle are obtained free from protoplasm. From the P content ($2\cdot5\%$) of the purified nuclei, they contain about 30% of thymus-nucleic acid. J. H. B.

Highly unsaturated fatty acids of ox-brains. J. B. BROWN (J. Biol. Chem., 1932, 97, 183—187; cf. A., 1929, 1329; 1930, 249).—Ox-brains were hydrolysed by aq. NaOH, the hydrolysates extracted by BuOH, and the extracted fatty acids brominated. The Et₂O-insol. fraction of the brominated acids was reduced, esterified (Me), and fractionated. The greater part of the distillate, b.p. $200-210^{\circ}$, consisted principally of acids belonging to the C₂₂ series, docosapentenoic acid predominating. Arachidonic acid could not be detected. F. O. H.

Phosphatides of human brain. I. Separation of α - and β -series of lecithins. Y. Yoko-YAMA and B. SUZUKI (Proc. Imp. Acad. Tokyo, 1932, 8, 183—185).—The α - and β -series of lecithins from human brain (and herring roe) are separable by the method previously used (A., 1931, 401) for soya-bean lecithins. H. B.

Phosphatides. V. Fatty acids of phosphat-ides and of neutral fat of ox-liver. E. KLENE and O. VON SCHOENEBECK (Z. physiol. Chem., 1932, 209, 112-133; cf. this vol., 636).—The fatty acids of liver-phosphatides are in general similar to those of brain-phosphatides but differ in that the amount of C_{22} acids is less than that of the C_{20} acids (with the brain acids the reverse holds), and the C_{18} acids contain, in addition to oleic acid, more highly unsaturated acids, principally linoleic acid. The neutral liver-fat also contains unsaturated acids of the C20 and C22 groups, but in smaller amount than the phosphatides, and the stearic exceeds the palmitic acid. In these respects liver-fat is more closely allied to depôt-fat. Since the unsaturated acids of liver-lipins consist principally of the C_{20} and C_{22} acids they cannot arise by dehydrogenation of depôt-fat, which contains chiefly C₁₆ and C₁₈ groups. J. H. B.

Bromine content of testicles, epididymis, and Plexus pampiniformis. I. L. KRIVSKY (Biochem. Z., 1932, 249, 288—295).—Administration of NaBr to castrated dogs restores conditioned reflex activity lost on castration but, since testicles, epididymis, and Plexus pampiniformis (I) (horse, ox) do not contain appreciably more than the average amount, for the body, of Br, no relationship between sex hormones and Br has been demonstrated. The Br content of (I) is somewhat greater than that of the other two organs, possibly because of richer blood supply.

W. McC.

Isolation, identification, and determination of ethyl alcohol normally present in human and animal tissues. A. O. GETTLER, J. B. NIEDERL, and A. A. BENEDETTI-PICHLER (Mikrochem., 1932, 11, 167—199).—A detailed account of work already noted (this vol., 637).

Rate of penetration of fixatives. B. M. L. UNDERHILL (J. Roy. Micros. Soc., 1932, 52, 113— 120).—The following fixatives are arranged in decreasing order of rate of penetration into guinea-pig's liver at the concns. indicated; AcOH 5, HgCl₂ 5, EtOH (abs.), OsO₄ 0.5, pieric acid 0.7, CrO₃ 0.5, CH₂O 4, and K₂Cr₂O₇ 1.5%. A. C.

Increase of dry matter and water content in the silk gland and some properties of the aqueous solution of liquid silk. H. KANEKO and F. KURASAWA (Bull. Sericult., Japan, 1932, 4, 12–16). —The growth curves of dry matter and H₂O content, respectively, are represented by the equations log [x-w/0.31-(x-w)]=1.03(t-5.3) and log [x-w/0.9]=(x-w)=1.01(t-4.6), where t is in days and x in g.

The H₂O content of the silk gland of the fully grown larva is about 76%. The sp. conductivity of an aq. solution of liquid silk decreases, and the $p_{\rm II}$ and relative viscosity increase, with increasing age, while there is an increase of aggregation of the protein mols. and slight gelatinisation. B. P. R.

Blood-sugar and digestive secretion. L. BUG-NARD and C. SOULA (Compt. rend., 1932, 194, 2330-2332).—The psychic gastric secretion produced by sham feeding in dogs is accompanied by a hyperglycæmia, but normal feeding does not cause a similar change in blood-sugar. In the latter case the loss of acid from the system is presumably quickly counterbalanced by the secretion of alkali through pancreas, liver, and intestinal mucous membrane. W. O. K.

Effect of administration of fat on the sebum of the skin. B. LUSTIG and A. PERUTZ (Biochem. Z., 1932, 249, 370—372).—Subcutaneous administration of olive oil to rabbits results first in an increase in the cholesterol content of the sebum of the skin and then in an increase in its content of unsaturated substances. W. McC.

Lactation. I. Production of milk in the dog as influenced by different kinds of food proteins. R. G. DAGGS (J. Nutrition, 1931, 4, 443-467).-Liver was a better source of protein than eggs or steak and produced greater milk yields of higher fat content. A G P

A. G. P. Human milk. VIII. Comparison of composition of milk from the two breasts. M. BROWN, I. C. MACY, B. NIMS, and H. A. HUNSCHER (Amer. J. Dis. Children, 1932, 43, 40-51).—The composition is uniform, but the total vols. may vary considerably. CH. ABS.

Determination of the hydrogen-ion concentration of urine. F. MAINZER and W. EDEN (Biochem. Z., 1932, 249, 296—307).—Three methods (H electrode, quinhydrone electrode, and colorimetric) have been compared and a table showing the best as well as other methods applicable, within various $p_{\rm H}$ ranges, to each case is given, the influence of protein content and colour being considered. W. McC.

Determination of free organic acids in urine. M. LAFARGUE (Bull. Soc. Pharm. Bordeaux, 1931, 3, 202-207; Chem. Zentr., 1932, i, 1275).—Determination of the $p_{\rm H}$ and P_2O_5 content gives (by formula and tables) the H_2PO_4' ; the remainder of the titratable acidity (phenolphthalein) is due to free org. acids. A. A. E.

Urinary albumin and pseudo-albumin. V. ZOTIER (Bull. Sci. pharmacol., 1931, 38, 337–346; Chem. Zentr., 1932, i, 1275).—Only the reaction with HNO₃ in the cold is sp. for albumin; AcOH, $CCl_3 \cdot CO_2H$, HCl, and boiling always co-ppt. pseudoalbumin. Pseudo-albumin is a normal constituent of urine (0.05 g. per litre). A. A. E.

Renal threshold of bilirubin. I. M. RABINO-WITCH (J. Biol. Chem., 1932, 97, 163—175).—Bilirubin may be found in urine when the blood conen. of this substance is as low as 0.12 mg. per 100 c.c. If there is a renal threshold val. for bilirubin, it is therefore much lower than that generally accepted. It is suggested that a more sensitive analytical method may show that bilirubin is a normal constituent of urine. A. C.

Regular occurrence of pyridine derivatives in normal urine. II. W. LINNEWEH and H. REINWEIN (Z. physiol. Chem., 1932, 209, 110—111; cf. this vol., 767).—Trigonelline is present in human urine during abstinence from coffee, tea, cocoa, and nicotine and is therefore probably a normal constituent. J. H. B.

Vitamin-B in anæmia. S. DAVIDSON (Lancet, 1931, 221, 1395—1398).—Clinical evidence suggests that the anti-anæmic factor contained in liver or liver extracts is not vitamin-B. L. S. T.

Value of the oyster in nutritional anæmia. H. LEVINE, R. E. REMINGTON and F. B. CULP [with C. B. ANDERSON] (J. Nutrition, 1931, 4, 469—481).—The anti-anæmic potency of the oyster shell is ascribed to its Fe, Cu, and Mn contents. Similar rates of blood regeneration in rats were produced by the ingestion of solutions of Fe, Cu, and Mn salts in proportions corresponding with those in shell.

A. G. P.

Effects of radiant energy on milk anæmia in rats. P. C. FOSTER (J. Nutrition, 1931, 4, 517— 524).—The haemoglobin content and the no., size, and saturation of the red cells of the blood of rats rendered anæmic by a milk diet were increased by exposure to a quartz-Hg arc. A. G. P.

Antianæmic substance in the blood activated by ultra-violet irradiation. R. SEYDERHELM (Arch. exp. Path. Pharm., 1932, 167, 106—107).— The anæmia produced by the intravenous administration of saponin to a dog is inhibited when the blood of the animal is subjected to ultra-violet irradiation. Irradiated blood from a normal dog injected into an animal suffering from saponin anæmia brings about an increase in the no. of red blood-corpuscles in the anæmic dog. The serum of the irradiated blood is inactive and the active substance exists in the stroma of the corpuscle. Normal irradiated blood contains some active material, but the greater bulk of the substance exists in an inactive form which is activated by ultra-violet light and for which the name "cytagenin" is proposed. W. O. K.

Bush sickness. I. H. O. ASKEW and T. RIGG. II. L. J. GRANGE, N. H. TAYLOR, T. RIGG, and L. HODGSON. III. Soil-iron in relation to the incidence of bush sickness. T. RIGG and H. O. ASKEW (New Zealand Dept. Sci. Ind. Res. Bull., 1932, No. 32, 62 pp.).—I. Pasture soils in affected areas are not notably deficient in the principal nutrients, but have sufficiently coarse textures to facilitate leaching and low Fe and Ti contents. The mineral content (including Fe) of the herbage is not unduly low.

II. Soil profiles in affected areas are described. Sickness is more acute on soils having high SiO_2 contents and low proportions of Ca, Ti, and more especially of total and available Fe.

III. A considerable proportion of the Fe required by animals is obtained from soil contaminating the herbage. Extraction of soil with 5% H₂C₂O₄ gives a measure of the available Fe, and vals. so obtained

are closely correlated with the incidence of sickness. Addition of Fe oxides or carbonate to salt licks reduces sickness. A. G. P.

Glutathione content and autolysis of malignant growths. H. HEINLEIN (Z. Krebsforsch., 1932, 35, 161—163; Chem. Zentr., 1932, i, 1265).—The glutathione content of tumours (Ehrlich mouse carcinoma, Rous sarcoma, and human carcinoma) is lower than that of normal organs. Hence the degree of activity of the cathepsin in malignant tumours cannot be higher than in other organs. There appears to be no simple relationship between the growth of tumours and proteolysis. A. A. E.

Composition of lipins of normal and pathological organs. I. Lipins of lymph glands of cattle. II. Lipins of normal and of carcino-matous or sarcomatous liver. III. Lipins of normal and of sarcomatous horse-spleen. B. LUSTIG and E. MANDLER (Biochem. Z., 1932, 249, 344-351, 352-365, 366-369).-I. The lipins from the mesenteric and axillary lymph glands of cattle occur partly free (directly extractable) and partly combined (extractable after peptic digestion). In the free portion the P is completely pptd. as phosphatide (chiefly monoaminophosphatide) by COMe2. Digitonin ppts. one third of the unsaponifiable matter as cholesterol. The solid fatty acids consist chiefly of palmitic and stearic acids and the liquid acids have mol. wt. corresponding with >16-18 C. The combined portion contains much more unsaponifiable matter than does the free. A smaller proportion of it is pptd. by digitonin and it contains only traces of phosphatide precipitable by $COMe_2$. The fatty acids of the combined portion have moderately high mol. wt. Solid fatty acids (largely unsaturated) preponderate in the material from the axillary glands, and liquid in that from the mesenteric.

II. In the lipins from normal human liver the P is completely precipitable by $COMe_2$ and most of the unsaponifiable portion consists of cholesterol, which is accompanied by highly unsaturated hydrocarbons, including (in one case) squalene. The solid fatty acids consist chiefly of palmitic and stearic acids and the liquid acids include oleic. The combined lipins differ in several respects from the free. Lipins from hepatic carcinoma differ in various ways (particularly in their low P content) from normal hepatic lipins and so also do lipins from melanotic sarcoma.

III. The lipins of the normal horse spleen have low sap. vals. and high contents of unsaponifiable matter and of material pptd. by COMe₂. The fatty acids, especially the liquid fatty acids, are highly unsaturated and have high mol. wt. Low P and high N contents characterise the phosphatides pptd. by COMe₂. In the lipins from melanotic sarcoma the amount of free fatty acids is higher than in the case of the normal organ, whilst only part of the P can be pptd. with COMe₂. In comparison with the phosphatides of the lipins from the normal organ those of the melanotic sarcoma have high P contents. W. McC.

Cholesterol content of the blood of female rats suffering from tumours and of pregnant rats. C. KAUFMANN and R. ERDMANN (Biochem. Z., 1932, 249, 438—442).—In female rats pregnancy or the presence of tumours does not affect the cholesterol (free or esterified) content of the blood. W. MoC.

Sex hormones in cancerous tissue. S. LOEWE, W. RAUDENBUSOH, and H. E. VOSS (Biochem. Z., 1932, 249, 443—445).—Cancerous tissue from men (tissue from genital organs excluded) contains, per kg. of fresh material, at least 125 mouse units of thelykinin and 1—2 mouse units of androkinin.

W. McC.

Purified (protein-free) virus of chicken tumour. I. M. R. LEWIS and W. MENDELSOHN (Amer. J. Hyg., 1931, 13, 639-642).—The (Berkefeld) proteinfree filtrate of tumour extract retains tumour-producing activity. The association of the active principle with the globulin is physical. CH. ABS.

Influence of magnesium on cancer mortality. A. SARTORY, R. SARTORY, J. MEYER, and E. KELLER (Compt. rend., 1932, 195, 400–403).—Analyses show that there is no correlation between cancer mortality, and the Mg in the essential foods and H_2O of different villages in Alsace-Lorraine. H. D.

Total nitrogen and non-protein-nitrogen partition of gastric juice obtained after histamine stimulation. L. MARTIN (Bull. Johns Hopkins Hosp., 1931, 49, 286—301).—During normal gastric secretion the non-protein-N excreted is within fairly definite limits; higher conces. are found in benign achylia, gastric cancer, and nephritis. CH. ABS.

Specific gravity of cholesterol from human gall-stones. R. ZEYNEK (Z. physiol. Chem., 1932, 209, 97–102).—Cholesterol from human gall-stones has d_{19}^{19} 1.052—1.053, d_{100}^{100} (*i.e.*, melted) 0.907, d_{20}^{150} 0.915. The heat expansion of solid .cholesterol is little greater than that of H₂O. J. H. B.

Hypochloræmia and intravenous supply of chlorides. A. PIERINI (Semana Méd., 1932, i, 378– 386). CH. ABS.

Significance of cholesterol in cellular oxidation and its bearing on mental disorder. B. H. SHAW and J. S. SHARPE (J. Mental Sci., 1931, 77, 53).— Lecithin is almost completely protected from oxidation by combination with small quantities of cholesterol. Blood-cholesterol in dementia præcox and mania was determined. CH. Abs.

Non-glucose reduction present in normal and increased in nephritic blood. R. J. PICKARD, L. F. PIERCE, C. S. MARSDEN, jun., R. K. TANAKA, and H. A. TOWNSEND (J. Lab. Clin. Med., 1932, 17, 471— 480).—The (average) non-glucose reducing substance present in the blood, as determined by the difference in vals. obtained by Benedict's modification of Lewis and Benedict's method and by Folin and Wu's method, is normally 40.4 mg., and in nephritis 108.7 mg., per 100 c.c. CH. ABS.

Variations in the antigen content of serum in disease. A. Q. WELLS (Lancet, 1931, 221, 1348— 1349).—When titrated against the appropriate antisera, sera from different normal animals and from man show const. antigen contents. Serum from nephritic patients differs from normal human sera in antigen content. Antisera against any one serum do not always contain the same antibody; two antihuman sera probably contained anti-albumin bodies in the one case and anti-globulin in the other. After severe hæmorrhage the antigen content of a horse agreed with the total protein content. L. S. T.

Biuret reaction in urinary pus-detection. JUSTIN-MUELLER (Chem.-Ztg., 1932, 56, 604). H. D.

V. Globulin and albumin fractions of serum. Distribution of the substances responsible for the Wassermann-Meinicke and Müller-Ballung reactions amongst the fractions of syphilitic serum. VI. Distribution of agglutinins of paratyphus-B in paratyphus antiserum and in normal human serum. E. FREUND and B. LUSTIG (Biochem Z., 1932, 249, 373-377, 378-380).-V. In syphilis, sera which react either positively or negatively to the Wassermann test (I) contain increased amounts of globulin belonging to the fraction sol. in NaCl solution. It is this fraction, and to a smaller extent that sol. in Na₂CO₃ solution, with which the substances responsible for (I) are associated. The albumins and H_2O -sol. globulins react negatively to The (I). The globulins sol. in H₂O and those sol. in NaCl solution (as well as the H₂O-sol. euglobulins in high concn.) react positively to the Meinicke tests. Almost all the globulins give the Müller and Ballung reaction.

VI. Paratyphus-B anti-sera (horse) contain more H_2O -sol. pseudoglobulin and much less H_2O -insol. globulin than do normal sera and it is almost entirely with the H_2O -sol. pseudo- and eu-globulin that agglutinating power is associated. In normal human sera the agglutinins are associated with other fractions. W. McC.

Effect of administration of iodine on the total iodine, inorganic iodine, and thyroxine content of the pathological thyroid gland. A. B. GUTMAN, E. M. BENEDIOT, B. BAXTER, and W. W. PALMER (J. Biol. Chem., 1932, 97, 303-324).-Normal and pathological human thyroid glands were desiccated and defatted. The total I was then directly determined by a modified method of Kendall (A., 1930, 1060), inorg. I by analysis of the aq. extract (ibid., 504), and, after hydrolysis, thyroxine by the method of Leland and Foster (this vol., 432). The vals. for exophthalmic goitre indicate that on treatment with I there occurs an increase in both inorg.- and thyroglobulin-I, a change in the chemical nature of the thyroglobulin, and increases in the relative and abs. thyroxine and di-iodotyrosine contents of the gland. Thus treatment with I converts the exophthalmic gland into a normal gland except for the increased relative inorg. I content and for the increased abs. content of I compounds due to its enlarged size.

F. O. H.

Pharmacology of urea ; problem of uræmia. M. BAUR (Arch. exp. Path. Pharm., 1932, 167, 104-106).—Various dyes in different degrees have their permeability through the animal organism increased by the presence of urea in the tissue. The toxicity of strychnine to frogs is increased by the presence of urea, presumably as the result of increased permeability of the tissues to the poison. The rate of diffusion of certain dyes in gelatin gel is altered by 1% urca, the acid dyes tending to move more rapidly and the basic dyes more slowly. The high urea concn. in the tissues in uræmia may result in the development of toxic symptoms in consequence of the increased permeability of the tissues. W. O. K.

Bismuth diuresis and the blood and urinary changes under clinical conditions. A. B. STOCK-TON (Arch. Int. Med., 1932, 50, 142—149).—Intramuscular injection of Bi Na tartrate caused an increase in diuresis in 11 of the 15 cases observed, and the increase in the amount of urine correlated with the losses of œdema fluid in œdematous patients. The blood-urea showed no change, whilst the urinary urea, blood- and urine-Cl increased with increasing diuresis.

A. L.

Sodium dehydrocholate diuresis. L. KAUFT-HEIL and E. NEUBAUER (Arch. exp. Path. Pharm., 1932, 166, 675—692).—Generally in diseased humans and without exception in dogs intravenous injection of the bile salt leads to the rapid onset of a diuresis accompanied by a lowering of the abs. and relative urinary Cl'. In dogs the serum-proteins and -Cl' also decrease, whilst the abs. but not the relative bile-Cl' increases. The diuresis, unless very great, is inhibited by posterior pituitary extract. F. O. H.

Renal glycosuria. Calcium and glucose in blood. I. MORTADA (J. Egypt. Med. Assoc., 1932, 15, 522—544).—A discussion of the lowering of the renal threshold for glucose by pathological conditions of endocrine glands, and of the rôle of Ca in carbohydrate metabolism. A. C.

Iron retention by women during pregnancy. C. M. COONS (J. Biol. Chem., 1932, 97, 215—226).— In practically all the cases examined the Fe content of the food ingested exceeded that of the excreta, the retention being sufficiently great to supply the fœtal need and the Fe reserves of the new-born infant.

F. O. H.

Changes in the composition of the blood and in the tonus of the vegetative nervous system of cows during pregnancy and delivery. L. SEEKLES, B. SJOLLEMA, and F. C. VAN DER KAAY (Biochem. Z., 1932, 249, 424-437; cf. A., 1931, 383).-Until the fourth day before delivery the mineral composition of the blood-serum of pregnant cows varies only slightly. Then decrease in Ca and inorg. P begins, the lowest vals. being reached just before or just after delivery, but alternate increases and decreases may occur during the period of birth. During the same period the Mg content of the serum increases and the K decreases, the min. val. for K being reached a few days post partum. The diffusible Ca, inorg. P, Mg, and total ionic Ca may vary during the period either in parallel with the total content of these mineral constituents or very irregularly, whilst the bloodsugar increases and the residual N remains unchanged. For a few days before and after delivery the ketonic compounds increase largely and then vary greatly post partum; as a rule high vals. accompany low sugar vals. and vice versa. When parturient paresis occurs it is not when the serum-Ca is at its lowest but after considerable increase has occurred. Injection of parathyroid extract cures the paresis within 1.5 hr. and reduces the total Ca. As pregnancy advances a

relative increase occurs in the vagus tonus of the heart: this increase, which disappears after delivery, is related to the increased K : Ca ratio in the serum and to other factors. W. McC.

Respiration and fermentation of the surviving human placenta; influence of hormones and the lactic acid metabolism of the living placenta in pregnant animals. A. LOESER (Arch. Gynäkol., 1932, 148, 118—148; Chem. Zentr., 1932, i, 1389). —The metabolism of the placenta is similar to that of a benign tumour. The younger is the placenta the greater is the anaërobic lactic acid fermentation; in the first two months of pregnancy there exists a measurable aërobic lactic fermentation. Insulin raises the anaërobic lactic acid formation slightly and the respiration markedly. Folliculin is without effect. The blood-lactic acid is increased during pregnancy. L. S. T.

Total blood-lipin in alimentary lipæmia. H. F. WECHSLER (Arch. Int. Med., 1932, 50, 37-45).— Curves showing change with time in the total amount of blood-lipin after the ingestion of 100 c.c. of olive oil by persons free from pancreatic or hepatic disease are flat and ascending as age increases and descending in cases where arteriosclerosis is present. A. L.

Fatty acids essential in nutrition. III. G. O. BURR, M. M. BURR, and E. S. MILLER (J. Biol. Chem., 1932, 97, 1—9; cf. A., 1930, 810).—Linolenic and linoleic acids (given as Me esters) are effective and oleic acid is ineffective in curing rats suffering from fat deficiency. Although tung oil is eurative, α -elæostearic acid prepared from it is inactive. Me arachidonate depresses the action of a mixture of Me linoleate and linolenate. A. C.

Influence on carbohydrate metabolism of experimentally induced hepatic changes. I. Fasting and administration of thyroxine. II. Phosphorus poisoning. T. L. ALTHAUSEN and E. THOENES (Arch. Int. Med., 1932, 50, 46-57, 58-75).-I. Glucose, H₂O, and insulin were administered to fasting rabbits and to normal animals treated with thyroxine, this being followed by injections of adrenaline. The fasting animals showed a diminished sugar tolerance and a smaller rise in blood-sugar after adrenaline compared with normal animals, this being probably due to the lowered liver-glycogen. With the rabbits receiving small doses of thyroxine, the sugar tolerance was unchanged and the adrenaline response greater than that for normal animals. No hypoglycæmia was observed in either of these two groups after the modified sugar-tolerance test, and all rabbits showed an increase in hepatic glycogen at this point.

II. In rabbits receiving small daily doses of P, the normal blood-sugar level was not maintained. After administration of glucose, H_2O , and insulin to such animals, there was a progressive decrease in sugar tolerance, and in the last stages of poisoning blood-sugar curves ending in hypoglycæmia were obtained. When the administration of glucose, H_2O , and insulin was followed by injections of adrenaline the resulting hyperglycæmia increased, then decreased to zero as the P poisoning was continued. In the late stages of poisoning the liver could still convert

lactic acid into glucose. Experiments on acute P poisoning gave parallel results. A. L.

Variations in blood-sugar values of normal and vagotomised dogs following glucose administration. J. P. QUIGLEY, W. R. HALLARAN, and B. O. BARNES (J. Nutrition, 1932, 5, 77-80).-Glucose administered 20 hr. prior to the test caused an increased ability to metabolise sugar in vagotomised, but not in normal, animals. A. G. P.

Influence of cholic acid on sugar in intestinal resorption and on its behaviour in the liver. H. YUUKI (Z. physiol. Chem., 1932, 209, 1-4).--Administration of cholic acid promotes resorption of sugar in the intestine of the rabbit, and the fixation of the resorbed sugar in the liver. J. H. B.

Basal metabolic rates of vegetarians. G. WAKEHAM and L. O. HANSEN (J. Biol. Chem., 1932, 97, 155—162; cf. A., 1931, 1084).—The mean basal metabolic rate of 20 life-long vegetarians was 11% below Du Bois normals. A period of 6—8 years' vegetarianism is necessary to produce the decrease. A.C

Protein intake and basal metabolism of college women. R. A. HETLER (J. Nutrition, 1932, 5, 69-75).—The average daily intake of protein was slightly lower than for men (0.94 g. per kg. live-wt.) and the daily urinary excretion of N was 7.69 g. The average basal metabolism showed a deviation of -7.1% from the Harris-Benedict standard. No definite relationship was observed between protein intake and basal A. G. P. metabolic rate.

Growth-promoting values of dried buttermilk, dried skim milk, and dried whey for chicks. F. E. MUSSEHL and C. W. ACKERSON (Poultry Sci., 1932, 11, 69-73).—When fed at the same protein level, dried buttermilk was more efficient than dried skim milk, apparently owing to the presence of lactic acid (approx. 6%). CH. ABS.

Question of the formation of citrulline in the animal body. D. ACKERMANN (Z. physiol. Chem., 1932, 209, 12-19).-The fission of arginine into citrulline and NH₃ (by arginine deimidase) was not observed on subcutaneous injection of arginine into a dog, nor was it produced by ox liver, kidney, muscle, spleen, goose liver, or liver and muscle of the crayfish. After prolonged action, ox kidney, spleen, and muscle but not liver of goose and crayfish show a weak J. H. B. arginase effect.

Endogenous uric acid and hæmatopoiesis. III. Uric acid outputs and reticulocyte counts as affected by glycine, caffeine, urea, bilirubin, atophan, and xylose. J. KRAFKA, jun. (J. Lab. Clin. Med., 1932, 17, 428-436) .- Increased rate of excretion of uric acid which follows the oral administration to dogs of caffeine, glycine, urea, NaHCO₃, and NH₄Cl appears to be due to diuresis. The increase is more marked when the bone marrow is in an active state. Bilirubin, xylose, atophan, and adenosine are not hæmatopoietic agents. CH. ABS.

Liver and elimination of phenols from the blood. A. D. MARENZI (Rev. soc. argentina biol., 1931, 7, 27-35).-In hepatectomised animals conjugation of phenols is normal; disappearance from the blood is retarded. CH. ABS.

Kidney and elimination of phenols from blood. A. D. MARENZI (Rev. soc. argentina biol., 1931, 7, 36-57).—Phenols are retained in the (dog's) kidney before being excreted. In severe experimental С́н. Abs. nephritis phenols are not excreted.

Is some organ especially adapted for the conjugation of phenols? A. D. MARENZI (Rev. soc. argentina biol., 1931, 7, 58-68).—Tying off dogs' abdominal viscera or extirpation of the intestines retards, but does not suppress, conjugation of phenols after injection of phenol. Hepatectomy, nephrectomy, or extirpation of the spleen, stomach, or colon has no effect on conjugation. CH. ABS.

Factors which determine the concentration of calcium and of inorganic phosphorus in the blood-serum of rats. II. B. KRAMER and J. HOWLAND (J. Nutrition, 1932, 5, 39-60).-The serum-Ca and -inorg. P varied with the amounts of these elements and of vitamin-D in the diet, and with min. quantities of vitamin-D the proportionality was direct. An increase of Ca in the diet raised the serum-Ca and lowered the -P. Increased P in the diet produced the reverse effect. Variations due to dietary changes became less marked as the vitamin-D content was increased. A Ca : P ratio of 1.5 (1.2 g. Ca and 0.8 g. P) in the diet produced a similar (normal) ratio in the serum irrespective of the vitamin-D supplied. Under these conditions the effect of vitamin-D was apparent in the live-wt. increases. Cod-liver oil regulated the Ca and P metabolism. A. G. P.

Mineral balance studies on poultry. R. H. COMMON (J. Agric. Sci., 1932, 22, 576-594).—Pullets showed an increased retention of Ca and P during the 2-3 weeks prior to laying. During laying much P was voided in the droppings, involving a temporary negative P balance. A. G. P.

Effect of lime and cod-liver oil on sheep fed on a calcium-deficient ration. D. W. AUCHINACHIE and A. H. H. FRASER (J. Agric. Sci., 1932, 22, 560-575).-Live-wt. increases in indoor sheep were raised to the same level as those of outdoor sheep by additions of cod-liver oil (but not by additions of CaO) to the diet. The effect is ascribed to vitamin-D in the oil and to its action in increasing the utilisation of P and maintaining a suitable $Ca \times P$ product. A low level of serum-Ca is not incompatible with rapid growth.

A. G. P. Mineral exchanges of man. II. Effect of excess of potassium and of calcium on two normal men and an œdematous nephritic. S. H. BASSETT, C. A. ELDEN, and W. S. MCCAHN (J. Nutrition, 1932, 5, 1-27).-Ingestion of K citrate did not alter the Ca, Mg, or P metabolism in normal or nephritic cases. Addition of CaCl₂ to the diet increased Ca excretion and led to a positive Ca balance in normal but not in nephritic patients. Adminis-tration of large proportions of K did not produce negative balances of Na or Cl in normal cases, but in the nephritic, caused increased urinary excretion of both elements, resulting in negative balances. During
the feeding of $CaCl_2$ to normal patients, the Na and K balances were negative. The N metabolism was not affected by administration of K citrate or $CaCl_2$. Fe storage occurred in normal subjects with an average daily intake of 21 mg. and in the nephritic case, 12 mg. of Fe. The proportion of Ca and Na in the urine of the nephritic was abnormally low.

A. G. P.

Calcium content of common dietaries in India. D. R. N. SAHU and A. N. BOSE (Indian Med. Gaz., 1932, 67, 140—141). CH. ABS.

Phosphorus metabolism in infants fed [with] breast milk or cow's milk. D. B. WITT (Amer. J. Dis. Children, 1932, 43, 306–316).—Of the P ingested, $51-63\cdot 8$ or $29\cdot 2-44\cdot 2\%$ was retained for human or cow's milk, respectively. CH. ABS.

Effect of [administration of] magnesium salts on the growth of rats receiving constant amounts of carotene. H. VON EULER and E. VIRGIN (Biochem. Z., 1932, 249, 393—403).—Mg (as MgCl₂) when given in a diet containing excess of vitamins-B and -D and sufficient carotene and vitamin-A in const. amount, exerts its max. effect on growth when the dose is 150—350 mg. per 100 g. of dry food. Greater doses have less pronounced effects. It is possible that the effect is greatest when just the necessary amount of carotene is given. W. McC.

Utilisation of the iron of protein foods by the albino rat. I. Comparison of growth and iron assimilation as affected by different protein foods. II. Comparison of protein foods supplementary to milk as sources of iron in nutrition. R. C. MILLER and E. B. FORBES (J. Nutrition, 1931, 4, 483-505).—Examination of numerous protein foods is recorded. The dry wt. of rats is not a significant basis of reference for their Fe contents.

A. G. P.

Design and use of a glass [metabolism] cage [for rats]. J. T. SKINNER, H. STEENBOCK, and W. H. PETERSON (J. Biol. Chem., 1932, 97, 227-234).

Relations between chemical constitution and pharmacological action. J. SCHÜLLER (Arch. exp. Path. Pharm., 1932, 167, 70-71).—Certain radicals may be arranged in a series which represents the order in which they affect the physico-chemical properties of ions or mols. of which they form a part, as well as the pharmacological properties of chemical compounds into which they are introduced.

W. O. K.

Oxygen consumption of the insufficient dog's heart. A. RÜHL (Arch. exp. Path. Pharm., 1932, 167, 100-101).—When in a heart-lung prep. heart-insufficiency is produced by histamine, "unmal" or "somnifen," the O_2 consumption falls and the R.Q. is raised. Strophanthin tends to make the insufficient heart nearly like the normal. W. O. K.

Carbon monoxide affinity for hæmoglobin. Acute and chronic poisoning. Effect of automobile exhaust gas on guinea-pigs. T. L. RAMSEY and H. J. EILMANN (J. Lab. Clin. Med., 1932, 17, 415-427).—Guinea-pigs, when maintained in an atm. completely or 50% saturated with CO, do not survive after the blood has become >70% saturated with CO. When maintained at lower concns. for longer periods they are able to survive 60% saturation. Blood-CO may be detected after 28—31 days. Post mortem indications of CO poisoning are described. CH. ABS.

Detoxicating action of colloidal sulphur in carbon monoxide poisoning. N. VITA and E. SALMOIRAGHI (Arch. exp. Path. Pharm., 1932, 166, 519-528).—The absorption spectrum of blood containing CO is markedly changed on treatment with colloidal S. The min. lethal dose of CO for guineapigs is increased threefold when the animals are injected with colloidal S. This detoxicating action, however, is very transient, lasting < 1 hr.

F. O. H.

Antagonism of carbohydrate and hydrogen cyanide. A. W. FORST (Arch. exp. Path. Pharm., 1932, 167, 108—111).—The inhibiting action of glucose and other carbohydrates on HCN poisoning is probably dependent on the addition of HCN to the carbonyl group with formation of cyanohydrin. Curative as opposed to inhibiting effects are obtained only with trioses and appear to be a sp. action of these on the central nervous system. W. O. K.

Comparative pharmacology. I. Toxic and lethal doses of various substances for the mouse and frog. H. FÜHNER (Arch. exp. Path. Pharm., 1932, 166, 437-471).—The toxic and lethal doses of the following substances were determined for the grass frog and the white mouse : NaCN, chloral hydrate, camphor, PhOH, o-, m-, and p-C₆H₄(OH)₂, adrenaline, sympatol, acetylcholine, histamine, methylguanidine (I), caffeine, picrotoxin, colchicine (II), pyramidone, novocaine, and percaine. The ratio of the toxicities for each substance in the two animals gives the "frogmouse index," the vals. for which, in the case of the above substances, lie between 0.3 [for (I)] and approx. 400 [for (II)]. The importance of such an index for the characterisation of toxic substances is indicated. F. O. H.

Stimulation by the salts of the normal aliphatic acids in the rock barnacle Balanus balanoides. W. H. COLE (J. Gen. Physiol., 1932, 15, 611-620).-The efficiency of stimulation in *B. balanoides* of the Na salts of normal aliphatic acids increases with concn. and in the order, NaOAc, propionate, formate, butyrate, valerate, hexoate. A. L.

Stimulation by hydrochloric acid and by the normal aliphatic acids in the sunfish *Eupomotis*. J. B. ALLISON (J. Gen. Physiol., 1932, 15, 621-628). —The stimulating efficiency of HCl and normal aliphatic acids in *E. gibbosus* increases with concn. and with increasing length of the C chain, HCO₂H being an exception. A. L.

Influence of boric acid on the [toxic] action of arsenious acid. G. TAUBMANN and J. MÜCKE (Arch. exp. Path. Pharm., 1932, 166, 545—554).— The toxicity due to local and absorptive action of solid As_2O_3 is considerably decreased by H_3BO_3 , whilst with dissolved As_2O_3 there occurs only a delay unaccompanied by alleviation of the toxic action. These findings are explained by As_2O_3 being less sol. in aq. H_3BO_3 than in H_2O to an extent dependent on the [H] of the solution. F. O. H. Determination, localisation, and elimination of bismuth in the organism. PAGET, LANGERON, and DEVRIENDT (J. Pharm. Chim., 1932, [viii], 15, 600—608).—The determination of Bi in body-fluids, tissues, and fæces is described. After Bi injections, the metal appears in the urine and fæces within 24 hr., but elimination is prolonged over a considerable period, max. elimination occurring after 3—4 days. Elimination also occurs through the saliva and Bi is found in all the body-fluids ; it is localised especially in the liver and kidneys, and, to a smaller extent, in the brain. J. W. B.

Local irritation effect of calcium salts in relation to their chemical constitution. F. WEIL-GUNY (Arch. exp. Path. Pharm., 1932, 167, 71–72). —When injected subcutaneously solutions of Ca salts at the same $p_{\rm H}$ produce irritation which is greater with increase in the hydrophobic character of the anion and less with increase of its hydrophilic character. W. O. K.

Rôle of unantagonised cations in protecting the membrane-forming function in the eggs of the sea-urchin. A. R. MOORE (Protoplasma, 1932, 15, 268—275).—The addition of alkali metal and alkaline earth cations preserves the membrane-forming function of eggs exposed to non-electrolyte (e.g., urea, glycerol) solutions. Univalent (Na, K, Li, Rb, Cs) cations are almost equally potent, having an effective concn. of 0.14M. Similarly Ca^{**}, Sr^{**}, and Mg^{**} are equally effective in 0.002M solution, but Ba^{**} is uniformly more active. Ca^{**} and Na^{*} are not antagonistic but additive in their action. A. G. P.

Importance of atmospheric moisture in the growth of organisms. E. JANISCH (Naturwiss., 1932, 20, 589–591).—The H_2O v.p. in % of relative humidity at various temp. is discussed. W. R. A.

Variation in physiological activity of alcohols among isomerides and homologues. R. W. HUF-FERD (J. Amer. Pharm. Assoc., 1932, 21, 549-556). —The toxicity of purified alcohols to guinea-pigs (as measured by inability to walk) is in the following order : tert.-hexyl > sec.-heptyl > sec.-hexyl > tert.amyl>sec.-amyl>isoamyl>n-amyl>n-hexyl>Bu^a> sec.-Bu>n-heptyl>Bu^β> tert.-Bu>Pr^a>Pr^β>96% Et>100% Et>Me. R. S. C.

Toxicity of methyl alcohol. R. W. HUFFERD (J. Amer. Pharm. Assoc., 1932, 21, 548).—Very pure MeOH is slightly less toxic to rats than EtOH even in repeated doses. R. S. C.

Pharmacological methods for determination of nitro-compounds (glyceryl nitrate) in pharmaceutical preparations. F. A. LEHMANN (Arch. exp. Path. Pharm., 1932, 167, 87).—Glyceryl nitrate is determined by observation of the lowering of the blood-pressure on intravenous injection into a narcotised rabbit. W. O. K.

Oxidative poisoning and detoxication with respect to habituation. H. VOLLMER (Arch. exp. Path. Pharm., 1932, 166, 405-431).—Mice continuously injected with EtOH become habituated to the narcotic. Continuous injection of quinol, however, results in an increasing sensitivity to this substance. Mice habituated or hyposensitive to EtOH are hypersensitive to quinol, colchicine, or NH_2Ph ; those hypersensitive to quinol are hyposensitive to EtOH. These facts are explicable only on the ground of an increase in the vital oxidative processes accompanying habituation (positive or negative) to quinol or EtOH. Thus the increase in metabolism is the cause of habituation to EtOH and is connected with the relationship between age and metabolic rate on the one hand and sensitivity towards poisons on the other. F. O. H.

Influence of ethylthiocarbimide, ethyl thiocyanate, and allylthiocarbimide on sulphur metabolism in rabbits. M. SANDBERG and O. M. HOLLY (J. Biol. Chem., 1932, 97, 31—35).—The urinary S excretion (% of intake) of rabbits decreases when EtSCN or EtNCS is added to the diet, and slowly returns to normal after the experimental period. Allylthiocarbimide exerts a similar effect, but the excretion rises above the normal in the after-period. A. C.

Toxicity to goldfish of organic thiocyanates and thiocarbimides. N. L. DRAKE and R. L. BUSBEY (J. Amer. Chem. Soc., 1932, 54, 2930—2935). —Data are given, as survival time curves, regarding the toxicity to goldfish of *n*- and *iso*-amylthiocarbimides, BzNCS, PhCNS, and *p*-NMe₂·C₆H₄·CNS. Except in very low concns. the amyl compounds are the least toxic. The other three substances possess almost the same toxicity at high concns.; BzNCS is the least toxic in low concns. *tert*.-Amylthiocarbimide has no effect at a concn. of $3\cdot48 \times 10^{-5}$ mol./litre; CH₂Ph·CNS has little or no action at concns. of $3\cdot36$ to $7\cdot38 \times 10^{-5}$ mol./litre. BzNCS is much more toxic than the amyl compounds in high concn.

C. J. W. (b)

Biological assay of strophanthus (kombé) in comparison with ouabain. J. H. GADDUM (Quart. J. Pharm., 1932, 5, 274-300).—A comparison of the potencies of five different tinctures with the International Standard ouabain by nine different observers using seven different methods has revealed that the U.S.P. X method gives higher results than any of the other methods, and that such discrepancies are due, to some extent, to the use of ouabain, instead of a standard tincture of strophanthus, as a standard of comparison. W.S.

Assay of tinctures of digitalis by colorimetric and biological methods. F. J. DYER (Quart. J. Pharm., 1932, 5, 172—179).—The assay of tinctures of digitalis by the chemical (colorimetric) method of Knudson and Dresbach (A., 1922, ii, 882) furnishes results which deviate so profoundly and irregularly from those obtained by the biological (frog) method of Trevan and Boock (B., 1929, 112) as to render the former method useless, even as an approx. index of biological potency. W. S.

Xenopus in digitalis standardisation. J. W. C. GUNN and D. EFSTEIN (Quart. J. Pharm., 1932, 5, 180—182).—Xenopus lævis is preferable for use in the assay and standardisation of digitalis preps. to Rana temporaria, employed for this purpose by Trevan (A., 1927, 792; B., 1929, 112). Tinctures of digitalis deteriorate by 10—15% in two years, but thereafter retain 80% of their original strength, even after 11 years. W. S.

Action of digitalis on metabolism. H. FREUND (Arch. exp. Path. Pharm., 1932, 167, 73-76).— Small therapeutic doses of digitalis preps. increase the quantity of glucose utilised by finely-divided tissue, but the proportion of glucose converted into lactic acid is decreased whilst in presence of larger toxic doses much less glucose is utilised, but it is all converted into lactic acid. The amount of glycogen converted into lactic acid and reducing sugar is increased by therapeutic, but decreased by toxic, doses. Therapeutic doses increase the amount of lactic acid which disappears anaërobically (in presence of bromoacetate) whilst toxic doses have the opposite effect. Insulin and thyroxine have sp. and opposed actions on the system. W. O. K.

Action of Japanese camphor on the heart. IV. Allo-*p*-ketocamphor ("vitacamphor "). K. TAMURA, G. KIHARA, and M. ISHIDATE.—See this vol., 948.

Antiseptic value and toxicity of menthol isomerides. F. WOKES (Quart. J. Pharm., 1932, 5, 233-244).—*l*-, *d*-, *dl*-, and *dl*-iso-Menthol, and *dl*-neomenthol exert a toxic action on mice (average oral dose for 50% mortality 3—4 mg. per g. of body-wt.). These substances are 5—12 times as lethal as PhOH towards *B. coli* and *Staph. pyogenes aureus. l*-Menthol has a lower activity than its *d*-enantiomorph. W. S.

Action of a soluble derivative of hexylresorcinol. K. S. GREWAL (J. Pharm. Exp. Ther., 1932, 45, 283-290).—Sodium hexylresorcinol disulphate gives a yellow ppt. with aq. Br which dissolves in aq. NH_3 to form a yellow solution. It is practically devoid of antiseptic power and has no effect on paramecia. H. D.

Absorption of salicylic acid in the mouth. W. BLUME and G. BUCHHOLZ (Arch. exp. Path. Pharm., 1932, 166, 472-492).—Absorption of Na salicylate from the rabbit's mouth is slow, the first traces of the acid appearing in the urine 25 min. after injection into the mucous membrane. The total excretion is dependent on the type of food. With rabbits fed on turnips 80% of the acid injected is excreted, the first appearance in the blood occurring 15-30 min. after intravenous injection. The detailed changes in the urinary and blood levels following injection of Na salicylate by various routes are described. F. O. H.

Amphibian poisons. O. GESSNER (Arch. exp. Path. Pharm., 1932, 167, 92—93).—In the gland secretion of *Molge marmorata*, 3 poisons are found: (a) a volatile substance with local irritating action, (b) a non-volatile substance agglutinating red bloodcells, and (c) a saponin. The alkaloids of the salamander (samandarine, m.p. 325°, and salamander alkaloid II) have been investigated pharmacologically. On mammals they act as convulsive poisons.

W. O. K. **Poisons in edible fungi.** H. STEIDLE (Arch. exp. Path. Pharm., 1932, **167**, 91–92).—Poisons may be extracted from many edible fungi, *e.g.*, a muscarinelike substance from Cantharellus cibarius, blood poisons from Boletus edulis and Agaricus campestris, and poisons attacking the blood vessels from many fungi. W. O. K.

Pharmacological actions of benzoyl-N-methylhomogranatoline. G. K. ELPHICK and J. A. GUNN (Quart. J. Pharm., 1932, 5, 220-232).—Several pharmacological actions of benzoyl-N-methylhomogranatoline (I) are qualitatively similar to those of tropacocaine (II). Quantitatively, (I) stands approx. between (II) and benzoyl-N-methylgranatoline (cf. Tanret, A., 1923, i, 832). W. S.

[Pharmacology of] morphine, codeine, and derivatives. I. General methods. II. Isomerides of codeine. N. B. EDDY (J. Pharm. Exp. Ther., 1932, 45, 339-359, 361-381).-I. Methods of comparing the physiological action of morphine and its derivatives on mice and rabbits are described.

II. The effects of the isomerides codeine, ψ -codeine, *iso*codeine, and *allo-\psi*-codeine as regards depression of respiration, toxic, analgesic, and constipating effects are compared. H. D.

Influence of atropine on sugar metabolism. A. CASANEGRA (Semana Méd., 1932, i, 803—809).— Normally atropine does not affect blood-sugar. In diabetes it is slightly lowered by administration of atropine before meals; the tolerance curves are not influenced. In the dog large doses produce hyperglycæmia; small doses slightly reduce the sugar. The hypoglycæmic curve after injection of insulin is unchanged. CH. ABS.

Determination of atropine in human urine. P. PULEWKA (Arch. exp. Path. Pharm., 1932, 167, 96).—The method involving the pupil of the mouse's eye is used. During several months' treatment with atropine, the amount excreted in the urine falls slowly from the normal fraction $(\frac{1}{3}$ to $\frac{1}{4}$ of that administered) to sometimes $<\frac{1}{6}$. W. O. K.

Hyperglycæmic action of hordenine sulphate. G. TANRET (Compt. rend., 1932, 195, 271—273).— The substance exerts a hyperglycæmic action in rabbits and dogs, the effect being approx. twice as great by intravenous as by subcutaneous injection.

P. G. M.

Effects on the circulation of tissue-constituents. H. H. DALE (Arch. exp. Path. Pharm., 1932, 167, 21-32).—A review of present knowledge of vasopressor and vasodilator substances. W. O. K.

Effects on the circulation of tissue-constituents. G. EMBDEN (Arch. exp. Path. Pharm., 1932, 167, 50-52).—A review of the pharmacological action of adenylic acids and related substances. The action on the heart which decreases with increased phosphorylation is apparently associated with deamination, whilst the uterus action which increases with increased phosphorylation would appear to be produced by undeaminised adenylic acid.

W. O. K.

Tissue-constituents with effects on the circulation. F. VOLHARD (Arch. exp. Path. Pharm., 1932, 167, 32-50).—A review of the mechanism of skin reactions and blood-pressure disturbances, especially in pathological conditions with vasomotor symptoms. W. O. K.

Influence of histamine on the gaseous metabolism of the isolated perfused dog's limbs. A. BERGWALL (Arch. exp. Path. Pharm., 1932, 167, 101).—Histamine reduces the difference in O_2 content between arterial and venous blood but no change in the corresponding CO_2 contents. W. O. K.

Action of histamine on the gaseous metabolism of isolated perfused dog's limbs. A. BERGWALL and A. RÜHL (Arch. exp. Path. Pharm., 1931, 166, 529—535).—Large doses (3 mg.) of histamine result in a marked decrease of O_2 -consumption accompanied by an increase in the R.Q. due to a disturbance of O_2 -diffusion resulting from an ædema produced by the histamine. F. O. H.

Liberation of a histamine-like substance during anaphylaxis in the guinea-pig. R. BARTOSCH, W. FELDBERG, and E. NAGEL (Arch. exp. Path. Pharm., 1932, 167, 81—82).—When the lung of a guinea-pig which has been previously sensitised with ovalbumin is perfused with Ringer solution containing a small amount of ovalbumin it develops anaphylactic rigidity and the perfusate contains a histamine-like substance or histamine itself in quantities which may be detected biologically. The perfusate is able to induce anaphylaxis when perfused through the lung of a fresh unsensitised guinea-pig. W. O. K.

Determination of acetylcholine in the presence of choline, histamine, and adrenaline by means of leech preparations. B. MINZ (Arch. exp. Path. Pharm., 1932, 167, 85—87).—The action of acetylcholine on preps. of leech muscle sensitised with eserine may be used as a sp. quant. test for acetylcholine.

W. O. K.

Pharmacology of sauerkraut-juice. W. GEH-LEN (Arch. exp. Path. Pharm., 1932, 166, 703—710).— Parenteral introduction of the juice into animals is followed by a local reaction due to its acidity. Oral administration is followed by diarrhœa. The action of the juice on the isolated heart and its stimulating power on the parasympathetic nervous system and the fact that the latter property is destroyed by alkalis indicate the presence of lactyl- or acetyl-choline in a conen. of approx. 1: 20,000. F. O. H.

Biological efficacy of various kinds of light. E. KEESER (Arch. exp. Path. Pharm., 1932, 166, II. 624-633).-With respect to their action on the bloodsugar of fasting rabbits, red light activates adrenaline and inactivates insulin, blue light activates insulin and inactivates adrenaline, whilst green light activates both hormones. The rise in blood-sugar following intravenous injection of glucose into fasting rabbits irradiated with blue light is less and the recovery more rapid than in rabbits with red light, whilst with green light there are only slight variations from the normal. The changes occurring in the sugar content of the skin and in the reduced glutathione contents of the skin and blood exhibit a similar dependence on the type of light. The possible relation of these phenomena to a primary action on the autonomic nervous system is discussed. F. O. H.

Chemistry of mitogenetic radiation. I. Oxidation reactions as a source of the radiation. A. E. BRAUNSTEIN and A. POTOZKY. II. Mitogenetic spectra of oxidation reactions. A. POTOZKY (Biochem. Z., 1932, 249, 270-281, 282-287).-I. Mitogenetic radiation is probably a special case of ultra-violet chemiluminescence of very low intensity and probably accompanies all oxidation and reduction reactions whether biological or not. It is independent of all other factors in these reactions. No such radiation has been detected in other types of reaction. If illumination conditions are the same in both cases, the order of intensity of the radiation is the same for biological and non-biological reactions. When yeast is used as detector great variations are observed in the times required to produce max. effect in the various reactions. In many cases, after an optimum time has elapsed the effect diminishes rapidly and may even be reversed.

II. The λ of the mitogenetic radiation from inorg. oxidation reactions lie in the range specified by Gurwitsch (1900-2500 Å.) and mainly between 2150 and 2350 Å., although radiations of other λ may also be emitted. Illumination of the source with visible light increases the intensity of the radiation in some cases. The radiations from the erythrocytes of pigeon's blood have λ in the same region (2150-2350 Å.). The spectra of the inorg. reactions differ slightly in the distribution and intensity of the lines, but they are to a great extent sp. W. McC.

Mitogenetic radiation from muscle and from oxidation reactions. G. FRANK and S. RODIONOV (Biochem. Z., 1932, 249, 323—343).—By means of a modification of the apparatus of Schreiber and Friedrich (A., 1931, 125) in which an Al cathode is used, the intensity of the mitogenetic radiation from working frog muscle and isolated heart as well as from muscle extract and from chemical oxidation reactions (oxidation of alkaline pyrogallol, $SnCl_2+2HgCl_2$, $K_2Cr_2O_7+$ $FeSO_4$) in vitro has been measured by entirely physical means without the aid of biological detectors. In the case of the last-named reaction the intensity of the radiation depends on the extent of the illumination with visible light. W. McC.

Enzymes and their action. (SIR) F. G. Норким (Proc. Roy. Soc., 1932, **B**, 111, 280—297).—А discussion. A. L.

Chain reactions in enzymic catalysis. J. B. S. HALDANE; D. RICHTER.—See this vol., 917.

The enzyme model of Bredig and Fajans. P. RONA and F. REUTER (Biochem. Z., 1932, 249, 455-469; cf. A., 1908, ii, 268; 1924, ii, 842).—The unimol. decomp. of bromocamphorcarboxylic acid in COPhMe is changed by addition of increasing amounts of quinine into a type of reaction resembling the autocatalytic, the time-% decomp. curve becoming S-shaped. During that part of the process to which the S-shaped portion of the curve corresponds the max. rate of decomp. is proportional to the concn. of quinine. If the max. rates of decomp. of the three forms (d, l, dl) of the acid be plotted against the corresponding concns. of quinine, the curves for the d- and dl-acids coincide. The slope of the curve for the d-acid is less steep. If the concn. of quinine is kept const. and the amount of substrate varied the max. rates of decomp. tend towards a limit. W. McC.

Asymmetric synthesis with the aid of catalysts. II. G. BREDIG and M. MINAEFF (Biochem. Z., 1932, 249, 241-244; cf. A., 1912, i, 983; Rosenthaler, A., 1909, i, 622).—Optically active (d or l at will according to the alkaloid used) hydroxynitriles are produced from HCN and the following aldehydes by the action of quinine or quinidine which, in this respect, behave exactly as do appropriate enzymes : cinnamaldehyde, The anisaldehyde, citral, piperonal, MeCHO. alkaloids, in proportion to their concn., also greatly accelerate the reaction. As regards optical activity the reaction exhibits a max. attained after an optimum time. W. McC.

Amylosynthease. T. MINAGAWA (Proc. Imp. Acad. Tokyo, 1932, 8, 244—246).—The fractional pptn. of amylosynthease and amylase from autolysed yeast extract by $(NH_4)_2SO_4$ or Pb(OAc)₂ is described. Further separation is effected by glycerol in which only amylase is sol. Amylosynthease is also obtained from potato and rice seeds. Its activity in polymerising achroodextrin is max. at 20° at $p_{\rm II}$ 6.2, and is destroyed in 10 min. at 50°. The synthease polymerises trihexosan and hexahexosan. A. C.

The lipoxidases of Glycine soja and Phaseolus vulgaris. E. ANDRÉ and K. Hou (Compt. rend., 1932, 195, 172—174).—The grains of different varieties of soya have no effect on guaiacol preps. G. soja and P. vulgaris oxidise the oils obtained from the former; this oxidation is produced by sp. oxidases. H. D.

Hydrolysis of acetylcholine and related substances. A. SIMONART (Amer. J. Med. Sci., 1931, 181, 879—880).—Acetyl- (I), propionyl- (II), and butyryl-choline (III) have equal rates of hydrolysis; (I) is destroyed twice as quickly as acetyl- γ -homocholine, and nearly 6 times as quickly as acetyl- β methylcholine. Eserine strongly inhibits the hydrolysis of (II) and (III), and, less markedly, of triacetin. Probably the enzyme causing fission of (I) is not sp. CH. ABS.

Enzymic hydrolysis and synthesis of esters. P. RONA and R. AMMON (Biochem. Z., 1932, 249, 446—454; cf. this vol., 92).—In the presence of H_2O dry powder from the pig pancreas induces synthesis of ester from Bu^aOH and Pr^aCO₂H or hydrolysis of PrCO₂Bu^a, the same equilibrium point being reached in both cases. The synthesis is greatly and the hydrolysis to a smaller extent inhibited by Ca (as CaCl₂) but both are unaffected by quinine hydrochloride, strychnine sulphate or Na taurocholate. When a buffer is present it undergoes vol. changes during the hydrolysis, which therefore cannot be followed dilatometrically. During the autohydrolysis (buffer absent) of the Et ester of *dl*-alanine a vol. decrease of 15.0 c.c. per mol. of alanine liberated is observed. W. McC.

Asymmetric hydrolysis by esterase (human liver) of racemic mandelic esters. R. AMMON and W. GEISLER (Biochem. Z., 1932, 249, 470—475; cf. this vol., 648).—Esterase from human liver asymmetrically hydrolyses Me, Et, Pr^a, and Bu^a

dl-mandelates and except in the case of the Bu^a ester (concn. 0.012-0.120M) reversal of the direction of optical rotation ("inversion") occurs when the concn. of the substrate is sufficiently high. The concn. of the substrate at which symmetrical hydrolysis occurs decreases as the no. of C atoms in the alcohol residue of the ester increases and, since the solubility of the esters in H₂O decreases with the increase in the no. of C atoms which they contain, the "inversion concn." may depend on solubility. If the ester is present in excess the specificity of the esterase is independent of the concn. of the substrate. Bu^a dl-mandelate has b.p. 127-128°/0·3-0·4 mm., 161°/ 14 mm. W. McC.

Muscle-phosphatase. I. H. HARA (J. Agric. Chem. Soc. Japan, 1931, 7, 1053-1060).—The activity of muscle-phosphatase is greatest at $p_{\rm H}$ 6.4 for the female (fowl, horse, rabbit) and at $p_{\rm H}$ 7.94 for the male. CH. ABS.

Liberation of invertase from yeast. III. Condition of the sugar-hydrolysing enzymes in the yeast cell. R. WILLSTÄTTER and M. ROHDEWALD (Z. physiol. Chem., 1932, 209, 38-48; cf. this vol., 305).—Invertase and other yeast carbohydrases are endo-enzymes; they are protected by the cell-membrane, a carbohydrate-protein complex on which they are loosely adsorbed. They are liberated only after enzymic hydrolysis or mechanical destruction of the cell-membrane. The enzymes attacking the membrane are of two kinds, malt amylase and plant proteinase. The desmo-enzymes of leucocytes differ from endo-enzymes in their inhibition by glycerol and non-dependence of their action on $PO_4^{\prime\prime\prime}$. They are chemically bound to the protoplasm and are liberated by enzymes which hydrolyse the colloidal J. H. B. carrier.

Cocarboxylase. II. E. AUHAGEN (Z. physiol. Chem., 1932, 209, 20—26; cf. this vol., 305).—Cocarboxylase is removed from yeast juice with difficulty by dialysis against H_2O , but more readily against aq. Na_2HPO_4 . In the latter case juices are obtained which are activated 25—50 times in fermentation of $AcCO_2H$ by addition of cocarboxylase. Mg also stimulates the fermentation. J. H. B.

Fermentation activator Z and growth-promoting substances. H. VON EULER and T. PHILIPSON (Biochem. Z., 1932, 249, 245—256; cf. A., 1931, 263). —A method of determining the amount of the Zcomplex and of its two components in extracts obtained from plants by boiling with H₂O and in other materials (egg, urine) is described. The complex or one of its components can be pptd. from solution by Zn, Fe, or Al hydroxide after preliminary treatment of the solution with Pb and Hg salts. Hg(NO₃)₂ is also a useful pptg. agent. W. McC.

Action of volatile substances and gases on the growth of moulds. R. G. TOMKINS (Proc. Roy. Soc., 1932, B, 111, 210—226).—In the presence of vapour of such substances as $COMe_2$, $CHCl_3$, and Et_2O , the latent period of germination of fungi is the same as that in air, the colony spreads at a const. but reduced rate, and the concns. of the substances necessary to inhibit growth check germination. Such

substances as MeCHO, HCN, H_2S , and NH_3 cause an increased latent period of germination and a reduced rate of growth which increases with the size of the colony, the concns. necessary to inhibit growth being greater than those required to inhibit germination. A. L.

Influence of iron on the citric fermentation of Aspergillus niger. A. QUILICO and A. DI CAPUA (Giorn. Chim. Ind. Appl., 1932, 14, 289–293).—The contradictory statements of the literature are discussed, and two strains of the mould, both capable of forming citric acid from sugar, were tested. One strain (S) gives virtually no acid in presence of traces of Fe, whereas the other (A) gives a yield of acid increasing with the proportion of Fe (as FeCl₃).

T. H. P.

Influence of heavy metal salts on Penicillium glaucum with special reference to the action of anions. J. TALTS (Protoplasma, 1932, 15, 188---238).-Two phases in the growth of P. glaucum are observed, the first being characterised by a rapid increase in the dry wt. of the fungus and in the [H] of the nutrient, the second by a decrease in the [H] and a smaller increase in dry wt. These changes in [H[•]] are markedly affected by the presence of Zn, Co, Ni, and Cd salts in 0.005M solutions. The effect of the cations predominates, and causes delayed germination of spores and an actual decrease in the % germination. The relative toxicity of the anions Cl', Br', I', NO_3' , SO_4'' , and OAc' varied with the cation associated with them and with the concn. of solutions containing the same cation. The order of toxicity of the cations was Ni<Zn<Co<Cd. The toxicity of these salts is due not to the coagulation of the plasma colloids, but to the retarded absorption of essential nutrients. A. G. P.

Production of organic acids from carbohydrates by fermentation. O. E. MAX and H. T. HERRICK (Chem. News, 1932, 145, 81—92).—A survey of recent research on the production of acetic, butyric, eitric, formic, fumaric, gallie, gluconic, kojic, lactic, malic, oxalic, propionic, and succinic acids.

E. S. H.

Biological purification in nature and industry. J. SMIT (Chem. Weekblad, 1932, 29, 486—490).—A lecture, dealing with the bacteriological processes occurring in rivers and the sea, and in sewage-disposal plants. H. F. G.

Stability of physiological characters of bacteria. E. B. FRED (Proc. Nat. Acad. Sci., 1932, 18, 455-460).—N-fixing, lactic acid, and tubercle bacteria all show a remarkable constancy of properties when cultured over a long period of years. H. D.

Mechanism of cellulose digestion in the ruminant organism. III. Action of cellulosesplitting bacteria on the fibre of certain typical feeding stuffs. H. E. WOODMAN and J. STEWART (J. Agric. Sci., 1932, 22, 527-547; cf. A., 1928, 1402).—The % fermentability by thermophilic bacteria of the crude fibre from a no. of feeding stuffs was higher than the digestion coeff. determined by feeding trials, and the order of magnitude of the two vals. was not the same. The fermentation coeff. of the fibre of untreated feeding stuffs was much lower than that of the chemically separated fibre. Differences are ascribed to the manner of deposition of the resistant lignocellulose in the cells rather than to the actual amount present. During fermentation there was an apparent increase in fibrous material, probably due to the formation, from the oil fraction, of new and resistant substances. The fermentation coeff. of separated fibre is not a trustworthy index of its digestibility in the untreated feeding stuff, but gives information as to the partition of cellulose and lignocellulose in the material. The process of lignification and the corresponding reduction in fibre digestibility in growing rye grass is associated with the formation of relatively small amounts of lignocellulose. Cultural details and the adaptation of the fermentation method for the examination of fæces are described. A. G. P.

Celluloses of Acetobacter xylinum and Tunicates. R. SUTRA (Compt. rend., 1932, 195, 181– 182.)—The membranes of A. xylinum after extraction with EtOH, CHCl₂, and Et₂O contain 1.8% N. By subsequently treating with NaOH until decolorised, 0.5% aq. NaOCl, EtOH, and Et₂O, all the N is removed, showing that the latter must be present as protein and not as chitin. The celluloses of Acetobacter and Tunicates as regards chemical and physical properties are identical with those of cotton. H. D.

Formation of methylglyoxal by Clostridium acetobutylicum. L. B. PETT and A. M. WYNNE (J. Biol. Chem., 1932, 97, 177–182).—The bacterium, incubated at 37° for 48 hr. in solutions containing Mg hexosephosphate (mainly diphosphate) at $p_{\rm H}$ 60, produces methyglyoxal and possibly also AcCO₂H. F. O. H.

Coagulation of milk by B. typhosus and other bacteria. C. GORINI (Compt. rend., 1932, 195, 187—188).—Sterilised milk is coagulated by various streptococci by adding it to a culture on gelatin; B. typhosus also produces a clot when treated in the same manner. The same stock of typhosus, if inoculated into milk alone, will not coagulate it. The proteolytic activity of the bacteria is independent of their action on caseinogen. H. D.

Decomposition of proteins by micro-organisms with particular reference to purified vegetable proteins. S. A. WARSMAN and R. L. STARKEY (J. Bact., 1932, 23, 405-428).-Purified proteins are readily decomposed in liquid media by bacteria, actinomyces, and fungi. The rate and extent of decomp. of various plant and animal proteins showed considerable variation, but no characteristic differences between the two classes of substances in this respect were observed. Where proteins were used as sole sources of C for the organisms, media rapidly became alkaline and much NH3 was lost. The ratio of protein decomposed to protein synthesised by the organisms was greatest for bacteria and least for fungi. The resistance to decomp. shown by proteins contained in plant tissue is due not to sp. differences in chemical structure between these and animal proteins, but to their ability to form resistant complexes with non-nitrogenous compounds.

M. A. G. P. . Availy hydrolyses Mo. R. B. P. .

Porphyrin compounds derived from bacteria. F. M. STONE and C. B. COULTER (J. Gen. Physiol., 1932, 15, 629-639).—Extraction of *B. phosphorescens*, yeast, and *C. diphtheriæ* with *N*-alkali gives hæmochromogens similar to cytochrome-*C*, those from the first two being identical and that from the last-named differing from them in the position of the main absorption bands. These extracts treated with AcOH and Et₂O give α -hæmatin and a porphyrin with a characteristic absorption spectrum, the latter yielding coproporphyrin and the Cu compound of coproporphyrin with 5% HCl. Lycopene occurs in the AcOH-Et₂O extract of *C. diphtheriæ*. A. L.

Purification and concentration of diphtheria texin. A. WADSWORTH, J. J. QUIGLEY, and G. R. SICKLES (J. Exp. Med., 1932, 55, 815-828).—A stable toxoid was obtained by pptn. with COMe₂ at 4°; its flocculating val. was studied. CH. ABS.

Effect of carbon monoxide on the biological reduction of nitrate. J. H. QUASTEL (Nature, 1932, 130, 207).—CO has a small inhibitory effect on the reduction of NO₃' by *B. coli*; the inhibition is the greater the smaller is the quantity of NO₃' present. In the presence of a suitable donator NO₃' reduction by *B. coli* is also inhibited, and to a greater extent, by O₂. The ClO₃'-oxidase of *B. coli* appears to be inhibited by O₂ and CO. L. S. T.

Oxygen consumption of Escherichia coli during the lag and logarithmic phases of growth. D. S. MARTIN (J. Gen. Physiol., 1932, 15, 691-708).— The rate of O_2 consumption of a growing culture of E, coli increases logarithmically before the growth curve becomes logarithmic. The rate of O_2 consumption per cell reaches a max. near the end of the lag phase of growth curve, and then gradually decreases, the time of max. respiration coinciding with that of max. surface area of the average cell. Results based on O_2 consumption, CO_2 output, and heat production agree within fairly close limits. A. L.

Correlation of the cellobiose test for the colon-aërogenes groups. C. F. POE (J. Amer. Water Works' Assoc., 1932, 24, 891-894).—The correlation of the cellobiose fermentation test with Me-red and Voges-Proskauer tests is almost perfect for the aërogenes group, but unsatisfactory for the colon organisms. C. J.

Physico-chemical studies of acid-resistant strains of tubercle and timothy-grass bacilli. A. MACHEBGUF, G. SANDOR, and C. NINI (Compt. rend., 1932, 195, 275–277).—Emulsions of the bacilli in saline were kept at 0° for several days and filtered. The filtrates contained 0.05-0.08% of protein when 5% saline was used, but less with isotonic saline. A lipin extract of the filtrates, made by means of boiling EtOH followed by Et₂O, was evaporated and extracted successively with Et₂O, H₂O, and EtOH, the last solvent containing all the antigen.

P. G. M. Fission of tubercle fat by lipases. I. H. KRAUT and H. BURGER (Z. physiol. Chem., 1932, 209, 49—58).—The lipase of serum and liver produces a slow and incomplete hydrolysis of the COMe₂-sol. portion of tubercle fat. The presence of tubercle fat retards the fission of Me butyrate and tributyrin by horse-serum. Human, guinea-pig, and rabbit sera are more, rat-serum is less, inhibited. The liverlipases show similar inhibition. This phenomenon indicates the formation of a relatively stable tubercle fat-lipase complex. J. H. B.

Structures produced in blood-sugar cultures by hydrogen peroxide and mercury. J. IDZERDA and W. A. G. VAN EVERDINGEN (Biochem. Z., 1932, 249, 381-392).-Ring structures identical with those produced by streptococci are formed in the cultures by H_2O_2 or Hg. Decrease in the concn. of the agent due to distance from the centre of application is not an explanation of the phenomenon, which depends on the ratio of this concn. to the number of erythrocytes. The resistance of the erythrocytes to the influence of temp., [H[•]], and other factors is also involved. On the assumption that the agent diffuses outwards from a centre in all directions, consideration of the distribution of the erythrocytes and of the changes of concn. of the agent leads to a satisfactory W. McC. explanation of the process.

Viruses. T. M. RIVERS (Science, 1932, 75, 654-656).—An address. L. S. T.

Twort-d'Hérelle phenomenon (bacteriophagy). E. WOLLMAN and E. WOLLMAN (Ann. Inst. Pasteur, 1932, 49, 41-74).—Spontaneous formation of bacteriophage was observed in a culture of a "mucous" variety of B. sublilis. Heating the culture at 85° prevented the formation; despite this, sufficient evidence exists to refute the parasite hypothesis of the bacteriophage. Bacteriophages are more resistant than bacteria to the oligodynamic action of Ag salts. Their function as group- or type-sp. antigens compared with the lytic power of lipins indicates the latter as probable constituents of bacteriophages. Liberation of a bacteriophage which has been neutralised by the appropriate serum is not effected by acids, bases, trypsin, or heat. F. O. H.

Measurement of $p_{\rm H}$ of solid media in bacteriology. W. VAN DAM and A. VEDDER (Rec. trav. chim., 1932, 51, 312—314).—A special type of electrode is described, whereby the $p_{\rm H}$ may be determined within 2 min. to an accuracy of 0.1. D. R. D.

Adrenal cortex hormone. S. LOEWE, L. MARX, F. ROTHSCHILD, H. E. VOSS, and A. BURESCH (Klin. Woch., 1932, 11, 281—284; Chem. Zentr., 1932, i, 1391).—The extracts, prepared by the authors' androkinin procedure, were readily sol. in H_2O ; the hormone is fairly stable towards hydrolysis. Experiments on rats, cats, and on the treatment of Addison's disease are described. A. A. E.

Metabolic study of an adrenal cortex hormone. G. A. HARROP, H. WIDENHORN, and A. WEINSTEIN (Münch. med. Woch., 1932, 79, 171–172; Chem. Zentr., 1932, i, 1390).—The hormone prep. (Swingle-Pfiffner) diminishes the O_2 demand in hyperthyroidism. The substance is of general metabolic importance and has a special influence on kidney function, relating particularly to H_2O excretion and urinary N.

A. A. E. Apparent prepotent function of the adrenal glands. S. W. BRITTON and H. SILVETTE (Science, 1932, 75, 644—646).—Evidence showing the essential importance of the adrenal cortex in regulating carbohydrate metabolism is presented. L. S. T.

Power of adrenaline to influence the condition in which calcium exists in the organism. S. HERMANN (Arch. exp. Path. Pharm., 1932, 167, 82— 84).—In rabbits the Ca quotient (cf. this vol., 81) is increased by intravenous injection of adrenaline and also by administration of vitamin-D. W. O. K.

Formation of adrenaline. J. E. ABELOUS and R. ARGAUD (Compt. rend., 1932, 195, 338-340).—The cortex and medulla of the suprarenal gland of a horse are separated and pulped. A suspension of the cortical pulp in 3% aq. Na₂CO₃ at $24-27^{\circ}$ contained more adrenaline after 5 hr. than initially, whilst the medulla and mixtures of medulla and cortex under the same conditions contained none after 5 hr. Aq. extracts behaved in the same way. The medulla appears to be merely a depository for the adrenaline produced in the cortex. H. D.

Effect of thymocrescin on growth. V. W. NOWINSKI (Biochem. Z., 1932, 249, 421-423).—From thymus preps. from which growth-promoting material has been extracted there is obtained, by repetition of the extraction, a second, more active, growth-promoting fraction (cf. A., 1930, 1615; Stotzer, A., 1931, 878). W. McC.

Sulphur and water content of liver and brain in hyperthyroidised or thyroxine-injected animals. C. I. PARHON and M. CAHANE (Compt. rend. Soc. Biol., 1931, 108, 1004—1006; Chem. Zentr., 1932, i, 1259).—The mean liver-S was 0.189% (normal, 0.2058%); the brain-S showed smaller differences. The liver-H₂O was slightly high. A. A. E.

Action of antithyreoidin on the gaseous metabolism of the rat. K. OBERDISSE and S. THADDEA (Arch. exp. Path. Pharm., 1932, 167, 79-80).--Antithyreoidin reduces the metabolism of normal and hyperthyroidised rats. W. O. K.

Influence of altitude on the effect of thyroid gland administration in dogs. IV. Hyperthyroidism in animals on a nitrogen-free diet. R. E. MARK (Arch. exp. Path. Pharm., 1932, 166, 493—518).—The metabolic and physiological characteristics of dogs kept at altitudes of 63, 1000, and 2000 m. are described. At 2000 m. the effects of thyroid administration as indicated by loss in body-wt., N-excretion, H_2O metabolism, and pulsefrequency are comparable with those at sea-level, whilst at 1000 m. such symptoms of hyperthyroidism are greatly diminished and, in addition, the increase in body-temp. and the degree of alimentary glycosuria are also somewhat less evident. F. O. H.

Standardisation of thyroid preparations. G. ROTTER and M. MECZ (Arch. exp. Path. Pharm., 1932, 166, 649-674).—The total, thyroxine-, and inorg. I and the biological response of various commercial preps. were determined. The thyroxine-I vals. were parallel with the biological vals. Fresh or dried pigs' thyroid glands had a much lower content of thyroxine-I than those of horses or oxen. Albino guinea-pigs were much more sensitive to thyroxine poisoning than pigmented guinea-pigs. F. O. H.

Thyroid gland and the ovary. I. ABELIN and E. WIEDMER (Arch. exp. Path. Pharm., 1932, 166, 584— 591).—Subcutaneous injection of thyroxine or oral administration of thyroid gland preps. to rats partly or totally suppresses the æstrous cycle. This action of the thyroid is antagonised by extracts of anterior pituitary lobe and, to a smaller extent, by æstrin. Any appreciable disturbance of the æstrous cycle due to the continuous influence of thyroxine may also be eliminated by means of suitable diets. This counteraction to hyperthyroidism is of importance for the correct functioning of the genitalia. F. O. H.

Specificity of the substance in anterior pituitary extracts having an excito-secretory action on the thyroid. M. ARON (Compt. rend. Soc. Biol., 1931, 105, 974—975; Chem. Zentr., 1932, i, 1258).—The effects produced on guinea-pigs by minute (0.001 mg.)quantities of anterior pituitary are not produced by Schockaert's substances, which are stated to be active with ducks. A. A. E.

Thyreotropic extracts from anterior pituitary lobe. A. LOESER (Arch. exp. Path. Pharm., 1932, 166, 693—702; cf. this vol., 199).—The lobes are dried with COMe₂ and extracted with aq. pyridine, NHEt, or aq. NH₃. The extract is deproteinised by means of $CCl_3 \cdot CO_2 H$ and pptd. by excess of $COMe_2$, yielding a crude prep. (yield 1.5%) which may be further purified by extraction with MeOH. The product is insol. in org. solvents, sol. in aq.-EtOH, $-COMe_2$, or -pyridine, is thermolabile, inactivated by BzCl (when it is no longer diazotisable), and gives ppts. with alkaloid reagents. Its activity on the thyroid gland is demonstrable histologically. F. O. H.

Anterior pituitary hormone. K. EHRHARDT (Arch. Gynäkol., 1932, 148, 235–264; Chem. Zentr., 1932, i, 1390).—Clinical. The hormones from mammals appear different from those from birds and coldblooded animals. A. A. E.

Is an active posterior pituitary hormone present in the blood during pregnancy? K. FEKETE (Endokrinol., 1932, 10, 16—23; Chem. Zentr., 1932, i, 1257).—Blood-pituitrin is decomposed by a substance which, towards the end of pregnancy, is present in excess. A. A. E.

Melanophoric agent of the posterior pituitary lobe. K. EHRHARDT (Arch. Gynäkol., 1932, 148, 265—270; Chem. Zentr., 1932, i, 1390).—Parenterally administered melanophoric agent is excreted in the urine in 24—48 hr. In pregnancy the melanophore hormone content of the pituitary is not increased; the hormone is present in the pituitary of fœtuses. The substance having uterine activity is to be distinguished from melanogens. A. A. E.

Malignant testicular tumours and anterior pituitary hormone. B. ZONDEK (Klin. Woch., 1932, 11, 274—279; Chem. Zentr., 1932, i, 1390).— In normal male human urine the anterior pituitary reaction is negative. Reaction I seldom occurs; the appearance of II and III indicates a malignant testicular tumour. The urine of a man with such a tumour gives the same anterior pituitary reactions as that of a pregnant woman. The excretion of follicular-ripening hormone in testicular tumour is at least 5 times as great as in female genital carcinoma. The anterior hormone could not be found in the pituitary after death resulting from malignant testicular tumour. A. A. E.

Changes in the pituitary after castration as a test for a testicular hormone. T. MARTINS (Compt. rend. Soc. Biol., 1931, 108, 1080-1082; Chem. Zentr., 1932, i, 1257).-The appearance of castration cells in the pituitary is avoided by injection of testicular extracts or by testicular implantation; testicles of infantile animals are active. The pituitary of male reacts more readily than that of female animals. The testicles probably produce two or more hormones, one of which has a direct or indirect action on the pituitary. A. A. E.

Dual endocrine activity of the testes. D. R. MCCULLAGH (Science, 1932, 76, 19-20).-Testicular extracts prepared with fat solvents prevent atrophy or bring about regeneration of secondary sex glands (prostate and seminal vesicles) if administered to rats after castration. The comb growth-promoting hormone from male urine appears to be identical with that extracted from the testes. The hormone from urine or blood is derived from the testes, and when given in doses large enough to regenerate atrophic secondary sex glands in castrated rats neither prevents nor corrects the hypertrophy of the pituitary or adrenals after castration. Aq. testicular extracts, which must contain a new hormone ("inhibin"), prevent cellular changes appearing in the pituitary of rats after castration and completely inhibit the hyperfunction of this gland. The testes thus secrete two hormones, inhibin and "androtin," the name given to the C_6H_6 -sol. substance responsible for the development and maintenance of the secondary sex glands. Androtin is comparable both physiologically and chemically with theelin. L. S. T.

Chemical constitution of the follicular and testicular hormones. A. BUTENANDT ((Nature, 1932, 130, 238).-New results have not substantiated the formula given (this vol., 781) for the follicle hormone, but indicate the presence of 3 aromatic double linkings (C_6H_6 ring) in the mol., making 4 rings in all. Catalytic hydrogenation saturates only 3 double linkings in the hormone and hormone hydrate mol. and gives hexahydrohormone hydrate $C_{18}H_{27}(OH)_3$, m.p. 256°, hexahydrodeoxyhormone hydrate $C_{18}H_{28}(OH)_2$, m.p. 153°, and hexahydrode-oxyhormone, $C_{18}H_{29}$ ·OH, m.p. 105°. These products react as completely saturated compounds, the firstnamed being stable towards KMnO4, O3, BzO2H, and $C(NO_2)_4$. Mol. refraction vals. for the deoxy-follicle hormone $C_{18}H_{23}$ OH, m.p. 133°, the hormone hydrate, its acetate, and Me ether are compatible only with a hormone formula containing 3 isolated double linkings or 1 C₆H₆ ring. Dehydrogenation with Zn dust produced an aromatic hydrocarbon, probably $C_{18}H_{14}$ or $C_{17}H_{14}$, m.p. 234°, stable to KMnO₄; this also supports the view of a 4-ringed structure. Tentative results for the 4 cryst. products isolated from the oily, physiologically active fraction of human

male urine are as follows: (i) $C_{18}H_{28}(OH)_2$, m.p. 232°, $[\alpha] + 16.6°$, isomeric with hexahydrodeoxy-follicle hormone hydrate; acetate, m.p. 112°, (ii) hydroxy-ketone, $C_{18}H_{30}O_2$ or $C_{17}H_{28}O_2$, m.p. 163°, $[\alpha]_0 + 76°$; oxime, m.p. 216°, (iii) hydroxy-ketone, $C_{16}H_{26}O_2$ (?), m.p. 176.5°, $[\alpha]_0 + 89.9°$; acetate, m.p. 158°, oxime, m.p. 215°, and (iv) hydroxy-ketone, $C_{16}H_{26}O_2$ (?), m.p. 178°; acetate, m.p. 160°. Only (iv) produces high physiological activity in the smallest doses in the capon test, and is to be regarded as the hormone producing comb-growth. The remainder appear to be completely inactive when pure.

L. S. T. Effect of gonadectomy and subsequent parathyroidectomy on the calcium exchange in dogs. J. CHEYMOL and A. QUINQUAUD (Compt. rend., 1932, 195, 287-288).-Gonadectomy does not affect the serum-Ca nor does it modify the effects of parathyroidectomy. P. G. M.

Further purification of gonadotropic hormones. (p-factors). P. G. MARSHALL (Nature, 1930, 130, 170).—The process described gives a very active product containing 9.1% of N (ash-free basis), and no S, P, or halogen. The ninhydrin reaction for α -NH₂-acids is obtained only after hydrolysis by dil. mineral acids. The active principles appear to be N compounds, probably polypeptide in character.

L. S. T.

Active principle of the corpus luteum. E. ENGELHART (Arch. Gynäkol., 1932, 148, 76-80; Chem. Zentr., 1932, i, 1389)-Oral administration (12 rabbit units) has no action on the uterus of the rabbit. The corpus luteum hormone is probably destroyed in the intestine, since lipase-containing pancreatic extracts in vitro quickly destroy the hormone. L. S. T.

Production of corpora lutea by ovarian transplants in male guinea-pigs. E. GUYÉNOT, W. BARTSCHI, and K. PONSE (Compt. rend., 1932, 195, 198-200).-Injection of urine-extracts of ovariectomised women into male guinea-pigs which have previously had an ovarian transplant from immature females results in development of follicles without formation of corpora lutea. Similar injection of alkaline extract of the anterior lobe of the pituitary does not produce ovarian hypertrophy, whilst injection of both extracts leads to the formation of a large no. of true corpora lutea. Luteinisation depends on the degree of maturity of the follicles.

P. G. M. Standard of reference for cestrin, and the relation between the potency of ketohydroxy- and trihydroxy-æstrin (theelin and theelol). J. H. BURN and G. K. ELPHICK (Quart. J. Pharm., 1932, 5, 192-204).-The relative potencies of ketohydroxyæstrin (theelin) and trihydroxyæstrin (theelol) differ in aq. and in oily solutions; an aq. solution of theelin has 85% of the potency of a similar solution of theelol, but in oily solution the former is 4.5 times as potent as W. S. the latter.

Properties and bio-assay of œstrin. W. P. KENNEDY (Quart. J. Exp. Physiol., 1930, 20, 71-93) .--- The practical end-point for the vaginal smear reaction is furnished by a cell picture showing almost

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complete disappearance of leucocytes with at least half the epithelial cells showing cornification. Two types of mucus are described. Very early oophorectomy diminishes sensitivity to cestrin. Subcutaneous injections are more potent than intraperitoneal injections. The growth test is useful; the Nissl test is most suitable for accurate work. CH. ABS.

Crystalline insulin. XIV. Isolation of glutamic acid. H. JENSEN and O. WINTERSTEINER (J. Biol. Chem., 1932, 97, 93—98; cf. A., 1928, 553). A. A. L.

Crystalline insulin. XV. Action of acid and alkali on insulin. H. JENSEN and E. A. EVANS, jun. (Z. physiol. Chem., 1932, 209, 134—144).—Dil. alkali eliminates from insulin sulphide-S and NH₃, the amount of the latter depending on reaction conditions. Some of the NH₃ appears to be essential to activity. The cystine is attacked to some extent, but not arginine. Hot dil. HCl likewise removes NH₃, but without damaging the activity; this NH₃ probably arises from amide groups in the non-active portion of the mol. With acid and EtOH, the free NH₂ and CO_2H groups react with the formation of a diketopiperazine ring. The active group may be a glutamic acid-cystine complex. J. H. B.

Presence of a distinct insulin in depancreatised dogs after pancreatectomy. G. H. TUTTLE (Science, 1932, 76, 15–16).—A reply to criticism (cf. this vol., 655). L. S. T.

Mechanism of the action of insulin. S. LIVIER-RATO, M. VAGLIANO, and A. DERVENAGA (Praktika, 1930, 5, 336—340; Chem. Zentr., 1932, i, 1392).— Insulin acts by means of substances found in intact blood vessels. The nature of these substances and the fate of the blood-sugar could not be determined. L. S. T.

Effect of insulin on phosphorus compounds of muscle. S. E. KERR and M. E. BLISH (J. Biol. Chem., 1932, 97, 11—22).—Insulin injection causes a decrease in the sum of the phosphocreatine- and inorg.-P contents of rabbit muscle, and an increase in the hexosemonophosphate-P. A. C.

Correlation between blood-sugar fall and initial blood-sugar in rabbits injected with insulin. A. M. HEMMINGSEN and H. P. MARKS (Quart. J. Pharm., 1932, 5, 245-254).—A statistical analysis of the results obtained in a large no. of experiments on the depression of blood-sugar in rabbits by insulin shows that this depression is related to the initial blood-sugar level, and that the latter should, therefore, be incorporated in the terms expressing unit insulin potency. W. S.

Comparison of the rabbit and mouse methods in the assay of highly active insulin preparations. H. P. MARKS (Quart. J. Pharm., 1932, 5, 255—273).— An exhaustive statistical treatment of results showed that the mouse method of assay of insulin preps. furnished results 15—30% higher than the "crossover" rabbit test. W. S.

Callicrein (padutin). E. K. FREY (Arch. exp. Path. Pharm., 1932, 167, 64-66).—A review of present knowledge of callicrein, a vasodilator substance found in urine in a free condition and in blood where it is combined with probably a polypeptide. It probably orginates in the pancreas. W. O. K.

So-called tissue hormones. W. WEICHHARDT (Wien. med. Woch., 1932, 82, 139—142; Chem. Zentr., 1932, i, 1389).—The most diverse irritants influence metabolism in such a way that cleavage products are formed. These are stimulatory or inhibitory according to their amount. The term "activated cleavage product" is preferable to "hormone" in this connexion. L. S. T.

Dietary deficiency of fat-free diet for rats. U. TANGE (Proc. Imp. Acad. Tokyo, 1932, 8, 190– 193).—Rats fed on a fat-free diet of caseinogen (21%), starch (75%), and McCollum's salt mixture (4%), supplemented by yeast extract, biosterol, and irradiated ergosterol, develop a pellagra-like disease. The further addition of linoleic (or linolenic) acid causes normal and healthy growth, whilst oleic acid causes normal growth but the rats show loss of hair around the nose and mouth, swelling of the front paws, and (later) slight scaling of the hind legs. H. B.

Vitamins and the growth of newly-born children. E. STRASSMANN (Med. Welt, 1932, 6, 158-160; Chem. Zentr., 1932, i, 1392).—The children of lactating mothers fed on cod-liver oil show accelerated growth. L. S. T.

Separation of vitamin-A, carotene, and xanthophylls. P. KARRER and K. SCHÖPP (Helv. Chim. Acta, 1932, 15, 745—746).—Vitamin-A (I) can be separated from carotene by its more ready adsorption from ligroin by Al_2O_3 , and from xanthophyll and zeaxanthin by adsorption of these and similar compounds from ligroin or ligroin- C_6H_6 solution by pptd. CaCO₃. No trace of (I) is adsorbed by CaCO₃.

R. S. C. Vitamin-A avitaminosis in the chick. C. A. ELVEHJEM and V. F. NEU (J. Biol. Chem., 1932, 97, 71-82).—A diet is described which, given to day-old chicks, causes fatal A-avitaminosis in 3-4 weeks marked by severe inco-ordination of movements but not by typical ophthalmia. Addition of 2% of codliver oil to the diet results in normal growth. The uric acid content of the blood of avitaminotic chicks varies from 5 (val. for normal chicks) to 44 mg. per 100 c.c., and depends on the extent of injury to the kidney. The degree of inco-ordination is not related to the uric acid content of the blood. A. C.

Carotene and xanthophyll as sources of vitamin-A for the growing chick. O. L. KLINE, M. O. SCHULTZE, and E. B. HART (J. Biol. Chem., 1932, 97, 83—91).—A daily dose of 0.03 mg. of carotene (m.p. 172.5° , from spinach) prevents symptoms of vitamin-A deficiency in chicks up to 7—S weeks of age, but is inadequate above this age. In curative experiments more than 0.05 mg. of carotene per day is necessary. Xanthophyll (m.p. 174°, from spinach) does not act as a source of vitamin-A in doses of 0.25 mg. per day either in prophylactic or curative tests. No toxic effects of xanthophyll are observed. A. C.

Ferrous iodide as a substitute for vitamin-A in rats. H. C. CAMERON (Science, 1932, 76, 18-19).-Experiments on albino rats confirm the statement that FeI_2 syrup is without effect on the xerophthalmia of rats deficient in vitamin-A. FeI_2 cannot replace vitamin-A in curing or preventing the terminal infections characteristic of this deficiency.

L. S. T.

Carotenoids and vitamin-A in animal and plant organs. H. VON EULER, U. GARD, and H. HELLSTRÖM (Svensk Kem. Tidskr., 1932, 44, 191— 198).—Carotene occurs in all of the following fish roes in addition to the carotenoids mentioned. Sole; cod and Lota vulgaris, xanthophyll; Hippoglossus, xanthophyll and zeaxanthin; pike, xanthophyll and chlorophyll. Pike spermatozoa contain small amounts of carotene. A bone-marrow extract (ox) did not show absorption at 328 mµ. Rat suprarenals are very rich in carotene (56.9 blue units per g.). Carotene also occurs in calf thymus, ox spleen (a trace), and, with xanthophyll, in the anthers of tulips and narcissi, and narcissus pollen. A. C.

Production of vitamin-A by a species of Corynebacterium. C. E. SKINNER and M. F. GUNDERSON (J. Biol. Chem., 1932, 97, 53—56).—Xerophthalmia in rats suffering from vitamin-A deficiency was cured and the rats increased slightly in wt. when fed 1 g. of dried bacteria daily from a culture of Corynebacterium made on a vitamin-A-free medium in the dark.

A. C.

Formation of vitamin-A from carotene in the animal organism. J. L. REA and J. C. DRUMMOND (Z. Vitaminforsch., 1932, 1, 177—183).—Contrary to Olcott and McCann (this vol., 97), the formation of vitamin-A is not observed when liver preps. from vitamin-A-deficient rats and cats are incubated with carotene. Attempts to prepare "carotenase" from the livers failed. The vitamin-A content of cat's liver does not increase after carotene administration either by injection of a colloidal suspension into the portal vein or orally. In the liver experiments considerable destruction of carotene occurs *in vitro* and *in vivo*. A carnivorous species appears to lack the function of converting carotene into vitamin-A.

A. C.

Vitamin-B in egg-yolk. K. SZYMAŃSKA (Poznań. Tow. Przy. Nauk. Prace Kom. Mat. Przyrod., 1931, VIB, 32 pp.).—The vitamin consists of 2 fractions, one (40%) being sol. in H_2O and exhibiting 40% of the total activity; the insol. fraction appears to be inactive. CH. ABS.

Isolation of oryzanin (antineuritic vitamin) from rice polishings. II. S. OHDAKE (Proc. Imp. Acad. Tokyo, 1932, 8, 179—182).—Analyses of oryzanin hydrochloride (I), m.p. 249—250° (decomp.) (A., 1931, 881) [and the corresponding *picrolonate*, m.p. 226° (decomp.), *picrate*, m.p. 208° (decomp.), *chloroaurate*, m. p. 189° (decomp.), and *chloroplatinate*, blackens at 245—250° without melting], support the formula $C_{12}H_{16}O_2N_4S$,2HCl. Pigeons and rats fed on a vitamin-*B*-free diet are cured and protected by 0·0025—0·01 mg. of (I) per day. H. B.

Effect of partial depletion of vitamin-B complex on the learning ability of rats. S. MAURER and L. S. TSAI (J. Nutrition, 1931, 4, 507-516).— Partial depletion of vitamin-B reduced the learning ability of rats in maze tests. Offspring of depleted animals regained normal ability if fed on a diet rich in vitamin-B. A. G. P.

Avitaminosis. XI. Specific effect of vitamin-B on growth as evidenced by the use of vitamin-B concentrates. B. SURE (J. Biol. Chem., 1932, 97, 133—139).—Experiments in which the plane of nutrition is controlled indicate that vitamin-B has a sp. influence on the growth of rats in addition to producing growth by stimulation of appetite. The sp. influence is shown by daily doses of 1-2 mg. of concentrates of vitamin-B complex, and 0.5-1 mg. of vitamin- B_1 concentrates. A. C.

Isolation and identification of vitamin-C. W. A. WAUGH and C. G. KING (J. Biol. Chem., 1932, 97, 325-331; cf. this vol., 657).-A solution of the purified vitamin in PrOH-petrol (this vol., 201), from which the active material can be pptd. by addition of Pb(OAc)₂ in MeOH, was evaporated to dryness and the residue extracted with EtOAc. The extract was conc. to 5 c.c. and an equal vol. of petrol added at the temp. of solid CO_2 , yielding a pale yellow cryst. material which on re-extraction with EtOAc gave a sol. cryst. solid identical with the hexuronic acid of Szent-Györgyi (A., 1929, 98; 1931, 533; this vol., 657) and an insol. fraction which, on drying, yielded crystals resembling the lactone form of the acid. The protective val. for guinea-pigs was approx. 0.5 mg. per day. That methylnornarcotine functions as vitamin-C (this vol., 310) could not be confirmed. F. O. H.

Value and limits of chemical vitamin reactions of cod-liver oil. II. Chemical examination of cod-liver oil for vitamin-D. W. BRANDRUP (Pharm. Ztg., 1932, 77, 728).—The violet colour reaction of cod-liver oil with P_2O_5 survives autoclaving at 135° and 3 atm. for 1 hr. It is not given by vigantol and is therefore not sp. for vitamin-D. A. C.

Examination of special foods for antirachitic activity. L. WAMOSCHER and A. SCHMIEDEN (Münch. med. Woch., 1932, 79, 51-53; Chem. Zentr., 1932, i, 1261).—The Ca: P ratio in the total meal must be 4:1. Preps. rich in P should first be rendered low in P. Only preps. having a rat-protection dose under 0.05 g. daily are suitable for human prophylaxy and therapy. A. A. E.

Accessory food factors. Fat-soluble vitamin requirements of cattle and pigs during growth. H. ISAACHSEN (J. Agric. Sci., 1932, 22, 460–484).— Trials with numerous commercial feeding stuffs indicate that pigs are much more likely to suffer from mineral deficiency (especially Ca, Na, and P or an unsuitable Ca: P ratio) than from shortage of fat-sol. vitamin. Mixtures of ground limestone and NaCl or of NaCl and bone meal are effective mineral supplements. A high-grade herring meal is a good source of vitamin-D for pigs on a deficient diet.

A. G. P.

Irradiated milk : the amount of energy required to prevent rickets in chickens. G. C. SUPPLEE, R. C. BENDER, and M. J. DORCAS (J. Biol. Chem., 1932, 97, 63—69; cf. this vol., 548).—The antirachitic activity of irradiated milk in dry form is determined in terms of the protection given to growing chickens against rickets. A min. of 1328×10^3 ergs of energy between 2000 and 3000 Å. must be applied per c.c. of milk to prevent rickets. The calc. vitamin-*D* content of this milk is $1\cdot 29 \times 10^{-6}$ g. per litre. A daily intake of $0\cdot 0267 \times 10^{-6}$ g. of vitamin-*D* per 100 g. of body-wt. did not prevent rickets completely, whilst $0\cdot 0341 \times 10^{-6}$ g. daily prevented rickets up to 8 weeks of age. A higher dose was not superior in antirachitic effect. A. C.

Reaction of the chicken to irradiated ergosterol and irradiated yeast as contrasted with the natural vitamin-D of fish-liver oils. H. STEEN-BOCK, S. W. F. KLETZIEN, and J. G. HALPIN [with F. HANNING, J. T. LOWE, V. M. TEMPLIN, and R. W. HAMAN] (J. Biol. Chem., 1932, 97, 249-264).— Whereas normal bone production is produced in chickens by the inclusion of 1% of normal cod-liver oil in the diet, it requires 40-120% equivalence as cod-liver oil of irradiated ergosterol and 7.5-60%equivalence of irradiated yeast to produce the same result. Satisfactory results are also obtained with 4% egg meal and 1.6% of an irradiated Penicillium. Burbot-liver oil has an antirachitic potency equal to that of cod-liver oil. Excessive dosage of irradiated ergosterol gives rise to a toxicity manifested by anorexia, loss in body-wt., increase in serum-Ca, and decrease in serum-P. That the feeding of irradiated ergosterol in maize or cod-liver oil is accompanied by the same degrees of antirachitic efficiency and toxicity indicates that the vitamin-D of irradiated ergosterol is a different substance from that of cod-liver oil. Administration of carotene has no effect on the antirachitic activity of irradiated ergosterol.

F. O. H.

Vitamin-D and the conservation of calcium in the adult [rat]. I. S. W. F. KLETZIEN, V. M. TEMPLIN, H. STEENBOCK, and B. H. THOMAS (J. Biol. Chem., 1932, 97, 265—280).—The skeletons of adult rats fed on a rachitogenic diet of high Ca: P ratio yield a low ash. The decrease is reduced but not prevented by addition of vitamin-D to the diet. With rats on a stock diet two successive pregnancies, uncomplicated by lactation, do not significantly affect the ash content of the femur (cf. A., 1930, 808), whereas a marked reduction in the ash occurs on lactation despite ample provision of Ca, P, and vitamin-D in the diet. Thus the theory that factors other than vitamin-D are concerned with loss of Ca during lactation receives further support. F. O. H.

Immunological differentiation of normal and irradiated ergosterol. E. BERGER and H. SCHOLER (Klin. Woch., 1932, 11, 158; Chem. Zentr., 1932, i, 1260).—Treatment of rabbits with ergosterol (I) + pig serum affords immune serum towards (I). Such sera do not react with the purified irradiation product of (I). Anti-cholesterol sera give with (I) and particularly with the purified irradiation product a slighter complement fixation than that of antiergosterol sera with (I). A. A. E.

Distance- and contact-action of irradiated substances. O. RIED (Arch. exp. Path. Pharm., 1932, 166, 592—602).—The nature of the photoactive effect due to substances such as irradiated fat is discussed. The effect from irradiated fats is

increased by the presence of metals and their salts. Ultra-violet irradiation of aq. NaCl or KCl results in a marked change in the growth of bean roots immersed in (contact-action) or above (distance-action) such solutions. A distance-action on bean seedlings is also shown by irradiated earth, Al, and Sn. The influence of the emanation on bacterial growth, the growth of mice (both with distance-action and with feeding of irradiated salts), the inheritance of tail necrosis, and the growth of Ehrlich mouse carcinoma is described. F. O. H.

Effects of carbon monoxide on the oxygen consumption and carbon dioxide production of germinating seeds of *Lupinus albus*. P. S. Tang (J. Gen. Physiol., 1932, 15, 655—665).—CO reversibly inhibits the O_2 consumption of germinating seeds of *L. albus* to a max. extent of 36% with a mixture of 24% O_2 and 76% CO at 18° in darkness. Illumination prevents inhibition. On returning to air, O_2 consumption increases up to 68% above the original consumption in air. CO does not inhibit CO₂ production. A. L.

Fat and fatty acid contents of seeds of Gramineae in relation to light effects on germination. H. KUMMER (Ber. deut. bot. Ges., 1932, 50, 300– 303).—Seeds of high fatty acid content germinate in darkness more readily than do those of lower acid contents. A. G. P.

Course of growth of agricultural plants. III. Maize, buckwheat, flax, tobacco, and poppy. H. WAGNER (Z. Pflanz. Düng., 1932, 26A, 8–57; cf. B., 1932, 696).—Variations in the % of N, P, K, Ca, and org. substances during the whole growth period are recorded and discussed. Relationships between the "relative vals." of the nutrients taken up (*i.e.*, % of max. content) to the relative vals. of dry matter produced in the same growth period offer a basis of plant classification from the point of view of nutritional physiology. A. G. P.

Distribution of some reserve substances in hard winter wheat plants at successive growth stages and their possible utilisation. R. C. MAL-HOTRA (J. Agric. Sci., 1932, 22, 485—496).—Plants contained lower proportions of H_2O in the early stage of winter growth and at maturity than during the major period of growth. Ash constituents are at a max. in seedlings, decreasing later and increasing again towards maturity. The oil content reached a max. at maturity. Sugar was low in seedlings, increasing later and declining again with the ripening of the grain. Starch occurred early in growth but disappeared later. The total N content was low in young plants but increased later. Hemicellulose reached a max. in spring but decreased later. A. G. P.

Physical and chemical changes in the ripening of deciduous fruits. F. W. ALLEN (Hilgardia, 1932, 6, No. 13, 381-441).—Changes in pigmentation and softening of fruits in storage are recorded. The proportion of sol. solids in plums, pears, and peaches increases during ripening on the tree and is approx. double that of total sugars. The increased sugar content during colouring on the tree consisted mainly of sucrose in stone fruits, sucrose and reducing sugars in apples, and reducing sugars in pears. Apples and pears, normally harvested prior to full ripeness, show a decrease in starch and a considerable gain in sugar content after picking. During maturity on the tree there is a decrease in the acidity of apricots, apples, and most plums and peaches. Treatment of apples with C_2H_4 hastens the softening and yellowing of the fruit, the effect being most marked in early-picked apples and in those treated at 21°. Fruit treated at 10° showed marked changes in starch, sugar, and acid contents. The effects of C_2H_4 varied considerably with different fruits and with different varieties of the same fruit. A. G. P.

Hydrolysis in green plants by moonlight. E. S. SEMMENS (Nature, 1932, 130, 243).—Starch disappears in the leaves of the vine, spinach, and *Tropæolum* exposed to moonlight at the time of max. polarisation. L. S. T.

Effects of tartaric acid and glucose on the metabolism of vine leaves. E. T. EVERINGHAM and W. H. PEARSALL (Proc. Leeds Phil. Soc., 1932, 2, 303—308).—The rate of hydrolysis of protein in vine leaves is reduced by both tartaric acid and glucose. The rate of deamination of $\rm NH_2$ -acids and that of carbohydrate loss are reduced by addition of tartaric acid. Age of leaf and illumination also play a part in these effects, young leaves, or leaves illuminated by weak light, being affected most. The addition of glucose results in a tendency towards protein synthesis. A. J. M.

Pithecolobium saman. L. VAN ITALLIE (Pharm. Weekblad, 1932, 69, 941–963).—From the bark of *Pithecolobium saman* have been isolated gallic and tannic acids, glucose, sucrose, fatty materials, a *phytosterol*, two *alkaloids*, $C_8H_{17}ON$ (*hydrochloride*, $[\alpha]_D^{*} - 13 \cdot 90^{\circ}$; *Au* salt, m.p. 184–185°) and $C_{17}H_{36}ON_3$ (pithecolobine; I) $[\alpha]_D^{*} - 12 \cdot 02^{\circ}$ in EtOH (*dihydrochloride* $[\alpha]_D^{*} - 19 \cdot 27^{\circ}$; *Au* salt, m.p. 178–181°), and a *saponin* (samanin; II), $[\alpha]_D^{*} - 16 \cdot 1^{\circ}$. (I) reacts with all alkaloid reagents except tannic acid, but contains no alkyl and probably no 'CO groups, does not form Ac or Bz derivatives, and does not reduce aq. NH₃-Ag solution; it is alkaline, and distils in "abs. vac." at 224°. On distillation with Zn dust it yields piperidine and NH₂Me. (II) yields on hydrolysis the *compound* $C_{23}H_{36}O_4$ (37.27%), m.p. 215–216°, $[\alpha]_D^{*} - 16^{\circ}$, probably $C_{21}H_{31}(OMe)(OH)(CO_2H)$, and arabinose (12.10%), rhamnose (15.84%), glucose (34.30%), and glycuronic acid (trace). The physiological actions of (I) and (II) are described. H. F. G.

X-Ray study of chitins of Aspergillus niger, Psalliota campestris, and Armillaria mellea. V. KHOUVINE (Compt. rend., 1932, 195, 396—397).— Animal chitin has the same X-ray spectrum as that from A. niger, P. campestris, and A. mellea. The N contents are also identical. H. D.

Phytochemistry. I. Sugars of the gum of Viscaria vulgaris (Lychnis viscaria, L.). E. VOTOČEK and F. VALENTIN (Coll. Czech. Chem. Comm., 1932, 4, 282—284).—Hydrolysis of the gum [obtained by extraction of the glutinous portions of the stems with boiling H_2O , evaporation of the aq. extract, clarification with Pb(OAc)₂, removal of Pb with H_2S , further evaporation to a syrup, and pptn. with EtOH] with 1% H_2SO_4 at 100° (bath) gives glucose and d-xylose. H. B.

Two constituents of Parosela barbata (Oerst.), **Rydb.** J. R. SPIES and N. L. DRAKE (J. Amer. Chem. Soc., 1932, 54, 2935–2938).—Extraction of the ground plant with C_6H_6 gives 0.075% of montanyl alcohol, $C_{29}H_{60}O$, m.p. $84-84\cdot5^\circ$ (phenylurethane, m.p. 96°; iodide, m.p. $64-64\cdot5^\circ$), and 0.6% of an oil, b.p. 95–110°/4–5 mm., which adds Br, decolorises neutral KMnO₄, does not reduce Fehling's solution, and is toxic (concn. of 1: 10,000 at 27°) to goldfish. C. J. W. (b)

Coffee bean. I. Unsaponifiable matter of the coffee bean oil. Preparation and properties of kahweol. R. O. BENGIS and R. J. ANDERSON (J. Biol. Chem., 1932, 97, 99—113).—The unsaponifiable part of the oil extracted from roasted coffee beans with light petroleum contains kahweol, $C_{19}H_{26}O_{3}$, m.p. 143—143.5° (softens 142°), $[\alpha]_{1}^{21}$ —161.06° (.4c derivative, m.p. 132—134° (+EtOH, $\frac{1}{2}H_2O$), m.p. 142—144° (sinters 125°, softens 133—134°, remelts after solidifying 136—137°)], reduced (H₂-colloidal Pt) to a substance, $C_{19}H_{32}O_3$, m.p. 171—172° (softens 165—166°, clears 175°) [Ac₂ derivative; dinaphthyl-urethane, m.p. 128° (softens 118°)] and an Et₂O-insol. substance. Kahweo lis sensitive to light, air, and acid, but stable to alkali. A sterol, $C_{27}H_{45}$ ·OH, H₂O, m.p. 138—139° (resolidifies 127—126°, remelts 138°), was also isolated. A. A. L.

Catechin of the cacao bean. K. FREUDENBERG, R. F. B. Cox, and E. BRAUN (J. Amer. Chem. Soc., 1932, 54, 1913—1917).—Contrary to Adam *et al.* (A., 1931, 535), *l*-epicatechin (and not *l*-acacatechin) is present in the cacao bean. Various papers of Nierenstein are criticised. C. J. W. (b)

Alkaloids of Argemone mexicana. A. C. SAN-TOS and P. ADRILEN (J. Amer. Chem. Soc., 1932, 54, 2923—2924).—Schlotterbeck's assumption (A., 1902, ii, 101) that A. mexicana contains berberine and protopine is correct. C. J. W. (b)

Croton-seed. III. Improbability of the existence of Tuson's alkaloid, and the presence of sucrose and glucose glucosides in croton-seed. E. CHERBULIEZ, K. BERNHARD, and E. EHNINGER (Helv. Chim. Acta, 1932, 15, 855—856; cf. this vol., 665).—Extraction of croton-seed (but not the oil therefrom) with H_2O gives sucrose. Neither the seed nor the oil contains an alkaloid (cf. J.C.S., 1864, 17, 195). The commercial oil contains 0.025% N. The MeOH extract of the seed, when freed from crotonoside and then hydrolysed, gives the aminohydroxypurine and a mixture of reducing sugars, probably containing glucose. R. S. C.

Formation of betaines and of alkaloids in plants. I. Formation of stachydrine and trigonelline. G. KLEIN and H. LINSER (Z. physiol. Chem., 1932, 209, 75—96).—Stachydrine and trigonelline are determined by colorimetric determination of the Bi in the ppt. obtained with K Bi iodide. The greatest amount of these substances was found in the blossoms and roots of the plants examined. Etiolated shoots of *Trigonella farnum graecum* contained more trigonelline after 6—15 days' germination than green shoots, later less. The effect of the injection of various NH_2 -acids into the hollow stems of plants was investigated. Proline, ornithine, and glutamic acid produced a marked increase in the betaine, glycine none. Addition of hexamethylenetetramine as source of CH_2O to proline gave a considerable increase. These findings agree with theoretical conceptions as to the origin of alkaloids in plants. J. H. B.

Occurrence and detection of choline in tobacco seeds and leaves. F. E. NOTTBOHM and F. MAYER (Z. Unters. Lebensm., 1932, 63, 620-623).—An extension of the authors' method (B., 1932, 367, 701) to the seeds or press-cake of tobacco after defatting with CHCl₃. Fat-free Nicotiana rustica contained 0.0651 and 0.0575%, and N. tabacum 0.0689 and 0.0576% (press-cake and seeds, respectively), and the fatty portions only traces of choline. The determination of nicotine and choline in tobacco is described. J. G.

Plant dyes. XLI. Taraxanthin from Tussilago farfara. P. KARRER and R. MORF (Helv. Chim. Acta, 1932, 15, 863—864).—The dried petals of Tussilago farfara yield to ligroin an ester of taraxanthin and, possibly, some violaxanthin. The apparently incomplete reduction of dihydrolycopene (cf. Kuhn and Lederer, this vol., 782) is due to instability of the dihydro-compound. R. S. C.

Synthesis of carotenoids in plants. H. VON EULER and E. KLUSSMANN (Svensk Kem. Tidskr., 1932, 44, 198—204).—The suggestion that polyenes and carotenoids are synthesised by a multiple aldol condensation of units of β -methylcrotonaldehyde is discussed. Carotenoids are probably not intermediates in the synthesis of sterols by yeast, but sterols may be directly synthesised from crotonaldehyde. A. C.

Spectrophotometric analyses of the colours and the content of pigments of autumnal foliage. C. SHEARD (Proc. Staff Mtg. Mayo Clinic, 1932, 7, 130—131).—As leaves of sumac, oak, and poplar change in colour the amount of chlorophyll *a* decreases, whilst that of chlorophyll *b* and of carotenoids changes little. The autumnal colours are ascribed chiefly to the diffusion of chlorophyll *a* at low temp. CH. ABS.

Juices of the leaves of Monarda punctata and M. fistulosa. A. A. HARWOOD (J. Amer. Pharm. Assoc., 1932, 21, 569—570).—The juice from the leaves of M. punctata and M. fistulosa contain 9.7 and 6.2% of bound H₂O, 1.41 and 1.48% of ash, 0.46 and 1.39% of reducing sugars, and 0.12 and 0.01% of invert sugar, respectively. R. S. C.

Fresh juice of the maguey plant (Manso fino, Karw.). M. D. JONES (J. Amer. Pharm. Assoc., 1932, 21, 574—575).—Dry maguey leaves yield to Et_2O an oil, from which an *aldehyde*, $(\text{C}_3\text{H}_5\text{O})_z$, m.p. 237—240° (decomp.), was obtained. R. S. C.

Chemical changes accompanying the fermentation of apple juice with and without the addition of sodium benzoate. C. F. POE, R. C. MEEHAN, and B. H. LINCOLN (Univ. Colorado Stud., 1929, 17, 1-16).—In apple juice containing NaOBz there was only a slight decrease in 126 days in total solids and sugars; very little sucrose was hydrolysed. There was little increase in volatile acid and a rapid increase in fixed acid. In absence of NaOBz the EtOH was max. in 31 days and thereafter decreased. CH. ABS.

Mineral composition of dates. M. M. CLEVE-LAND and C. R. FELLERS (Ind. Eng. Chem. [Anal.], 1932, 4, 267—268).—The ash of the edible portion of dates contains about 40% K₂O, 4—7% CaO, and 7—10% P_2O_5 ; the alkalinity is high. E. S. H.

Degree of pigmentation and its probable relationship to the mineral constituents of honey. H. A. SCHUETTE and K. REMY (J. Amer. Chem. Soc., 1932, 54, 2909—2913).—The amounts of SiO_2 , Fe, Cu, and Mn in the ash from 22 samples of honey are determined. A relationship apparently exists between the degree of pigmentation and the mineral content (notably Mn and Cu).

C. J. W. (b) Accumulation of molybdenum in some aquatic plants. H. TER MEULEN (Rec. trav. chim., 1932, 51, 549—550).—*Azolla*, growing in H₂O containing only traces of Mo, contains 1.12 mg. of Mo per kg. of dry plant. Marine algæ contain Mo.

R. S. C. Concentration of potassium isotopes in plants. II. K. HELLER and C. L. WAGNER [with K. PEH and B. MENDLIK] (Z. anorg. Chem., 1932, 206, 152—160; cf. A., 1931, 1342).—Contrary to the results of Loring and Druce, at. wt. determinations of K in cabbage, sugar beet, and potatoes failed to show that any concn. in the isotope K⁴¹ had taken place.

M. S. B.

Accidental occurrence of selenium in certain vegetation. TABOURY (Compt. rend., 1932, 195, 171).—By ashing plants of Sium latifolium and Pastinaca sativa which had grown near a Se-containing spring, adding HCl to the H_2O -sol. residue, evaporation nearly to dryness, and the addition of aq. NaHSO₃ a red ppt. of Se appears. H. D.

Germination of pollen and chemical stimulation. Microchemistry of pollen. A. NIETHAM-MER (Biochem. Z., 1932, 249, 412-420; cf. A., 1929, 1112).—Pollen from many species of plants is not induced to germinate by treatment with 0.0001%solutions of inorg. (e.g., MnSO₄, KI) or org. (e.g., peptone, malic acid) stimulants. In pollens which can be stimulated thus the extent of the action depends on the degree of ripeness, but the stimulants are not sp. in their action. Pollens which germinate with moderate ease are most stimulated. Thyroid has a surprisingly favourable effect on the germination, $MnSO_4$ is often favourable, and heavy metal compounds are only very slightly unfavourable. Digitonin is favourable and malic acid stimulates germination of pollen from apple blossom. Pollens which produce no sugar are usually incapable of germinating; changes in sugar content occur on keeping in some cases and small amounts of org. acids are always present in species which germinate well. Great variations are found in the constituents of the ash of pollens; these constituents may affect germination. Usually P and K are present, Fe, Na, and Mg rarely. The nature of the envelope of the pollen grains has no effect on their capability to be stimulated to germination. W. McC.

Concentration-power of cytoplasm ; formation of crystals of neutral-red in pollen grains. L. PLANTEFOL (Compt. rend., 1932, 195, 264—266).— Crystal formation takes place in certain varieties of *Prunus* in the pollen grains after several hrs.' immersion in neutral-red solutions (5—75 in 100,000). P. G. M.

Concentration of cell-sap of mulberry leaf. Y. IMAMURA and M. FURUYA (Bull. Sericult. Silk Ind., Japan, 1932, 4, 7).—The concn. of the sap increases for the various leaf cells in the following order: upper epidermis, lower epidermis, spongy parenchyma, and palisade parenchyma; it also varies with the part of the stem on which the leaf grows. In young leaves the concn. is lower, and in fully matured ones higher, whilst in over-matured leaves it is again lower. B. P. R.

Physical and chemical properties of the cellsap of *Halicystis ovalis* (Lyngb.), Aresch. G. J. HOLLENBERG (J. Gen. Physiol., 1932, 15, 651–653).— The cell-sap of *H. ovalis* has d^{25} 1.0257, v.p. same as sea-water (s), Cl' 1.926—1.978% (s, 1.851%), SO₄" 0.013% (s, 0.279%), $p_{\rm H}$ 5.4 (s, 8.15), $n_{\rm D}$ 1.3384 (identical with that of s). A. L.

Osmotic relationships between host plant and parasite. M. LILIENSTERN (Ber. deut. bot. Ges., 1932, 50, 337-340).—The osmotic concn. of the sap of *Cuscuta* is higher than that of *Cicer* but lower than that of *Melilotus albus*. Cryoscopic methods for such determinations are unsatisfactory and plasmolytic methods must be used. Certain data for saprophytic plants (Harris and Harrison) need reconsideration.

A. G. P.

Accumulation of electrolytes. V. Models showing accumulation and a steady state. W. J. V. OSTERHOUT and W. M. STANLEY (J. Gen. Physiol., 1932, 15, 667-689).-The accumulation of electrolytes in Valonia is investigated by means of a model consisting of a non-aq. layer (70% guaiacol and 30% p-cresol) placed between an alkaline aq. phase (0.05M-KOH or 0.05M-KOH and 0.05M-NaOH) and an acid aq. phase (CO_2) . The order of penetration in the model is the same as in Valonia, viz., K>Na>Ca>Mg>Cl>SO₄, and salt formation in the acid phase causes an increase in K. Na, and osmotic pressure. No equilibrium occurs, but a steady state is reached in which H₂O and salt enter at the same rate. A. L.

Direct detection of the migration of materials in the sieve tubes of plants. W. SCHUMACHER (Naturwiss., 1932, 20, 364—365; cf. A., 1931, 1099). —Fluorescein, activated by ultra-violet light, can be used to show the direction and velocity of the translocation of materials in the sieve tubes of plants. W. R. A.

Trustworthiness and limits of application of common methods of determining the osmotic concentration of plant cell-saps. H. R. OPPEN-HEIMER (Planta [Z. wiss. Biol.], 1932, 16, 467—517).— Results of cryoscopic and plasmolytic methods showed general agreement for leaf cell-saps of a no. of plants. The cryoscopic method was the more trustworthy, since it is less affected by the condition of cell membranes at the time of examination.

A. G. P.

Determination of bound water in plant tissue. J. D. SAYRE (J. Agric. Res., 1932, 44, 669-688).--Comparison is made of the cryoscopic method (lowering of the f.p. by sucrose additions), the calorimeter method (heat required to thaw frozen H_2O), and the dilatometer method (expansion during freezing) for determining the "free" H_2O in tissues. The calorimeter method is recommended although both it and the dilatometer method are subject to changes in the free : bound H_2O ratio during freezing. A. G. P.

Changes in the cells of Spirogyra associated with the presence of water polymerides. F. E. LLOYD and T. C. BARNES (Proc. Nat. Acad. Sci., 1932, 18, 422—427).—The cells of Spirogyra, cultured in pure melted ice, grow and divide more rapidly than when cultured in condensed steam. The difference is ascribed to the different states of polymerisation of the H_2O , the $(H_2O)_3$ form increasing growth. H. D.

Nutritional aspects in mottle-leaf and other physiological diseases of citrus. A. R. C. HAAS (Hilgardia, 1932, 6, No. 15, 484-559).—In H₂O-cultures roots of lemon seedlings were injured by 5 p.p.m. of Zn in the nutrient. Mottled leaves were produced by 2-5 p.p.m. of B. Picric acid in the nutrient caused mottling of a different type. In soil cultures the excessive use of fertilisers containing urea produced yellowing and mottling of leaves. High proportions of NH_4 salts were also injurious, especially when the NO_3' supply was low. NaNO₃ was non-injurious except in poorly-drained soils. Leaching of soil with very dil. H2SO4 or H3PO4 resulted in gum formation in orange leaves. Chromates, but not Cr salts, were very toxic. In soils treated to produce high K and low Ca contents premature leaf-fall occurred. Chlorotic leaves sprayed with Fe solutions showed darkening spots where each drop of solution dried. Addition of 20 p.p.m. of CuSO₄ to culture solutions induced a mosaic appearance in leaves. In sand cultures high [Cl'] was injurious even where Ca^{**} was the dominant cation. In the absence of sol. Ca^{**} (other than that derived from CaCO₃) K salts were more injurious than those of Na. Mottled leaves contained higher proportions of Na and K and less Ca than healthy leaves. The ratio insol. Ca: insol. ash is approx. the same in mottled and healthy leaves. The maintenance of an optimum % of sol. Ca in the nutrient is essential for healthy leaf growth. Excess of Mn produced varied conditions of mottling and gumming of leaves but no tip-burn. A. G. P.

Filtration of plant viruses. D. MACCLEMENT and J. H. SMITH (Nature, 1932, 130, 129-130).--Difficulties in the prep. and use of graded collodion membranes are discussed. Plant viruses differ markedly in size. By the use of these membranes two viruses occurring in the same plant can be separated. L. S. T.

Filtration of plant viruses. K. M. SMITH (Nature, 1932, 130, 243).—Results obtained with potato mosaic viruses and collodion membranes are described. L. S. T.

Microchemical reactions in plant tissues. W. M. GLESIN (Pharm. Zentr., 1932, 73, 420—422).— Staining tests (which can be produced direct on tissue sections and observed under the microscope) with simple reagents (e.g., H_2SO_4 , H_2SO_4 with EtOH vanillin solution, •HNO₃, furfuraldehyde, etc.) are described for Semen colchici, S. sabadillæ, S. hyoscyami, S. stramonii, S. strychni, Radix ipecacuanhæ, and Tubera aconiti. E. L.

Use of basic fuchsin in plant anatomy. W. H. CAMP and F. G. LIMING (Stain Tech., 1932, 7, 91– 93).—The cut ends of living plants are immersed in mixture of 1 part of 2.5% basic fuchsin in 95% EtOH to 2 parts of faintly alkaline H₂O until the dye has traversed the vascular bundles of herbaceous plants or the H₂O-conducting system of woody plants, which can then be studied. H. W. D.

Rapid digestion of biological material for analysis. A. BOLLIGER (Austral. J. Exp. Biol., 1932, 10, 57–60).—Dry or wet material is digested with 60% $HClO_4$, HNO_3 , and H_2O_2 . On evaporation to dryness, any NH_4ClO_4 decomposes, leaving a N-free ash. A. C.

Destruction of organic substances for toxicological tests. M. DUYSTER (Z. Unters. Lebensm., 1932, 63, 501-503).—Complete destruction is obtained by heating at 125° for 30 min. under reflux with 30 pts. of conc. H_2SO_4 and 60 pts. of perhydrol. To avoid loss of Pb, Hg, etc. a tube is attached to the top of the condenser, dipping into more acid perhydrol mixture which is sucked back down the condenser on cooling. E. B. H.

Permanent nitroprusside solution for acetone tests. R. M. HILL (J. Lab. Clin. Med., 1932, 17, 375).—Na nitroprusside (2-10%) in 2% H₂SO₄, when stored in brown glass bottles, does not deteriorate in 6 months. CH. Abs.

Determination of porphyrin with the stepphotometer. R. FIKENTSCHER (Biochem. Z., 1932, 249, 257-269).—An accurate method for use with small amounts of biological fluids is described.

W. McC.

Direct nesslerisation micro-Kjeldahl method for nitrogen. Determination in organic compounds and biological fluids. E. S. WEST and A. L. BRANDON (Ind. Eng. Chem. [Anal.], 1932, 4, 314-315).—Blood filtrates and urine are rapidly and completely digested by H_2SO_4 (1:1) containing approx. 0.2% Se. In the analysis of difficultly oxidisable substances, the digestion mixture is preferably saturated with K_2SO_4 . E. S. H.

Micro-determination of sulphate in biological material. S. MORGULIS and M. HEMPHILL (J. Biol. Chem., 1932, 96, 573—583).—The material, freed from PO₄, is digested with fuming HNO₃ and H_2O_2 , the ash dissolved in H_2O , and $SO_4^{\prime\prime}$ in the solution pptd. as BaSO₄ by addition of an aq. HCl solution of BaCrO₄. Excess of BaCrO₄ is pptd. by making

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the liquid alkaline with $\rm NH_3$, $\rm BaSO_4$ and $\rm BaCrO_4$ are removed by centrifuging, and $\rm CrO_4''$ in the supernatant fluid is determined iodometrically. The method is applicable to urine from which uric acid and other interfering substances are removed by a mild preliminary oxidation with $\rm H_2O_2$ and a trace of FeCl₃. F. O. H.

Triple acetate method for determination of sodium in biological material. P. W. SALIT (J. Biol. Chem., 1932, 96, 659-672).—The solution (2 c.c. containing 0.05-0.5 mg. Na) is pptd. with U Zn acetate reagent (6 c.c.) and EtOH (2.1 c.c.) added in aliquots of 0.3 c.c. with stirring between each addition. The ppt. is separated, washed with a saturated solution of Na U Zn acetate in AcOH, and the amount of ppt. determined either directly by weighing or colorimetrically with K₄Fe(CN)₆ according to the quantity of ppt. The application of the method to serum, whole blood, urine, faces, tissue, and ocular fluids is described. F. O. H.

Determination of phosphorus in calcium magnesium inositolphosphate. T. BODALSKI (Wiad. Farm., 1931, 58, 683—684, 697—699).—The ground seeds are treated for 6 hr. with excess of 5% AcOH; inositolphosphates are pptd. with NH₃ from the filtrate, and washed with Et_2O -EtOH followed by Et_2O . Fat-free seeds contained (wt.-%): Sesamum indicum 1.40, Fagopyrum sagitatum 0.53, Lens esculenta 0.52, Avena sativa 0.23, Triticum vulgare 0.73, Panicum miliaceum 0.20, Zea mays 0.81, Hordeum vulgare 0.61, Vicia sativa 0.11, Phaseolus vulgaris 0.20, Pisum sativum 0.12, Lupinus luteus 0.16, Cannabis sativa 4.37—8.20, rice bran 1.53, sunflower cake 0.92. The P content of the inositolphosphates depends on the plant, but is always < 22.8%. Vals. are: C. sativa 18.87, S. indicum 18.30, F. sagitatum 21.50, H. vulgare 21.87, T. vulgare 20.21, Z. mays 18.51, L. esculenta 21.49, Helianthus annuus 16.79, rice bran 20.35, 20.68%. Rice and Cannabis inositolphosphates are acidic; others are slightly alkaline. CH. ABS.

Determination of zinc in biological materials. W. R. TODD and C. A. ELVEHJEM (J. Biol. Chem., 1932, 96, 609—618).—The sample (equiv. to 0·1— 2·0 mg. of Zn) is ashed, the ash dissolved in dil. HCl, Na citrate and CuSO₄ are added, and H₂S is passed through the hot solution at $p_{\rm H}$ 3·5. The CuS+ZnS ppt. (cf. A., 1930, 563) is washed, oxidised by H₂O₂, and the sulphide pptn. repeated. Oxidation of this ppt. with aq. HCl+H₂O₂ yields a solution of CuCl₂ and ZnCl₂ from which, after addition of HCl, Cu alone is pptd. by H₂S. Zn is then pptd. from the filtrate as ZnNH₄PO₄ and the P in the ppt. determined colorimetrically (A., 1926, 443). The Zn content of various biological substances is given. F. O. H.

Use of colour filters in colorimetric analysis. R. H. HAMILTON, jun. (Science, 1932, 75, 563-564). —A method for matching the colour of mixtures, such as blood or urine, with pure solutions is described. L. S. T.