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A., I.—GENERAL, PHYSICAL, AND INORGANIC CHEMISTRY

CONTENTS

I.	Sub-atomics .					269	VII. Electrochemistry	
II.	Molecular Structure					271	VIII. Reactions	
$\mathbf{III.}$	Crystal Structure					272	IX. Preparation of Inorganic Substances .	
IV.	Physical Properties	of Su	ıbstan	ces	(not		X. Analysis	
	included above)	•		•		273	XI. Apparatus etc	
V.	Solutions, Dispersions, and Mixtures . 274					XII. Lecture Experiments and Historical		
VI.	Kinetic Theory. Th	ermod	lynam	ics		278	XIII. Geochemistry	

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CONTENTS

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BRITISH CHEMICAL AND PHYSIOLOGICAL ABSTRACTS

A., I.-General, Physical, and Inorganic Chemistry

NOVEMBER, 1943.

I.—SUB-ATOMICS.

Inverse Stark effect of sodium D line. H. Kopfermann and W. Paul (Z. Physik, 1943, 120, 545—552).—The inverse Stark effect produced by passage of Na D radiation through a beam of Na atoms has been investigated in fields up to 250 kv. per cm. The D_1 line consists of two π - and two σ -components, and the D_2 line of two π and four σ -components. In the applied field, the D_1 line is displaced as a whole towards the red, whilst the σ -components of the D_2 line are each split into two. No additional π -components of the D_2 line are found. L. J. J.

Bôle of copper in the tungsten-copper-barium cathode. K. Brüning (*Physikal. Z.*, 1940, **41**, 285—290).—The vaporisation of Cu alone and when covered with a layer of Ba has been investigated. Deactivation curves indicate that a Cu-Ba alloy, not containing W, is formed. The alloy attaches itself to the W wire better than Cu or Ba alone. The emission work for a W-Cu-Ba cathode is 1.05 v. It was determined at various temp. intervals, but no jump was observed in the val. at the m.p. of Cu, as might be expected. A. J. M.

Ionisation produced by single a-rays in different gases. G. Stetter [with W. Jentschke, E. Schachinger, and E. Maresch] (Z. Physik, 1943, 120, 639—651).—The authors' measurements of ionisation in air (A., 1935, 910) are extended to H_2 , N_2 , Ne, A, Kr, and Xe, giving vals. relative to air of 0.99, 0.96, 1.20, 1.26, 1.36, and 1.51, respectively. L. J. J.

Discharge-canal section and discharge produced by laterallyrestricted irradiation. W. Fucks and H. Bongartz (Z. Physik, 1943, 120, 468-475).—Measurements of the lowering (δE) of the discharge potential across a spark-gap by irradiation of the cathode with ultra-violet light show that δE increases rapidly with the area irradiated up to an area corresponding with that operative in spark formation, and much more slowly at greater areas. The operative area increases slowly with length of spark-gap. The space based on this area is called the "electron-canal," in which electronemission without ionisation occurs, and its area is < that of the "canals" corresponding with later stages in the discharge by one or two orders of magnitude. L. J. J.

Classifications of the elements. I. Mainly stable. F. H. Loring (*Chem. Products*, 1943, 6, 51-58, 71).—Some numerical relationships existing between elements and isotopes are pointed out.

A. J. M.

Has a cæsium isotope of long half-life existed ? Interpretation of nusual lines in mass-spectrography. J. Mattauch, H. Ewald, O. Hahn, and F. Strassmann (Z. Physik, 1943, 120, 598-617).—Massspectrographic examination of Ba from pollucite containing 30.77% of Cs₂O shows normal isotope distribution; hence Wahl's identification (Soc. Sci. Fenn., Comm. Phys.-Math., 1940, 10, 18) of the 132 line with ¹³²Ba from β -active ¹³²Cs is incorrect. 80% of the Sr present is derived from β -active Rb (1.60% of Rb₂O present). The high-frequency spark method of ion-production employed gives rise to new lines ascribed to groups of atoms [e.g., C chains (C₂₋₁₅), Na₂Br, BaOH, etc.]. A no. of characteristic lines and isotope groups suitable for mass-assignment in mass-spectrography are given. L. J. J.

Existence of a group of elements in the space reserved for actinium in the periodic system. G. E. Villar (*Proc. 8th Amer. Sci. Congr.*, 1942, 7, 39-43).—On the basis of their electronic structure, Ac, Th, Pa, and U should occupy a single space in the periodic system. F. R. G.

Energy and range of slow *a***-rays.** D. Hacman and O. Haxel (Z. *Physik*, 1943, **120**, 486—492).—Energies of *a*-particles of range <2 cm. have been determined by measurement of ionisation produced by the longest-range individual particles of a beam after interposition of varying thicknesses of air before the ionisation chamber. The method avoids errors due to scattering. The results agree with those of Holloway and Livingston (A., 1938, I, 426), and deviate somewhat from Livingston and Bethe's energy-range relation (*ibid.*, 7). L. J. J.

Normal radium standard. C. Weiss (Z. Physik, 1943, 120, 652-672).—A crit. discussion. 200 Energy expenditure in ionisation by radioactive recoil atoms. C. Gerthsen and E. Grimm (Z. Physik, 1943, 120, 476–485).—The equiv. range of Th-C' recoil atoms in air at atm. pressure is 0.228 mm.; 4700 ion pairs are formed per atom, with an expenditure of 36 e.v. per ion pair formed, in agreement with vals; for a- and H-rays. L. J. J.

Partition relations and energy of disintegration of uranium. A. Flammersfeld, P. Jensen, and W. Gentner (Z. Physik, 1943, 120, 450-467).—The energies of fragments produced simultaneously on both sides of a U film by slow-neutron bombardment give total energy of fragments 120-180 Me.v., and energy- or mass-ratio of simultaneously-formed fragments 0.4:1 to $\sim 1:1$. Equal fragments are not found. The most frequent disintegration process gives 151 Me.v. and mass-ratio 96:140. The results are in qual. agreement with Bohr and Wheeler's theory (A., 1939, I, 595).

Absorption of neutrons in aqueous solutions. Calculation of neutron absorption in the interior of a sphere. O. Haxel and H. Volz (Z. Physik, 1943, 120, 493—507, 507—512).—Scattering and capture of thermal neutrons by AgNO₃ solutions with addition of Cd(NO₃)₂ have been studied as a function of [Ag] and [Cd], giving comparative vals. for absorption cross-sections (σ) of Cd, H, and Ag. Assuming that $\sigma_{cd} = 3.3 \times 10^{-21}$ sq. cm., σ_{H} is 0.24×10^{-24} sq. cm. and σ_{Ag} 5.5 × 10⁻²² sq. cm. The capture-probability for neutrons in the Ag resonance range is $\sigma [Ag]^{0.5}$, being 32% for 25 wt.-% AgNO₃. Several lines are involved in resonance-capture. L. J. J.

Cosmic ray coincidences. W. Kolhörster (Z. Physik, 1943, **120**, 539-544).—The accuracy of simplified methods of computing coincidence data is examined for a range of (mainly existing) data, with a variety of counter-pair arrangements. L. J. J.

Statistical analysis of the coincidences of cosmic rays. A. Banos, jun. (Proc. 8th Amer. Sci. Congr., 1942, 7, 45-46).—Geiger-Muller counters have been installed at Mexico City for the investigation of cosmic rays. F. R. G.

Atmospheric absorption curves and their dependence on the nature of the primary cosmic rays. S. K. Chakrabarty (Indian J. Physics, 1943, 26, 121–129).—Atm. absorption curves for soft primaries have been calc. on the assumption that the no. of particles having energy E is $\alpha E^{-(\delta+1)}$, or that only discrete sets of isoenergetic particles are concerned. Comparison of observed and calc. curves proves the existence of protons in the primary cosmic rays. W. R. A.

Terrestrial magnetic field and its influence on cosmic radiation, M. S. Vallarta (Proc. 8th Amer. Sci. Congr., 1942, 7, 29-38).-A survey. F. R. G.

Hard component of cosmic radiation. H. Kulenkampfi (Z. Physik, 1943, 120, 561-577).—The mutual influence of disintegration and absorption must be taken into account in considering the intensity-variation of the mesotronic cosmic ray component. The intensity with varying absorption thickness (τ) is $\propto \tau^{-\gamma}$, where γ is cost. at 2.1 with increasing inclination of the coincidence apparatus, increases from an initial val. 1.0 with increasing height above ground-level, and increases from 0 with increasing thickness of H₂O. A val. $(1.5 \pm 0.7) \times 10^{-6}$ sec. is found for the mean life. L. J. J.

Anomalous absorption in air and life of the meson. G. Bernardini (Z. Physik, 1943, 120, 413-436).—Measurements of three- and four-fold coincidences at Rome (50 m. altitude), Cervinia (2060 m.), and Pian Rosa (3480 m.) with compensation for atm. thickness above Rome by 35 cm. and 50 cm. of Pb, respectively, and comparison of the effects of interposing 20 cm. of Pb between the second and third counters at each station, gave disintegration-absorption data for air and the mean life-energy relation. The ionisation loss is 1.92 Me.v. per g. per sq. cm. The val. found for the life is $\sim 3 \times 10^{-8}$ sec. per Me.v., assuming a homogeneous hard component originating at <4000 m. and formation of an electron and a neutrino on disintegration. L. J. J.

Direct mass determination of the mesotron by means of elastic collision. L. Leprince-Ringuet, E. Nageotte, S. Gorodetzky, and 270 R. Richard-Foy (Z. Physik, 1943, 120, 588—597).—Measurements on the trace in a cloud-chamber of a single elastic collision of a mesotron with a stationary electron in a magnetic field gave a val. for the mass of the mesotron of $240m (\pm 10\%)$. L. J. J.

"Observable magnitudes " in the theory of elementary particles. W. Heisenberg (Z. Physik, 1943, **120**, 513-538).—Theoretical. Those concepts in existing quantum theory which are independent of later theoretical modifications to account for divergences are discussed. L. J. J.

Probable errors and limits of error in relation to the problem of atomic constants. U. Stille (Z. Physik, 1943, 120, 703—719).—The necessity of recording actual measurements rather than derived vals. is stressed, and the use of international electrical units is recommended. Limits of error are preferred to estimated probable errors in recording results. L. J. J.

II.---MOLECULAR STRUCTURE.

Radiant properties and energy propagation in systems of densely packed similar atoms. F. Möglich and R. Rompe (Z. Physik, 1943, 120, 741-772).—Wave-functions for systems of densely-packed similar atoms are given. Broadening and displacement of absorption and emission frequencies and resonance fluorescence in such systems are calc. The theory explains Scheibe's observations on reversible polymerides of dye mols. L. J. J.

Spectrum of active nitrogen in the Schumann region. B. M. Anand, P. N. Kalia, and M. Ram (Indian J. Physics, 1943, 26, 69-78).—Emission and absorption spectra in the Schumann region of the active N afterglow have been investigated. Freezing-out of the active constituent, and the absence of ${}^{2}D$ and ${}^{2}P$ lines, render the at. hypothesis of Cario and Kaplan (cf. A., 1930, 124) unlikely, and support the mol. theories of Saha and Mathur (cf. A., 1936, 919) and Debeau (cf. A., 1942, I, 313). W. R. A.

Spectroscopic investigations of flames with atomic oxygen. K. H. Geib (Z. Elektrochem., 1941, 47, 275—276).—At. O-C₂H₂ and at. O-MeOH flames are examined. In the O-C₂H₂ flames, attention is focussed on the weak bands at λ 3000—4000 A., attributed by Vaidya (A., 1935, 279) to the CHO radical. O-C₂D₂ flames exhibit similar bands, showing that the radical responsible contains H. Experiments on O-MeOH and O-MeOD flames show that the OH in MeOH is not responsible for the OH emission observed. O atoms with H₂O₂ show no OH emission. J. F. H.

Metal carbonyls. XL. Absorption spectra of rhenium carbonyls. R. Schuh (Z. anorg. Chem., 1941, 248, 276–282).—The absorption spectra of $C_{6}H_{14}$ and dioxan solutions of $\text{Re}(\text{CO})_5\text{Hal}$ and $[\text{Re}(\text{CO})_5]_2$ (cf. A., 1943, I, 283) have been obtained. For the halogen compounds max. absorption occurs at ~3325 and ~2700 A., the max. for $\text{Re}(\text{CO})_5\text{Cl}$ and $\text{Re}(\text{CO})_5\text{B}$ being at slightly lower $\lambda\lambda$ in dioxan than in C_6H_{14} . For $\text{Re}(\text{CO})_5\text{I}$ the difference between the two solvents is very small. $[\text{Re}(\text{CO})_5]_2$ shows only one absorption max., at ~3100 A.; here, also, the influence of solvent is negligible.

C. R. H.

Absorption spectra of some *m*-substituted phenols, and the influence of nucleophilic substituents on electronic mobility. H. H. Hodgson (*J.C.S.*, 1943, 380–382).—The ultra-violet absorption spectra of *m*-substituted phenols, $\text{R-C}_{6}\text{H}_{4}$ ·OH (R = F, Cl, Br, I, OH, Me, OMe, OEt) have been measured in neutral, acid, and alkaline solution, and compared with the absorption spectrum of PhOH. Between 2200 and 3200 A. there is only one absorption band in each case. The band-envelope shifts are in the order F < H < OH, Me, OMe, Cl < OEt < Br < I, in neutral and acid solution, and H < F < Me < OMe < OEt < OH < Cl < Br < I, in alkaline solution. The order of the shifts indicates the difference in *op*-directing power, and agrees with the effects on reactivity.

A. J. M.

Ultra-violet absorption of dyes in solution, and influence of neutral salts on it. K. Chowdhury and C. Bose (Indian J. Physics, 1943, 17, 43-49).—The ultra-violet absorption of a no. of fluorescent dyes [succinylfluorescein (I) and pinakryptol-yellow (II) in glycerol; acriflavine (III), succinyleosin, pinaflavol, aniline-orange, rose-Bengal, and pinakryptol-green in EtOH] has been investigated. The effect of quenching by KI on (I), (II), and (III) has also been investigated, and it is shown that there is practically no change in the absorption curves on addition of KI. This indicates that quenching takes place by collisions of the second kind between mols. of dye and ions of added salt. A. J. M.

Fluorescence of silver halide-gelatin emulsions at low temperatures. --See B., 1943, II, 335.

Some problems of crystalline phosphors and insulators. K. Birus, F. Möglich, and R. Rompe (*Physikal. Z.*, 1943, 44, 122–129).— The quantum efficiency of phosphors is discussed. The fact that reflexion of light is very strong in the region of the fundamental lattice absorption is considered. The connexion between Dulong and Petit's law and the occurrence of multiple collisions, causing the disappearance of luminosity, is emphasised. A. J. M.

Experiments with electrets. I. B. Gross (Anais Acad. Brasil. Cienc., 1943, 15, 63-83).—Application of an intense alternating field during the solidification of a condenser containing molten carnauba wax results in a dielectric hetero-charge and a dia-electric homo-charge. It is concluded that these are electrochemical in character. F. R. G.

Mathematics of turbid media. S. Q. Duntley (J. Opt. Soc. Amer., 1943, 33, 252-257).—A review of existing analyses of the transmission of light through turbid media. L. J. J.

Transmission of light through a cloud of randomly distributed particles. G. N. Ramachandran (*Proc. Indian Acad. Sci.*, 1943, 17, A. 171-186).—The transmission of light through clouds of randomly distributed particles (transparent and opaque) is discussed theoretically. The intensity of transmission diminishes exponentially with the thickness of the medium; attenuation coeffs. have been calc. For transparent particles the transmitted intensity shows spectral variation. W. R. A.

Theory of coronæ and of iridescent clouds. G. N. Ramachandran (*Proc. Indian Acad. Sci.*, 1943, **17**, **A**, 202–218).—A new theory is developed. The theory based on the idea that H_2O droplets act as opaque discs is theoretically unsound and conflicts with experimental facts; allowance must be made for transmission through the droplets. W. R. A.

Identification of interference phenomena by scattering particles in interference fields. E. Mollwo (Z. Physik, 1943, 120, 618-626).— Interferences produced by multiple reflexion at glancing incidence in a wedge-sectioned transparent LiF film condensed on a Ag mirror, and rendered visible by diffusion from local surface irregularities, are used for thickness determination by interference methods. L. J. J.

III.—CRYSTAL STRUCTURE.

Graphical interpretation of X-ray diffraction data using polar coordinates. W. C. White (Amer. Min., 1943, 28, 99-102).

Rules for the conventional orientation of crystals. J. D. H. Donnay (*Amer. Min.*, 1943, 28, 313—328).—Rules intended to apply to all systematic descriptions, either morphological or structural, are detailed. L. S. T.

Symmetrically-excited electronic interferences. W. Kossel, I. Ackermann, and G. Möllenstedt (Z. Physik, 1943, 120, 553-560).— The fine structure and deviation from normal Bragg reflexion produced by simultaneous incidence of electrons from different directions on a lattice plane are discussed. L. J. J.

X-Ray analysis of thallium fluoantimonate, TISbF₆, and some isomorphous alkali compounds. N. Schrewelius (Arkiv Kemi, Min., Geol., 1943, 16, B, No. 7, 5 pp.).—Although NaSbF₆ crystallises in a cubic lattice, and the ions are arranged as in the NaCl crystal, compounds of the type M^3SbF_6 ($M^I = TI$, NH_4 , Rb, or Cs), in which the cation is larger, crystallise in the CsCl lattice. The structure is similar to that of compounds of the type $Zn(H_2O)_6SiF_6$. Lattice data are given. A. J. M.

Unit cell and space-group of claudetite.—See A., 1943, I, 288.

Positions of the carbon atoms in martensite. N. J. Petch (*Iron and Steel Inst.*, Feb., 1943, *Advance copy*, 7 pp.).—It is deduced from indirect evidence that the C atoms are situated at the midpoints of the long edges of the martensite tetragonal cell, and at the centres of the faces perpendicular to them (positions which are crystallographically equiv.). At most one twelfth of these positions are filled. S. J. K.

X-Ray studies of reactions of cellulose in non-aqueous systems. II. Interaction of cellulose and primary amines.—See A., 1943, II, 322.

Studies on the structure of thin metallic films by the electron microscope. R. G. Picard and O. S. Duffendack (J. Appl. Physics, 1943, 14, 291–305).—With an electron microscope of 30 A. resolving power, a study was made of thin films, condensed on collodion in vac., of Al, Cd, Cu, Au, Mg, and Zn. An evaporating chamber allowing control of the temp. of the condensing surface was devised. Photographs of the surfaces show that all the films are made of agglomerates of the metals, separated by interstices of various widths. All evidence indicates an explanation of the surface structure by assuming migration of the atoms over the surfaces. The observed structure can be used to explain the electrical conductivity, optical reflectivity, and adsorptivity of thin films. Electron microscopical studies also allow a classification of surfaces according to the mobility of the atoms comprising them, and thus enable a rough estimate to be made of the potential distribution over the surface. N. M. B.

Crystal structure and electrical properties. J. Rottgardt and O. Stierstadt (*Metallwirts.*, 1941, 20, 765-771, 789-792, 903-910).— The mechanism of conduction of electricity by metals is considered in detail, with particular reference to the Bi crystal. From the

271

results obtained it is considered necessary to divide the metals into different "conductivity types," since the same conductivity mechanism does not seem to operate for all metals. The basis for such a classification is still not clear. C. E. H.

Volume rectification of crystals. S. R. Khastgir (Indian J. Physics, 1943, 26, 111–113).—A review. W. R. A.

Ultramicroscopic fine structure of fractured glass surfaces. E. Golz (Z. Physik, 1943, 120, 773-777).—Electron-microscopical examination of boundaries between "specular" and "furrowed" surfaces in glass fractures shows furrows extending into the specular portions. L. J. J.

Structural homogeneity of glass. A. Winter (J. Amer. Ceram. Soc., 1943, 26, 277-284; cf. B., 1943, I, 370).—The variation of n, dispersion, and thermal expansion of glasses is discussed with The reference to the conditions existing above, below, and within the transformation range. It is shown that a glass which is initially free from mechanical strains (no birefringence) may not be in physico-chemical equilibrium at the temp. at which it is to be used, and may therefore develop strains, or its n may change, owing to its spontaneous transformation into the equilibrium state. Such spontaneous variation can be avoided only if the glass is annealed to max. n or ρ , as well as to freedom from birefringence.

J. A. S.

IV.—PHYSICAL PROPERTIES OF SUBSTANCES.

Electron theory of superconductivity. H. Welker (Physikal. Z 1943, 44, 134-138) .- The application of thermodynamics and electrodynamics to the problem of superconductivity is pointed out. It is shown how the phenomena of superconductivity can be ex-plained on the assumption of an electron gas. The magnetic exchange interaction, with its dependence on the motion of the electrons, plays a special part in the explanation. A. J. M.

Current distribution in superconductors. M. von Laue (Z. Physik, 1943, 120, 578-587).—Theoretical. Current distribution laws are generalised in the light of London's electrodynamics of super-L. J.] conductors.

Grinding of macro-molecules. Explanation of the depolymerising effect of ultrasonic waves. G. Schmid (*Physikal. Z.*, 1940, **41**, 326-337).—A theory of the depolymerisation produced by ultrasonic waves is suggested. The breakdown is due to frictional forces which come into play in the interior of the solution. In the concn. range found in a gel, the liquid, in consequence of the variation in range found in a get, the induct, in consequence of the variation in elastic properties and ρ of the macro-mols., is not uniform, so that neighbouring particles in the solution do not execute equally strong vibrations. The free solvent vibrates through the meshes of a net-work of macro-mols., whilst the network itself cannot follow the ultrasonic vibrations on account of its inertia. This causes the development of frictional forces. It is shown that these forces would be sufficiently strong to break chemical linkings. It is also shown that in suitable solutions of high polymers, a dispersion of ultrasonic waves would be expected; such a phenomenon would provide a new method for investigation of the solutions.

Application of photon statistics to the specific heat of a monatomic solid. B. N. Biswas (Indian J. Physics, 1943, 17, 1-5).—The expression for the sp. heat of a monat. solid with three degrees of freedom, obtained by applying the statistics of photons, is similar to that obtained by Debye. Expressions for entropy and free energy of the solid are also derived. A. J. M.

Heats of vaporisation from reference substance plot, D. H. Gordon (*Ind. Eng. Chem.*, 1943, 35, 851-853).—Calculation of latent heats in the neighbourhood of crit. temp. is possible by an extension of Othmer's method (A., 1940, F, 314). A plot of the v.p. of a substance against that of a reference substance at the same reduced temp. vals. gives a straight line; the unknown latent heat can be calc. for the slope of this line, the latent heat of the reference substance, and the two crit. temp. J. H. BA.

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Phase transformations of normal paraffins. C. G. Gray (J. Inst. Phase transformations of normal paralins. C. G. Gray (*j. 1nst. Petroleum*, 1943, **29**, 226—234).—The quantum theory of mol. heats leads to the equation $\theta = a - b/(n - 1)$, where θ is the m.p. of the normal paraffin C_nH_{2n+2} , and a and b are consts. Over the range n = 20—36, in which the mols. are packed vertically on a regular hexagonal base, a = 123.4 and b = 1659. For n < 36, $\theta = 137.4 - 2266.7/n$, and this curve, depressed by 2.4°, continues along the transition points of the regular (a) and unsymmetrical (β) hexagonal packings down to n = 26, whence it is concluded that β is the form stable at the m.p. for $n \leq 36$. From n = 6-20 the odd series is fitted by $\theta = 123 \cdot 7 - 1908 \cdot 86/(n + 1 \cdot 779)$, and the even series (oblique packing, γ -form) by $\theta = 126 \cdot 81 - 2143 \cdot 41/(n + <math>3 \cdot 7069)$. The latter curve is believed to continue as the $a \ll \gamma$ transition point for n = 20-28. A. R. PE.

Kinephotonic theory of atoms. A. do Prado (Anais Acad. Brasil. Cienc., 1943; 15, 135-150).-It is deduced that the energy of L2 (A., I.)

activation of a gas is equal to its energy of translation, and that the relation between pressure (p) and mol. velocity (u) is $p = 2\rho u^{2/3}$. R. G

Nomograph for P-V-T relations of gases below the critical point. G. W. Thomson (*Ind. Eng. Chem.*, 1943, 35, 895).—Equations and a nomograph are given, from which the compressibility and activity (fugacity/pressure) of hydrocarbons may be obtained at pressures and temp, below the crit, point. J. H. BA. and temp. below the crit. point.

Phase equilibria in hydrocarbon systems. Volumetric behaviour of methane. R. H. Olds, H. H. Reamer, B. H. Sage, and W. N. Lacey (*Ind. Eng. Chem.*, 1943, 35, 922-924).—The compressibility factor for CH₄ has been obtained for pressures up to 10,000 lb. per sq in at 100-460° r. A comparison is made with principle. sq. in., at 100-460° F. A comparison is made with previous data. J. H. BA.

Three types of energy of viscosity. A. E. Dunstan and A. H. Nissan (*Phil. Mag.*, 1943, [vii], **34**, 479–486).—The val. of η for simple liquids is dependent on three factors; one is invariant and almost independent of time, but the other two depend on temp. to different extents, equating at the crit. temp. and cancelling each other owing to their opposite signs. There appears to be an inherent increase in η with temp. which is masked by the larger decrease. In gases the opposite appears to be true. Probably the mechanism of principle the mechanism of viscosity in gases and liquids is essentially the same.

W. R. A

Relationship between viscosity and temperature. H. G. de Carvalho (An. Asoc. Quím. Brasil, 1943, 2, 21--28).—The relationship $\log \eta = -A + B/T + C \log T$ is in agreement with the experimental vals. for $C_{\rm g}H_{\rm g}$, CHCl₂, and EtOH. F. R. G.

V.—SOLUTIONS, DISPERSIONS, AND MIXTURES.

Elementary theory of thermal diffusion. R. N. Rai and D. S. Kothari (*Indian J. Physics*, 1943, 26, 103-106).—Mathematical. Derivation of the coeff. of thermal diffusion and its variation with concn. are discussed and compared with the experimental results of Grew (cf. A., 1942, I, 15) for $Ne-NH_3$, which are in fair agreement with theory. W. R. A.

Viscosity function. IV. Non-ideal systems. E. P. Irany $(J. Amer. Chem. Soc., 1943, 65, 1392-1398).-Graphical analysis of <math>\eta$ -conen. data for non-ideal binary systems is discussed, and the functional scales previously described (cf. A., 1942, I, 51) are applied to existing and measured data for $E_{12}O-H_{2}SO_{4}$, and for mixtures of $H_{2}O$ with dioxan, and with mono- and poly-hydric alcohols, and of HCO·NH₂ with $H_{2}O$, dioxan, alcohols, and aliphatic acids.

W. R. A.

Dependence of velocity of sound on concentration in a dipolar-non-polar liquid mixture. K. Sacher (*Physikal. Z.*, 1940, **41**, 360-362).—The variation of the velocity of sound with concn. in EtOH-CCl, mixtures was investigated. There is a min. for a mol. fraction of EtOH of 0.05. The adiabatic compressibility also shows a definite change at this concn. A. J. M.

Apparent ionic volume in infinitely dilute solutions. F. H. Lee and C. S. Sie (J. Chinese Chem. Soc., 1942, 9, 134-140).—An equation similar in form to van der Waals' equation is found to represent the apparent ionic vol. of alkali halides at temp. $0-50^{\circ}$. At infinite dilution a linear relation between apparent ionic vol. and spherical vol. of ions in the cryst. salts is found. L. J. J.

Propagation of elastic waves through electrolytic solutions. A. K. Dutta and B. B. Ghosh (*Indian J. Physics*, 1943, 17, 19–25).— The velocity of supersonic waves shows first a decrease and then an increase with concn. in the case of the heavy alkali haides (KBr and KI), the effect being greater at higher temp. This is contrary to results obtained with other electrolytes, which normally show an increase of velocity with concn. The connexion of the phenomenon with viscosity is discussed. A. J. M.

Complex ions. V. Magnetic moments of complex ions of nickel and copper. C. D. Russell, G. R. Cooper, and W. C. Vosburgh (J. Amer. Chem. Soc., 1943, 65, 1301-1306).—Magnetic moments of complex ions of Ni and Cu with C_5H_5N , NH_3 , glycine, $(CH_2\cdot NH_2)_2$, and o-phenanthroline have been determined, and their relative stabilities measured spectrophotometrically. For each the orbital magnetic moment is < that of the parent ion, the decreases being or stability. Magnetic moment is or max, absorption. W. R. A W. R. A. ∞ stability. Magnetic moment is ∞ max. absorption.

Electrochemical investigation of the system gold-antimony. F. Electrochemical investigation of the system gold-antimony. F. Weibke and G. Schrag (Z. Elektrochem., 1940, 46, 658-661). E.m.f. measurements were made between Sb and Au-Sb alloys containing 25·1 (eutectic), 40·0, 50·3, and 75·1% Sb, in an electro-lyte consisting of SbCl₃ dissolved in fused LiCl-RbCl eutectic, over the temp. range 312-353°. At ~318° the e.m.f. were 19·4, 18·6, 15·7, and 0·6 mv. respectively. All the e.m.f. decreased with in-creasing temp. The measurements give 1Au + Sb = 1AuSb + 1 creasing temp. The measurements give : $\frac{1}{2}Au + Sb = \frac{1}{2}AuSb_2 + \frac{1}$ 2.4 kg.-cal. R. K.

Solubility of tin in magnesium. H. Vosskühler (Metallwirts., 1941, 20, 805-808; cf. A., 1934, 1065).—The solidus and solid solubility line at the Mg end of the Mg-Sn system have been deter-

mined by an electrical resistivity method. The eutectic temp. is 562° and the solid solubility at this temp. is $15\cdot 2$ wt.-% of Sn. The solubility decreases to 0.45% at 200°. The solidus line remains practically the same as in previous work. C. E. H. practically the same as in previous work.

Solubility of hydrogen in iron and iron alloys.-See B., 1943, I, 411

Empirical relation between solubility of slightly soluble electro-lytes and dielectric constant of the solvent. J. E. Ricci and T. W. Davis (*Kolloid-Z.*, 1940, 91, 196–198).—See A., 1940, I, 207. C. R. H.

C. R. H. Elevation of the solubility of alumina in kaolin by preheating in gases. G. F. Hüttig and E. Herrmann (Z. Elektrochem., 1941, 47, 282—285).—Various samples of kaolin are heated in air, N₂, O₂. HCl, H₂O vapour, SO₂, NH₃, NO₂ + O₂, and moist NO₂ at temp. from 20° to 800°. The gases affect to different extents (i) the amount of H₂O evolved during heating, (ii) the temp. at which meta-kaolin is formed, (iii) the HCl-solubility of the Al₂O₃ and SiO₂ in the product (the increase in solubility of Al₂O₃ being > that of SiO₂), (iv) the adsorptive properties of the kaolin. The dehydration process is divided into three parts. The solubility of the Al₂O₃ is affected also by the period of heating and by the acid used as solvent. J. F. H.

Low-temperature adsorption of nitrogen, oxygen, argon, hydrogen, *n*-butane, and carbon dioxide on porous glass and partly dehydrated chabasite. P. H. Emmett and T. W. DeWitt (*J. Amer. Chem. Soc.*, 1943, 65, 1263-1262).--The adsorption near their b.p. of N₂, O₂, A, H₂, *n*-C₄H₁₀, and CO₂ on porous glass and partly dehydrated 1943, 65, 1203-1202).—The adsorption hear then 0.5, or N_2 , O_2 , A, H_2 , $n-C_4H_{10}$, and CO_2 on porous glass and partly dehydrated chabasite has been determined. The reproducible hysteresis encountered in adsorption on porous glass is discussed. The average pore size of the porous glass has been calc. by various methods, and the upper limit of pore radius, calc. by Kelvin's equation, is ~60 A. W. R. A. equation, is ~60 A.

Adsorption and desorption processes during the streaming [of gas] through layers of granular adsorbent. Concluding experiments and theoretical. E. Wicke (Kolloid-Z., 1940, 93, 129–157).—Experi-ments on the adsorption of CO_2 by active C have been carried out in order to complete earlier work. A mathematical treatment of adsorption and desorption is presented, the rate of gas diffusion into the interior of the granules, the slow mixing of gases in the pores of the adsorbent, and the curvature of the adsorption isotherm being among the subjects considered. Errors in earlier papers are corr. (cf. A., 1939, I, 254; 1940, I, 207). C. R. H.

Heat of adsorption of ethyl chloride and of sulphur dioxide on sugar charcoal.—See A., 1943, I, 279.

Multiplication process for the separation of racemates. H. Martin and W. Kuhn (Z. Elektrochem., 1941, 47, 216-220).—The principle involved is the preferential adsorption of either the d- or l-component by optically active adsorption media, a fall in temp. displacing the relative concn. in the adsorbate in favour of the component with the higher heat of adsorption. The equilibrium conditions obtaining for this component in an enclosed space interspersed throughout with adsorbent, when the upper part is kept hot and the lower cold, are considered. If N_h and N_c are the respective mol. fractions of the component in the adsorbate in the hot and cold parts of the the component in the adsorbate in the not and condition the system, $N_e = N_h(1 + \delta)$, where δ is small and positive. This individual effect, by employing a long, narrow, horizontal enclosure and making the liquid circulate along the entire length of the heated upper surface and back along the cooled lower surface, can be multiplied by U_a for the coore resulting at the average ends of multiplied by L/a for the concns. resulting at the extreme ends of the enclosure, L and a being the length and width respectively, where D is the diffusion coeff. If $u = su_0$, the separation will be decreased by the multiplying factor $2s/(1 + s^2)$. The time factor which would be involved in the attainment of equilibrium is discussed from a practical viewpoint. For the case when the liquid is stationary and the adsorbent circulated, experimental evidence for separation was obtained by measuring the sp. rotation of the resulting liquid portions at each end of the system. *dl*-Mandelic acid was employed as the racemate and wool, which is known to be built up of optically active NH_2 -acids, as the adsorbent. The upper surface was kept near 100° and the lower at room temp. In the resulting fractions, vals. for $[a]_D > 1.0°$ were observed.

L. H. I

Cation and anion interchange with zinc montmorillonite clays. M. M. Elgabaly and H. Jenny (J. Physical Chem., 1943, 47, 399-408).—The mechanism of Zp fixation on Na-, Ca-, and H-bentonites and the release of adsorbed Zn from Zn-bentonite (I) has been investigated. The uptake of Zn from solutions of ZnCl₂ involves Zn^{**}, ZnCl^{*}, and ZnOH^{*}, and the release of Zn from (I) by NaCl and $2n^{\circ}$, 2nCl, and 2nOH, and the release of 2n from (a) y states $CaCl_2$ is restricted mainly to bivalent Zn. (I) possesses strong anion-changing properties, Cl', OH', and NO_3' being mutually replaceable. (I) is regarded as possessing a mosaic surface capable of indepen-dent cation and anion exchange. C. R. H. dent cation and anion exchange.

Equilibria in carbonaceous cation exchanger. H. F. Walton (J Physical Chem., 1943, 47, 371-382).—Zeo-Karb, a so-called sul-phonated coal, was the exchanger used in a series of experiments

on Na'-K', Na'-Ca'', Ca''-Ba'', Na'-H', and Ca''-H' exchange. Except for Na'-Ca'', where there was hysteresis, the exchanges were reversible. Exchanges involving H' showed deviation from the law of mass action indicating that Zeo-Karb is non-homogeneous, hav-ing a no. of acting the stores of diverse character although it behaves of mass action indicating that Zeo-Karb is non-holdogeneous, have ing a no. of acidic groups of diverse character, although it behaves as a nearly uniform gel towards other cations. In Ca^{**}-H^{*} exchange at low [H^{*}] the intake of Ca^{**} increased with decrease in [H^{*}] without showing signs of reaching saturation. C. R. H. showing signs of reaching saturation.

Antonoff's rule. A. Yoffe and E. Heymann (J. Physical Chem., 1943, 47, 409-410).—The non-validity of Antonoff's rule is discussed. The rule is shown to be approx. valid for org. liquid-H₂O systems if the org. phase consists of weakly hydrophilic substances. C. R. H.

Capillary systems. XIX/11. Canal number distribution curve for polycapillary canal systems. Theoretical. E. Manegold, S. Koma-gata, and E. Albrecht (*Kolloid-Z.*, 1940, 93, 166—199).—The mathematical treatments by Erbe (cf. A., 1933, 672) and by Grabar and Nikitine (cf. A., 1937, I, 77) of canal no. distribution curves have been extended and applied to existing data. C. R. H.

Kinetics of order-disorder transformations in metal films. R. Suhrmann and H. Schnackenberg (Z. Elektrochem., 1941, 47, 277–281).—Amorphous layers of Ni, Fe, Cu, Ag, Au, Pb, and Bi are formed by vaporisation in a high vac. followed by condensation at very low temp. The layers have high electrical resistance (R) which is decreased on prolonged heating owing to the formation of cryst. material. The order-disorder reaction is studied by rapid heating to a higher temp., and maintaining this temp. during measurements of the decrease of R with time (t). Empirical relationships between R and t are derived and kinetic considerations provide equations of the same form. The energy of activation of the process is >1000g.-cal. per g.-atom and approx. equals energy of vibration of the lattice. J. F. H.

Donnan membrane equilibrium. S. G. Chaudhury (J. Proc. Inst. Chem. India, 1942, 14, 220–225).—Mathematical. The dependence on the val. of the membrane potential (E_m) of the accuracy of equations connecting E_m with osmotic pressure differences is discussed. C. R. H.

Filterability and liquid absorption of sediments. A. von Buzagh and E. Erényi (Kolloid-Z., 1940, 91, 191–196).—A series of experiments on the filtration of powdered SiO_2 from aq. solutions of inorg. salts has shown that there is a close relation between filterability (F), liquid absorption (w), sediment vol. (v), and particle size. (F), liquid absorption (w), sediment vol. (v), and particle size. With increasing concn. of salt, F, w, and v increase, fairly regularly in the case of NaCl, K_2SO_4 , and K_3PO_4 , and rapidly to a const. val. in the case of BaCl₂ and MgSO₄. In the case of AlCl₃ F, w, and vincrease rapidly with concn. to a max. val. and then fall to a const. val

Mechanism of the formation of Kohlschütter's silver sol. II H. B. Weiser and M. F. Roy (J. Physical Chem., 1943, 47, 325-Π. 329).—When CO is passed through Ag_2O solutions Ag hydrosol is formed. With untrafiltered saturated solutions the hydrosol is very formed. With untraintered saturated solutions the hydrosol is very stable, but in presence of excess of Ag_2O the solution deposits within a few weeks a reddish-brown layer, leaving a clear yellow sol which is green by reflected light. The hydrosols are purer and more uniform than those obtained with H₂ as reducing agent, mainly because in the latter case excess of Ag_2O must be present and, furthermore, reduction is incomplete. (Cf. A., 1934, 25.) C. R. H.

New effects due to anisotropy of colloidal particles. R. E. D. Clark (Chem. and Ind., 1943, 348-350).—Application of a high potential gradient to bentonite (I) suspensions causes orientation of particles at electrodes. At the anode they form closely packed layers causing almost immediate polarisation. This momentarily disappears on reversal of current or when another anode is substituted, but not when the cathode is replaced by another. Keeping the anode in motion breaks up the orientation and gives increased current. Such a system acts as a rectifier. NH, oleate and eggchildren in the second a system acts as a rectifier. This office and egg albumin (at pH 8, not at pH 5.5) show similar effects, but not starch. At the cathode, (I) suspension (particles probably perpen-dicular to plane) has greater conductivity than in bulk since move-ment of the cathode decreases the current. Orientation also accounts for changes in the coeff. of friction (μ) between surfaces have been been been as a catchildred between them. Accounts lubricated by (I) when a p.d. is established between them. Anomalous conductivity of (I) suspensions is also explained. J. H. BA.

Properties of dialysed hydrous alumina hydrosols. I. pH changes due to ageing, and titration with neutral salts. N. P. Datta (J. Indian Chem. Soc., 1942, 19, 159-174).—Various sols, dialysed to different extents, all show a decrease in pH on ageing. Conductometric titres of Cl content with Ag salts differ with the Ag salt used, but are < the total Cl content. This indicates that Cl is present both bound and free. The fraction of bound Cl increases with extent of dialysis. Neutral salts increase pH and Cl⁻ activity. A constitution for the sols is suggested and discussed. J. H. BA.

Variation in electrochemical properties of hydrogen-clay sols with temperature. B. Chatterjee and A. Sen (J. Indian Chem. Soc., 1942,

19, 189).—The H-clay sol Padegaon-B shows an increase in free acidity, total acidity, and degree of dissociation, with rise in temp. H. BA

Determination of electrolyte content in the intermicellar portion of colloidal solutions. R. Wintgen (Kolloid-Z., 1940, 93, 257-280). —The course of ultrafiltration with collodion membranes and with porcelain filter plates by Zsigmondy's method has been investigated for a no. of sols of various types. The process is sometimes normal, but frequently abnormal. Even when it takes the normal course, it is not always possible to draw conclusions about the composition of not always possible to draw conclusions about the composition of the intermicellar liquid from that of the ultrafiltrate. This uncertainty is due to the fact that ordinary electrolytes may suffer a change in composition during ultrafiltration. Thus, in the ultrafiltration of dil. HCl with Zsigmondy's apparatus, the filtrate is less conc. than the original, and part of the H^{*} of a sol can be replaced by Ca^{**} from the filter plate. This can be avoided by using collodion sacks, as in Wintgen and Hacker's process (A., 1933, 124). With a Fe₂O₃ sol, the conductivity of the ultrafiltrate using the collodion sack The possibility of the unit and the Donnan equilibrium from the potentiometrically determined activities of H^{*} and Cl' in the sol, and the velocity of transport of the ions. In equalised ultra-filtration, where the ultrafiltrate remains in contact with the sol residue across the membrane for several days, so that equilibrium may be reached, the sol behaves differently. Thus, in the equalised ultrafiltration of a Cr₂O₃ sol, the conductivity of the sol can be calc. by the method of mixtures from the vol, and conductivity of the ultrafiltrate and those of the sol residue, and when these two are remixed the sol has the original conductivity. With a Fe_2O_3 sol, small but definite departures from additivity occur, possibly due to a loss of HCl from the Fe₂O₃ micellar ions. A. J. M.

Relations between electrical conductivity and degree of dispersion of lyophilic colloids. IV. Electrical conductivity of solutions of sodium oleate in presence of the isomeric cresols. E. Angelescu and A. Woinarosky (Kolloid-Z., 1940, 93, 199-207).—The electrical conductivity of solutions ($0\cdot 1-0\cdot 4N$.) of Na oleate (I) in presence of 0-10% of cresol has been measured over the range $20-60^\circ$. In absence of cresol the mol. conductivity (λ) is const. for solutions 0.1-0.3n, but λ decreases at higher concns. The val. of λ is 5-10 times the corresponding val. for equimol. solutions of Na stearate. This is due to differences in the degree of dispersion. With increasing addition of cresol λ rises to a max. and falls, a preliminary fall to a min. val. also occurring at low temp. and for high concess of (I). This min. is most pronounced with p-cresol. As temp, rises and concn. of (I) diminishes the differences between the effects of o-, m-, and p-cresol disappear. The free affinity forces of the double bond and the electrical forces due to dissociated groups are the forces mainly responsible for the phenomena.

. . R. H. **V.** Transformation of cellulose hydrate into natural cellulose. **Mechanism of the transformation and stability of natural cellulose.** V. **Mechanism of the transformation and stability of natural cellulose and of cellulose hydrate.** T. Kubo (*Kolloid-Z.*, 1940, 93, 338– 345).—X-Ray diagrams indicate that cellulose hydrate and its derivatives are converted into natural cellulose on heating in polar liquids, such as glycol and glycerol. The effect of cooling at various rates on the transformation has been investigated. The hydrate was heated to 250° with glycerol. and then cooled by wrater at 0° was heated to 250° with glycerol, and then cooled by water at 0°, solid CO₂, liquid air, or slowly (8 hr.) to room temp. or at the normal speed to room temp. These different treatments did not greatly affect the degree of transformation of the hydrate, as indic-ated by X-ray diagrams. The mechanism of the transformation and the stability of natural and hydrate cellulose are discussed on the basis of the thermochemical and electrokinetic behaviour of A. J. M. these compounds.

Starch gels. W. Seck and G. Fischer (Kolloid-Z., 1940, 93, 207-224).—The relation between the gel-forming properties of starches and their behaviour on swelling is discussed. η and elasticity measurements on starches which have been swollen by different methods have been made, and the effects of acid hydrolysis and oxidation have been studied. Gel-forming starches have a lower η than non-gel-forming starches but there is no general relation between η and degree of gel-formation. Seed starches are gel-forming but stem and root starches are non-gel-forming. Gelforming tendencies are increased by oxidation and hydrolysis.

R. H

Mechanical and material properties of fibrin. U. Ebbecke (Kolloid-Z., 1940, 91, 134-152).—Fibres and films of fibrin were prepared and examined as to their physical and mechanical properties. Comparison was made with collagen, gelatin, elastoidin, myosin, casein, polyamides, keratin, and rubber. The property changes which take place during stretching and as a result of adsorption and removal of liquid are illustrated with the aid of the mesh C. R. H. structure conception.

Influence of heat-treatment on solutions of crystalline horse serum-G. R. Cooper and H. Neurath (J. Physical Chem., 1943, albumin. 47. 383-398) .- The effects of heat-treatment on solutions of cryst. horse serum-albumin depend on pH and ionic strength of the solutions. At pH 7.6 the degree of aggregation increases with increasing

ionic strength and the heated protein differs from the unheated protein in average particle size, electrophoretic pattern and mobility, and in susceptibility to tryptic digestion. At pH 3.6 heat-treat-ment produces slight changes in particle size and heated and unheated proteins show the same electrophoretic pattern, although the electrophoretic mobility of the heated protein is $\sim 20\% >$ that of the unheated protein. Readjustment of pH to near the iso-electric point does not reverse these changes. Heating at pH 4.2 results in polymerisation with an 8-fold increase in mol. wt.

VI.—KINETIC THEORY. THERMODYNAMICS.

Equilibrium of gaseous dibromoethylenes.—See A., 1943, I, 280.

Complex boric acid-polyhydroxyl compounds. J. Y. Tung and H. L. Chang (J. Chinese Chem. Soc., 1942, 9, 125-133).—The effect of arabinose, pyrocatechol, fructose, galactose, mannitol, and xylose on the pH of H_3BO_3 solutions has been examined. The effects on the pH of H_3BO_3 solutions has been examined. The effects found agree with the expression pH = $-\frac{1}{2}\log \{6\cdot5 \times 10^{-10}[H_3BO_3](1 + K[X]^2)\}$ at 25°, where K is 1.45 × 104, 3.63 × 105, 2.75 × 106, 1.41 × 103, 2.75 × 106, 1.58 × 104 for the above polyhydroxy-com-pounds (X) respectively. The *complexes* formed are H_3BO_3, X_2 , with m.p. 146—148°, 132°, and 172—173° for the mannitol, xylose, and functions are plause respectively. and fructose complexes, respectively. L. I. I.

Inadequacy of pH and pR to express acidity. rA. R. A. Catani (Rev. Brasil. Quim., 1943, 15, 264-269).—Acidity may with advantage be defined as the no. of mg.-equiv. of H' per c.c. which is, unlike pH, independent of temp. F. R. G.

Apparent dissociation constants of galactose-1-phosphoric acid. H. W. Kosterlitz (*Biochem. J.*, 1943, 37, 321-322).—The acid has pK_1 ' 1.0 and pK_2 ' 6.17. W. McC.

Acid strengths of aliphatic nitro-compounds. G. W. Wheland and J. Farr (J. Amer. Chem. Soc., 1943, 65, 1433).—pK at 25° of the nitro-forms are MeNO₂ 10·24, EtNO₂ 8·60, PraNO₂ 8·98, and Pr^{β}NO₂ 7·7—7·8±0·04. The low val. for Pr^{β}NO₂ is due to the lines of force between the NO₂ and H⁺ passing through the Me (cf. Turnbull et al., A., 1943, I, 153; Westheimer et al., A., 1939, I, 263).

R. S. C.

Dissociation of certain amino-acids in dioxan-water mixtures. E. L. Duggan and C. L. A. Schmidt (*Arch. Biochem.*, 1943, 1, 453–471).—Potentiometric titration curves are given for a- and β -alanine, γ - and δ -aminovaleric acid, glutamic acid, lysine, arginine, and histidine in H₂O and 20 wt.-% aq. dioxan. The apparent dissociation consts. in H₂O, 20% dioxan, and 65% and 86% aq. EtOH are compared; these depend on the activity and the ionis-ation const of H O in the solvent the dielectric const of the achieved ation const. of H_2O in the solvent, the dielectric const. of the solvent, and variations in the inductive effect of polar groups on the proton of the dissociating group of the mol. with change in H₂O content of the solvent. E. R. S

Effect of neutral salts on dissociation of certain amino-acids in dioxan-water mixtures. E. L. Duggan and C. L. A. Schmidt (Arch. Biochem., 1943, 1, 473—486; cf. A., 1940, I, 116; 1941, I, 47).— Curves are given showing the effect of NaCl, KCl, LiCl, MgCl₂, and CaCl₂ on the apparent dissociation consts. of a- and β -alanine, and β -alanine, biotiding available of the apparent dissociation consts. γ - and δ -aminovaleric acid, lysine, histidine, arginine, and glutamic acid in 20 wt.-% aq. dioxan. There is no material difference between the effects of salts in H₂O and 20% dioxan. E. R. S.

Activity of osmotic coefficients of sodium chlorate by an isopiestic method. J. H. Jones (*J. Amer. Chem. Soc.*, 1943, **65**, 1353–1354). —Isopiestic ratios of aq. NaCl and NaClO₃ (0·2—3·0M.) have been determined, and used to calculate the activity and osmotic coeffs. of NaClO₃ by comparison with existing data for NaCl. W. R. A.

Ternary system MgO-Al₂O₃-Cr₂O₃. W. T. Wilde and W. J. Rees (*Trans. Ceram. Soc.*, 1943, 42, 123-155).—The abnormally high m.p. of 2135° for Cr_2O_3 given by Bunting (A., 1931, 41) has not been confirmed. The suggestion that the more usually observed m.p. (2060, 2009) is due to the formation of a domain which here there the domain m.p. (2060-2080°) is due to the formation of a lower oxide has been disproved by the demonstration that reduction establishes an been disproved by the demonstration that reduction establishes an equilibrium of metallic Cr and Cr₂O₃. The system $M_2O_{-}Cr_2O_3$ shows complete solid solution. The system $M_2O_{-}Al_2O_3$ has only one compound, $M_2O_{-}Al_2O_3$, which can take a large amount of Al_2O_3 (but no M_2O) into solid solution at high temp., from which Al_2O_3 is pptd. on slow cooling. The system $M_2O_{-}Cr_2O_3$ has only one compound, $M_2O_{-}Cr_2O_3$, which does not dissolve either M_2O or Cr_2O_3 . The system $M_2O_{-}Cr_2O_3$ forms a complete series of solid solutions and no ternary compound. The lattice dimensions of the spinel compounds depend solely on the relative proportion of the spinel compounds depend solely on the relative proportion of Al_2O_3 and Cr_2O_3 present in the high-MgO part of the field, and MgO also has an effect in the low-MgO region. The variation of lattice dimension with composition is not completely regular and an explanation is suggested. I. A. S.

Mutual melting relations of pyroxenoids, melilites, and olivines in the quaternary system CaO-FeO-Al₂O₃-SiO₂-See A., 1943, I, 268. Heats of formation of the lower phosphides of several heavy metals. F. Weibke and G. Schrag (Z. Elektrochem., 1941, 47, 222–238).— The heats of formation of Fe₂P ($34.5\pm2\%$), Fe₃P ($35.2\pm2\%$), Co₂P ($42.9\pm2\%$), Ni₅P₂ ($95.9\pm2\%$), Ni₅P ($48.4\pm2\%$), and Cu₃P ($32.0\pm4\%$ kg.-cal. per g. mol.), from the metal and red P, are determined at 630°. Known mixtures of the finely-divided, freshly reduced metal and P are formed into pastilles, preheated, and used in an improved version of the adiabatic high-temp. calorimeter of Kubaschewski and Walter (A., 1939, I, 579). Graphs of at.-% P-heat of formation per g.-atom of alloy are nearly linear within the range 5-30 at.-% P. The results are combined with those of Biltz *et al.* for the higher phosphides of the metals studied and the heats of formation of the complete metal-P systems are derived. These are compared with the vals. for the corresponding aluminides and silicides. J. F. H.

Heats of polymerisation of vinyl compounds. G. Goldfinger, D. Josefowitz, and H. Mark (J. Amer. Chem. Soc., 1943, 65, 1432–1433).— ΔH of polymerisation of styrene, CH₂:CMe·CO₂Me, and CH₂:CH·OAc, determined calorimetrically, are 15.0, 7.9, and 8.0 kg.-cal. per mol. W. R. A.

Heat of adsorption of ethyl chloride and of sulphur dioxide on sugar charcoal. S. J. Gregg (J.C.S., 1943, 351-355).—The heats of adsorption have been measured and the adsorption isotherms determined from very low pressures up to atm. for SO₂ and up to 469 mm. for EtCl. The differential heat of adsorption of EtCl falls rapidly from 11,500 to 6000 g.-cal. per mol. within a narrow adsorption range and at ~100 mm. This fall is ascribed to the completion of a unimol. layer of EtCl and the inception of a thicker layer. Although the data do not conform to Henry's law, they are not considered as disproving that law since the adsorbed layer may not have been sufficiently dil. to behave as a perfect twodimensional gas. C. R. H.

VII.—ELECTROCHEMISTRY.

Redox theory of electric cells. D. Giribaldo (Proc. 8th Amer. Sci. Congr., 1942, 7, 145-167).—A general equation of electrolytes is proposed, on the basis of the different degrees of oxidation of the ions present. F. R. G.

Pulsations on mercury surface caused by polarisation. K. S. G. Doss and B. S. Rao (*Proc. Indian Acad. Sci.*, 1943, **A**, 17, 158–160),...-Hg in contact with a solution containing acid and an oxidising agent (e.g., $H_2SO_4 + K_2Cr_2O_7$) becomes anodically polarised. If the Hg surface is now touched by Fe wire a voltaic cell is formed with Fe as anode and Hg as cathode. The Hg becomes cathodically polarised, interfacial tension increases, and the Hg contracts laterally and recedes from the Fe. Out of contact with Fe, Hg becomes anodically polarised and the process repeats itself, giving rise to pulsations ("the Hg heart"). Various conditions under which the effect is displayed have been investigated. W. R. A.

Overvoltage. XV. Decomposition potentials. Cathodic and anodic polarisation of a platinised platinum cathode near the reversible value in hydrogen-saturated acid solutions. XVI. Cathodic and anodic polarisation of a platinised platinum cathode near the reversible value in nitrogen-saturated acid solutions. A. L. Ferguson and M. B. Towns (Trans. Electrochem. Soc., 1943, 83, Preprints 8 and 9, 105— 117, 119—128; cf. A., 1943, I, 18, 63).—XV. The potential (V) of a platinised Pt electrode has been studied as it is subjected to cathodic and anodic currents in still and stirred 2N-H₂SO₄ saturated with H₂. During cathodic charge V changes in a non-linear manner from zero to a stable negative val. which is higher for still than for stirred solution. It is suggested that V is determined by the concn. of at. H at the interface and that stirring hastens the diffusion of H atoms into the solution. Low anodic polarising currents cause V to rise in still solutions to a stable positive val. \ll the potential at which O₂ is normally evolved and this V is considered to represent the state at which the consumption of H₂ equals the rate of supply of H₂ to the surface by diffusion. Higher c.d. causes V to rise to the potential of O₂ evolution. On anodically polarising an electrode which has previously been a cathode the V-time curve shows an inflexion with more rapid rise of V between +0.30 and +0.87 v. A similar break in the curve is observed on reversing the current. In stirred solution stable vals. of V very little above the reversible val. are established with low currents and only with relatively high c.d. does V reach the val. for O₂ evolution. The inflexion in the V-time curve is similar to that for still solutions. It is suggested that at <+0.30 v. the current is used in producing H' ions from H atoms, some of which are supplied to the surface from mols. in the solution, whereas at +0.30 to +0.87 v. the process does not directly involve H₂ mols. from the solution.

Solution, which is the post of the process does not directly involve H₂ moles from the solution. XVI. When a platinised Pt electrode in 2N-H₂SO₄ saturated with N₂ is made to assume a positive potential and then made a cathode at low c.d. V falls gradually to a stable val. more positive than the reversible potential and higher for stirred than for still solution. It is suggested that H' ions are discharged throughout this process and the [H'] at the interface increases until a back potential approx. equal to the applied potential is built up, after which the current passed is required to maintain the [H']. With higher c.d. the stable potential is negative and is lower for the stirred solution. All the V-time curves have a linear section from $\sim +0.30$ v. to the final stable val. During anodic polarisation from a stable cathodic val. the V-time curves have two linear portions, a slow change extending to +0.30 v. and a more rapid change between +0.30 and +0.87 v., followed by a slower increase in V to the potential of O₂ evolution. A rapid change from +0.87 to +0.30 v. is also observed when the potential is reversed. The results support the view that the potential depends on the activity of H atoms and H' ions at the electrodesolution interface. J. W. S.

VIII.—REACTIONS.

Kinetics of chemical reactions. F. Olmer (J. Physical Chem., 1943, 47, 313-317).—A new method of studying reactions, in which variations in a physical property are measured during the linear raising (*i.e.*, with time) of the temp. of the system, has been developed. The method gives information on the initial temp. of a reaction and of any subsequent reaction, the formation and composition of intermediate compounds, the relative speeds of partial reactions, etc. C. R. H.

Thermal decomposition of vinyl ethyl ether. S. N. Wang and C. A. Winkler (*Canad. J. Res.*, 1943, **21**, **B**, 97—110).—CH₂:CH-OEt undergoes thermal decomp. at 377—448° yielding C₂H₄ and MeCHO according to a first-order equation with velocity coeff. $4.0 \times 10^{-11}e^{-44,400/RT}$ sec.⁻¹ The reaction sensitises the decomp. of MeCHO and the polymerisation of C₂H₄, indicating that free radicals are formed. NO has no effect on the rate of decomp. of CH₂:CH-OEt but inhibits the sensitised decomp. of MeCHO. It is suggested that the decomp. of CH₂:CH-OEt occurs through a rearrangement mechanism in which an a-H of the Et group passes to the a-C of the vinyl group with simultaneous rupture of the C-O linking. Free radicals do not play an important part possibly owing to the inhibiting character of the unsaturated ether. J. W. S.

Measurement of reaction velocities and determination of smallest quantities of catalytic substances by a potentiometric method I. Iodine. F. L. Hahn and M. Adler (*Proc. 8th Amer. Sci. Congr.*, 1942, 7, 169–175).—Sandell and Kolthoff's method (A., 1934, 856) is used. F. R. G.

Kinetics of chain polymerisation. IX. Induction of polymerisation reactions by free radicals. G. V. Schultz (Z. Elektrochem., 1941, 47, 265-274).—Investigation of the effect of adding a small proportion of $(CPh_2:CN)_2$ (I) to styrene (II) and to $CH_2:CMe:CO_2Me$ (III), and of $CPh_3:N:NPh$ (IV) to (II), shows that the polymerisation of (II) and (IIV). The polymerisation proceeds by a chain mechanism. (I) and (IV) promote the termination of the chains according to their reactivity. Comparisons of the no. of macromols. produced with the no. of free radicals present show that the kinetic chain length is equal to the mol. chain length. J. F. H.

Active oxides and reactions of solids. CXXI. Kinetics of the thermal dissociation of calcium carbonate. Kinetics of lime burning. H. Kappel and G. F. Hüttig (Kolloid-Z., 1940, 91, 117—134).—In the isothermal decomp. of CaCO₃ there is a sudden first-order reaction at points in the surface layer where there is a local rise of temp. Beneath this surface layer and separated from it by a transition layer where the reaction order is more complex, there is a region of slow decomp., the reaction being of zero order and depending on the rate of application of heat rather than on thermal conductivity or diffusion. C. R. H.

Significance of crystallographic factors in heterogeneous reactions. E. Schiebold (Z. Elektrochem., 1941, 47, 288).—Preliminary notice.

Equilibrium of gaseous dibromoethylenes. R. M. Noyes and R. G. Dickinson (J. Amer. Chem. Soc., 1943, 65, 1427-1429).— Gaseous equilibrium of cis- and trans- $C_2H_3Br_2$, catalysed by I, has been investigated at 144-178°. Equilibrium mixtures contain equal amounts of each isomeride; thus changes in G° , H° , and S° are all zero for the isomerisation. W. R. A.

Effect of active nitrogen and of certain nitrogen compounds on catalytic properties of carbon. P. F. Bente and J. H. Walton (J. Physical Chem., 1943, 47, 329—337).—Pure C (from lactose) was treated with N₂, NH₃, NO, N₂O, and (CN)₂ at temp. 300—875° and then used as catalyst in the decomp. of H_2O_2 , oxidation of quinone, and oxidation of K urate. NH₃- and N₂O-treated C were the only ones which were more catalytically active, although the activity increases were not due to the presence of NH₃ or N₂O. Indeed, N₂O-treated C was almost if not entirely N₂-free, and it is possible that N₂O oxidises C forming active surface oxides. When N₂ becomes attached to C it may be either as an association between N₂ and the ash content of the C or to attachment of N₂ to the C surface whereby new active points are created or, as in cases of inhibition, existing active points are destroyed. C. R. H. **Reactions of hydroxylamine and the catalytic oxidation of ammonia.** M. Bodenstein (Z. Elektrochem., 1941, 47, 287).—Preliminary. NH₂OH, formed as the primary product in the catalytic oxidation of NH₃, is stable at -78° , but decomposes readily in contact with solid surfaces at room temp. giving N₂O + 2NH₃ + 3H₂O; above 200° NO, N₂, H₂O, and NH₃, but no N₂O, are produced. N₂O is the main product when NH₂OH vapour and O₂ are circulated over a Fe₂O₃-Bi₂O₃ catalyst at 200°. This supports the assumed reaction NH₂OH + NO + 2H₃ is shown not to occur. I. F. H $N_2 + H_2O + 2H_2$ is shown not to occur. I. F. H.

Catalytic hydrogenation rates.-See B., 1943, II, 305.

Fluid catalyst process. Catalytic cracking of petroleum.-See B., 1943, I, 394.

Catalytic] hydrogenation of some sulphur compounds.—See B., 1943, II, 305.

Effect of surface on cathode polarisation during electrodeposition of copper.—See B., 1943, I, 415.

Nature of latent images formed in photographic emulsions due to light absorption and to the passage of ionising particles. D. M. Bose (Indian J. Physics, 1943, 17, 27–37).—The effect of photons on photographic emulsions takes place from the surface inwards, but that of ionising particles in a value of not warface from the surface that of ionising particles is a vol. effect working from the inside of the Ag halide grains to the outside. Hence emulsions with large grains will be more sensitive than fine-grained emulsions for photons, and the reverse for ionising particles. The increase in sensitivity of fine-grained emulsions in the case of ionising particles brought about by optical desensitisers is discussed. Such desensitisers about by optical desensitisers is discussed. Such desensities of destroy surface-sensitive spots and give greater prominence to internal latent images. Ag halide grains in an emulsion possess different degrees of sensitiveness, both to photons and to ionising particles. An expression is deduced for the no. of Ag grains deposited plang the track of ionising particles. A. J. M.

Apparatus for photolysis studies in the gas phase. I. Acetone and iodine mixtures. S. W. Benson and G. S. Forbes (J. Amer. Chem. Soc., 1943, 65, 1399-1405).—A continuous-flow apparatus *Chem. Soc.*, 1943, **65**, 1399—1405).—A continuous-flow apparatus has been used to investigate the photolysis in the gas phase of $COMe_2$ and $COMe_2$ -I mixtures by λ 2537 A. at 60—140°. When I is absent, the main products are C_2H_6 and CO with some CH_4 and Ac_2 , but when I is present the main products are CO and MeI with traces of AcI and CH_4 . The primary process (quantum efficiency ~1) is the decomp. of $COMe_2$ to Me and Ac radicals, at least 22% of the latter decomp. into Me and CO. Simultaneous formation of CH_4 and $COMe_2$ to Me_4 . CH_4 and COMeEt in the photolysis of $COMe_2$ is suggested. Activ-ation energies for decomp. of Ac and the formation of AcI from Ac radicals and I are 16 and 9 kg.-cal. per mol. W. R. A.

Flash saturation and reaction periods in photosynthesis. F. F. Rieke and H. Gaffron (J. Physical Chem., 1943, 47, 299-308).— In the flashing light method for studying photosynthesis the intervals between successive flashes were made of unequal length, the average intensity remaining the same. With this modification there is, between one pair or group of closely spaced flashes and the next pair or group, a dark interval during which the rate-limiting reaction has time to recover. The method has been applied to CN'-inhibited photosynthesis and to the photo-reduction of CO_2 . In the former case it is shown that the reaction responsible for flash saturation is insensitive to CN', the action of CN' being to limit some other reaction, possibly connected with the initial fixation of CO2. In the latter case it is shown that the length of the dark interval ncessary to maintain flash saturation is the same as for normal photosynthesis. The data support the view that photochemical processes are un-changed whether CO_2 is reduced with O_2 evolution or with H_2 absorption. C. R. H.

IX.—PREPARATION OF INORGANIC SUBSTANCES.

Helium and rare gases. H. Damianovitch (Proc. 8th Amer. Sci. Congr., 1942, 7, 137-144).—A summary of the evidence for com-pound formation of He, A, and Xe with metals. F. R. G.

Existence of some transient hydrates. B. Ghosh (J. Indian Chem. Soc., 1943, 20, 120-122).—A differential thermocouple method has been employed to detect the transient formation of hydrates during dehydration of salts. L. J. J.

Reactions of the solid state. F. Feigl, L. I. Miranda, and H. A. Suter (Anais Acad. Brasil Cienc., 1943, 15, 151–186).—Experi-mental details are recorded for reactions between solids. Those described are $CuSO_4$, $Fe_2(SO_4)_3$, $MnSO_4$, $NiSO_4$, or $CoSO_4$ with MgO; Ag1, HgCl, HgI, CuI, or TII with Zn; formation of lakes from Al_2O_3 , MgO, BeO, TiO₂, ZrO₂, and ThO₂ respectively with alizarin, purpurin, quinalizarin, $NO_2 \cdot C_4H_4 \cdot N_2 \cdot C_{10}H_3 \cdot OH-a$, diphenylcarb-azide, or diphenylcarbazone; Ni(CN)₂ and (CMe:N·OH)₂ and other substances forming complex metallic salts; AgI, PbI₂, TII, or CuI with MnO_2 ; WO₃ with ZnO, MgO, or CdO; V_2O_5 with ZnO; MoO₃ with PbO or CdO; $Mg_2P_2O_7$ and $Mg_2As_2O_7$ respectively with MnO_2 ,

Mercuri-iodides. M. Meyer (J. Chem. Educ., 1943, 20, 145–146). —Ag', Pb'', Hg', Cu'', Bi''', and Cd'', of the usual 24 ions of qual. analysis, yield ppts. when K_2HgI_4 is added to solutions of the metal salt. Ag_2HgI_4, ρ_4^{36} 6·02, an amorphous yellow powder at room temp., changes reversibly at 51·2° to an orange modification; it darkens on exposure to light. The Pb compound, probably Pb(OH)₂, 3PbHgI_4, ρ_4^{36} 6·16, is an amorphous orange-red powder, transition temp. to yellow modification at 133·8°. HgHgI_3, ρ_4^{46} 6·92, an amorphous yellow-orange powder, is photosensitive; transition temp. are: to red >160°, to orange-red at 172·6°, and to deep-red at 220·1°, m.p. 224·4°. Cu₂HgI₄, ρ_4^{36} 5·97, is a micro-cryst. red powder; transition temp., 66·6° to a purple-brown modification. Addition of K₂HgI₄ to Bi''' gives first HgI₂, then a purplish-black, micro-cryst. basic salt with no transition temp. up to 300°. Cd'' gives a ppt. of HgI₂ with K₂HgI₄. The Cu and Ag compounds gives a ppt. of HgI₂ with K₂HgI₄. The Cu and Ag compounds sealed into narrow-bore glass tubing to make coloured stirring-rods show rapid and brilliant colour changes when placed alternately in L. S. Ť hot and cold solutions.

Standardisation of activity of aluminium oxide for chromatography. P. B. Müller (Verh. Ver. Schweiz. Physiol:, 1942, **21**, 29–31).—The heat evolved in treating Al_2O_3 (with solvents (light petroleum) is reproducible and ∞ its chromatographic adsorption activity. When active and inactive products are mixed, the relation between content of active Al₂O₃ and evolution of heat is complex and dependent in a non-linear manner on the composition of solvent mixtures, but products of any desired degree of activity may be obtained by mixing with reference to preconstructed curves. With sensitive adsorbates, the lowest practicable adsorption activity is recom-A. H. C. mended.

Periodates of zirconium. R. K. Bahl, S. Singh, and N. K. Bali *I. Indian Chem. Soc.*, 1943, **20**, 141–142).—32 rO_2 , I_2O_7 , $14H_2O$ and $4ZrO_2$, I_2O_7 , $18H_2O$ are formed by the action of Na₂ paraperiodate and K metaperiodate, respectively, on Zr nitrate. 62 rO_2 , I_2O_7 , $20H_2O$ is formed by the action of paraperiodic acid on Zr hydroxide. The latter on dehydration at <100° gives a series of hydroxide.

of hydrates with 13, 8, 6, and 4 H_2O . L. J. J.

Reactions below 800° in powdered mixtures of lime with lead and manganese silicates used in the glass industry. J. A. Hedvall [with N. Isakson, G. Lander, and S. Palsson] (Z. anorg. Chem., 1941, 248, 229—242).—Powdered mixtures of PbSiO₃, Pb₂SiO₄, and MnSiO₃ with excess of CaO were heated in air and in N₂. The metasilicates formed double salts, CaPbSiO₄ and CaMnSiO₄, whereas Pb₂SiO₄ reacted according to $2CaO + Pb_2SiO_4 \rightarrow Ca_2SiO_4 + 2PbO$. C. R. H.

C. R. H. Crystalline complexes of arsenic, antimony, and bismuth tri-chlorides with dioxan. C. J. Kelley and P. A. McCusker (J. Amer. Chem. Soc., 1943, 65, 1307–1309).—The compounds $2A_{SBT_3}, 3C_4H_8O_2$, $A_{ST_3}, C_4H_8O_2$, $2SbCl_3, 3C_4H_8O_2$, $SbCl_3, 2C_4H_8O_2$ (I), $2SbBr_3, 3C_4H_8O_2$, and $2BiCl_3, 3C_4H_8O_2$ have been prepared, and their dissociation pressures, together with that of $2A_{SC}C_3, 3C_4H_8O_2$ (I), at 20°, and of (I) from 0° to 20°, have been determined. Complete dissociation occurs with all dioxanates in C. H. solution and with dissociation occurs with all dioxanates in C6H6 solution and with (II) in the vapour phase. W. R. A.

248, 283–250).— It talkates and modates have been prepared by fusing K_2CO_3 or KOH with Ta_2O_5 and Nb_2O_5 . Examination of the products has demonstrated the existence of $4K_2O_3Ta_2O_5, 16H_2O$ and $7K_2O_5Ta_2O_5, 24-30H_2O$, which are very similar in lattice structure. The existence of the corresponding niobates was demon-strated, although $7K_2O_5Nb_2O_5, xH_2O$ was obtained only occasionally. C. R. H.

Sulphur monoxide. VIII. Decomposition of sulphur monoxide. Polysulphur oxides. P. W. Schenk (Z. anorg. Chem., 1941, 248, 297-312).-Mol. wt. data and vol. contractions observed on decomp. of gaseous SO indicate a mol. wt. of ~70 and show that it is either a mixture of $(SO)_2$ and SO, or a mixture of S_2O and SO_2 formed according to $3SO \rightarrow S_2O + SO_2$. A new investigation of the decomp. of liquid SO confirms earlier conclusions (cf. A., 1937, I, 576) that it contains polysulphur oxides of the formula $S_n O_{n-x} (x < n)$. CS_2 , $CHCl_3$, and CCl_4 solutions of SO show evidence of polymerisation, mol. wts. of 720–930 in CCl_4 having been obtained.

C. R. H.

Amides of tervalent chromium and cobalt. O. Schmitz-Dumont (Z. Elektrochem., 1941, 47, 221–222).—Chromic and cobaltic amides have been prepared from KNH_2 and $[\text{Cr}(\text{NH}_3)_e](\text{NO}_3)_2$ or $[\text{Co}(\text{NH}_3)_e](\text{NO}_3)_3$ in liquid NH₃ under pressure. They retain no bound NH₃ at 0° and are amorphous solids of empirical formulæ $(\text{cr}(\text{NH}_3)_{end})$. bound $\rm NH_3$ at 0° and are amorphous solids of empirical formulæ $\rm Cr(\rm NH_2)_3$ and $\rm Co(\rm NH_2)_3$, apparently highly polymerised into long chain-like mols. with each metal atom surrounded by 6 $\rm NH_2$ -groups. These amides resemble one another more than the corresponding hydroxides. $[\rm Cr(\rm NH_2)_3]_n$ is bright pink, dissolves in $\rm H_2O$ without depressing the f.p. to give a red solution, and slowly hydro-

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lyses. It does not give triaquotriammine salts with dil. acids, 1988. It does not give triaquotriammine salts with dil. acids, and is amphoteric in liquid, NH₃ giving (i) a deep red solution with NH₄Br containing isolatable $[Cr(NH_2)_3, NH_4Br, HBr]_n$, and (ii) $K_n[Cr(NH_2)_4]_n$ with KNH₂. $[Cr(NH_3)_6]_1_3$ and excess of KNH₂ give $K_n[HNCr(NH_2)_2]_n$. Thermal decomp. of chromamide to CrN gives $HNCrNH_3$, and probably $HN[Cr(NH_2)_2]_2$ and $Cr_2(NH)_3$ as inter-mediates. $[Co(NH_2)_3]_n$ is brown and likewise amphoteric in liquid NH₃, giving (i) a dark brown solution with NH₄NO₃ containing $[Co(NH_2)_3, NH_4NO_3]_n$, and (ii) a reaction with KNH₂, the amido-salt initially formed evolving NH₃ spontaneously to give the black $Co_0(NV_2)_5$. L. H. L. L. H. L. $Co_2(NK)_3$.

Affinity. XCIX. Phosphides of tungsten, molybdenum, and chromium. F. E. Faller and W. Biltz [with K. Meisel and M. Zumbusch] (Z. anorg. Chem., 1941, 248, 209-228).—Phosphides of W, Mo, and Cr have been prepared by heating the powdered metals W, Mo, and Cr have been prepared by heating the powdered metals with white P. Only two stable W phosphides were obtained, WP₂ and WP₁ W₃P₄ having been shown to be a two-phase system and W₂P being a mixture of WP and W. Amorphous, labile W₄P decomposes into W + WP and not into W + W₂P. The stable Mo and Cr phosphides are MoP₂, MoP, and Mo₃P, and CrP₂, CrP, Cr₂P, and Cr₃P. There is no evidence of Cr₂P₃. The heats of formation of WP₂, MOP₂, and CrP₂ from monophosphide and yellow P are 12, 10, and 6.5 kg.-cal., respectively. The increments of mol. vol. due to P have been calc. from d data for each compound. C, R. H.

Reduction of ferric oxide by hydrogen. F. Olmer (J. Physical Chem., 1943, 47, 317–325).—The author's method for studying reactions (cf. A., 1943, I, 280), applied to the reduction of Fe_2O_3 and magnetic EQ in H shows that FoQ is reduced to FeQ. and magnetic Fe_3O_4 in H_2 , shows that Fe_2O_3 is reduced to Fe_3O_4 below 325° and directly to Fe above 325°, no Fe_3O_4 or FeO being formed. Fe_3O_4 is directly reduced to Fe without formation of FeO.

C. R. H. Metal carbonyls. XXXVII. Ease of formation and properties of rhenium halogenopentacarbonyls. W. Hieber, R. Schuh, and H. Fuchs. XXXVIII. Rhenium pentacarbonyl. XXXIX. Amine-substituted rhenium carbonyls. W. Hieber and H. Fuchs (Z. anorg. Chem., 1941, 248, 243—255, 256—268, 269—275).—XXXVII. The ease of formation of $\text{Re}(\text{CO})_5 X$ (X = Cl, Br, I) from K₂ReX₆ and CO decreases in the order I > Br > Cl, a temp. of ~230° and a CO pressure of ~30 atm. being necessary to form $\text{Re}(\text{CO})_5 \text{Cl}$, whereas $\text{Re}(\text{CO})_5 \text{I}$ is formed at atm. pressure. $\text{Re}(\text{CO})_5 \text{Cl}$, whereas $\text{Re}(\text{CO})_5 \text{I}$ is formed at atm. pressure. $\text{Re}(\text{CO})_5 \text{Cl}$, and an org. halide, at 200—250° and ~200 atm. initial CO pressure. The order of stability towards reagents is Cl > Br > I. Cl_2 and Br order of stability towards reagents is Cl > Br > I. Cl_2 and Br liberate I from $Re(CO)_{I}I$.

Therate 1 from $\operatorname{Re}(\operatorname{CO})_{5}$. XXXVIII. $[\operatorname{Re}(\operatorname{CO})_{5}]_{2}$ (I) (m.p. 177°) has been prepared by the interaction of CO and $\operatorname{Re}_{2}O_{7}$ or KReO_{4} at 250° and 350 atm. or at 270° and 500 atm. effective pressure, respectively. $\operatorname{Re}_{2}S_{7}$ and CO at 240°/250 atm. also afford (I); in presence of H_{2} or $H_{2}O$ small quantities of a volatile Re compound, probably a Re carbonyl hydride [ReH(CO)_{5}?], are also formed. (I) belongs to the mono-clinic prismatic system, with a:b:c 1·045:1:2·045, $\beta = 76^{\circ}$ 28'. (I) reacts with X to form Re(CO) X

(I) reacts with X_2 to form $\operatorname{Re}(\operatorname{CO})_5 X$. XXXIX. By heating $\operatorname{Re}(\operatorname{CO})_5 X$ or $[\operatorname{Re}(\operatorname{CO})_5]_2$ with $\operatorname{C}_5 \operatorname{H}_5 \operatorname{N}$ or *o*-phenanthroline the following 8 compounds have been prepared : $\operatorname{Re}(\operatorname{CO})_3(\operatorname{C}_5 \operatorname{H}_5 \operatorname{N})_2 X$, $\operatorname{Re}(\operatorname{CO})_3(\operatorname{C}_5 \operatorname{H}_5 \operatorname{N})_2$, $\operatorname{Re}(\operatorname{CO})_3(\operatorname{C}_{12} \operatorname{H}_8 \operatorname{N}_2 X)$, $\operatorname{Re}(\operatorname{CO})_3 \operatorname{C}_{12} \operatorname{H}_8 \operatorname{N}_2$. The non-halogenated compounds are probably dimensional compounds are probably

C. R. H. dimeric.

X.—ANALYSIS.

Elementary spark spectrum analysis. C. C. Kiplinger (*J. Chem. Educ.*, 1943, 20, 234).—Laboratory apparatus suitable for qual. analysis is described. L. S. T.

Systematic indirect analysis. II. Further development to indirect volumetric analysis. P. Fuchs (Z. anal. Chem., 1941, 121, 305-347).—A review of principles involved in the application of the methods of indirect volumetric analysis to mixtures of several components.

Sensitivity of chemical reactions. II, III. A. Schleicher (Z. anal. Chem., 1941, 121, 183-186, 187-189; cf. A., 1943, I, 262).--Theoretical.

Drop reaction experiments. I. Catalytic reactions. II. Reaction Drop reaction experiments. 1. Catalytic reactions. 11. Keaction on filter-paper. III. Heterogeneous reactions. F. Feigl (J. Chem. Educ., 1943, 20, 137—141, 174—178, 240—243).—I. Experiments are described showing the following : the catalysis of the I_2 -NaN₃ reaction by S''; the autocatalysis of the KMnO₄-H₂C₂O₄ reaction; the formation of HNO₂ during the reduction of aq. KNO₃ by Zn and dil. HCl in presence of KI; the acceleration by NO₃ of the reduc-tion of KMnO₄ by H from Zn and H SO₄ the prevention of the and dif. Hern presence of H_1 , the acceleration by H_3 of the curve tion of the oxidation of MnO_4 by H from Zn and H_2SO_4 ; the prevention of the oxidation of Mo-blue by conc. HNO_3 in presence of $CO(NH_2)_3$, due to destruction of HNO_2 by $CO(NH_2)_2$; and the prevention of the oxidation of KCNS to K_2SO_4 by HNO_3 in presence of NaN₃, which agains destroys HNO_2 as soon as it is formed. If The following reactions on filter-naper are described and

II. The following reactions on filter-paper are described and discussed : union of S or Se with Tl₂S to form Tl₂S,S_# or Tl₂S,Se_#,

respectively (limits of identification, $3 \mu g$. of S or $1 \mu g$. of Se per drop); reaction of finely-divided MnO₂ with dil. HCl, dil. H₂SO₄, AcOH, and reducing agents; reaction of HgO with NH₂OH,HCl in two stages; oxidation of S to SO₄" by I; conversion of metal sulphides, *e.g.*, Tl₂S, HgS, PbS, into the corresponding iodides; and the reaction of HgS with alkali polyiodide, which is now shown to proceed according to the schemes HgS + I₂ = HgI₂ + S, and HgI₂ + 2KI = K₂HgI₄. Owing to the much greater dispersion of a ppt. formed on paper many effects, hitherto unknown, have been observed and can be demonstrated in some of the above reactions. demonstrated in some of the above reactions.

III. Experiments illustrating (i) the condensation and reaction of H_2 + air or illuminating gas + air on the surface of finelydivided Pt or Pd, (ii) the reaction between MnO₂ or K₂CrO₄ and dil. HCl in presence of Ag salts, and (iii) the detection of the start of pptn. reactions before the ppt. becomes visible, *e.g.*, the reactions between $Na_2S_2O_3$ and HCl, and $K_2Ni(CN)_4$ and HCl, are described L. S. T. and discussed.

Polarographic determination of small quantities of aldehydes and [hydrogen] peroxide. See A., 1943, II, 316.

Determination of hydrogen-ion concentration in the electrolytic zinc bath.—See B., 1943, I, 416.

Determination of free acid in salts of tervalent chromium and bivalent copper.—See B., 1943, I, 401.

Ballistic method of determining the moisture content of [cellulosic] specimens.—See B., 1943, II, 314.

Electrophotometric determination of fluorine in aluminium salts. -See B., 1943, I, 401.

Determination of the concentration of industrial sulphuric acid aerosols.—See B., 1943, I, 401.

Rapid determination of sulphate in hydrogen sulphite, sulphite, and thiosulphate lyes .- See B., 1943, I, 401.

Determination of sulphur dioxide in presence of nitrogen oxides.-See B., 1943, I, 401.

Quantitative X-ray analysis [determination] of selenium.—See B., 1943, I, 402.

Determination of residual nitrogen in the inert gases. G. Heyne, E. Hille, and F. Schaefer (Z. anal. Chem., 1941, 121, 411-419). $N_2 \sim 0.01$ vol.-% in the inert gases is fixed either as Mg_3N_2 using an electric arc between Mg electrodes and determining the N as NH₃, or as oxides of N in a spark discharge. The N oxides are absorbed in alkali and the NO₂' is determined colorimetrically by the Griess-Ilosvay reaction, or as NH₃ after reduction by Devarda's alloy. Procedure for analysing NO₃' or NO₂'-NO₃' mixtures colorimetrically after reduction of the NO₃' by Pb powder is de-ceribed. L. S. T. scribed.

Determination of nitrogen in alloys containing chromium.-See B., 1943, I, 414.

Unreliability of resorcinol-periodate test for hyponitrites. W. V. B. Sundara Rao and V. V. K. Sastry (*J. Indian Chem. Soc.*, 1942, **19**, 188).—At pH 1—3 a red colour is given also by NH₂OH and NO₃'; at pH 7—8 the colour is pink (given also by B_4O_7'' , HCO_3' , and NO_3'). The production of the colour is unaffected by the buffers, by excess of NaCl, or by varying the concn. of resorcinol or the order of addition of the reagents (cf. Corbet, B., 1940, 709). J. H. BA.

Determination of phosphoric acid by weighing magnesium ammon-ium phosphate. P. Lederle (Z. anal. Chem., 1941, 121, 241-254). The ppt. obtained from PO₄^{'''} and Mg^{'''} in presence of NH₄Cl and aq. NH₅ can be weighed directly after washing with dil. NH₅ and anhyd. COMe₂, and drying for 10 min. in a vac. desiccator. An empirical factor, 0.2759 instead of 0.2894 for MgNH₄PO₄,6H₂O, must be used to obtain the P₂O₅ content. With citric acid extracts of basic slag, the factor becomes 0.2788 (mean of 100 determinations). The method can also be used in the determination of Mg⁻¹ L S. T The method can also be used in the determination of Mg. L. S. T.

Rapid colorimetric determination of phosphorus in iron alloys in presence of arsenic.—See B., 1943, I, 411.

Volumetric determination of boric acid. I, II. H. Schafer and A. Sieverts (Z. anal. Chem., 1941, 121, 161–169, 170–183).—I. Metals interfering with the usual titration of H_3BO_3 are removed by pptn. with 8-hydroxyquinoline (I) dissolved in dil. NaOH. Excess of (I) is removed by means of aq. MgCl₂ and animal C. Normal amounts of alkali and alkaline-earth metals need not be removed. Data showing satisfactory recoveries of H_3BO_3 in pres-ence of Zn, Pb, Al, Fe, or Ni'are recorded. II. Methods for titrating aq. H_3BO_3 with CO₂-free alkali in pres-ence of invert sugar or mannitol, using Me-red or bromocresol-purple as indicator, are described. Data showing that the invert sugar method is not interfered with by NH₄, Zn^{*}, Ni^{*}, Cd^{*}, Co^{*}, Mn^{**}, AsO₃^{***}, and small amounts of SiO₂, nH_2O , H_3PO_4 , and H_3ASO_4 are given; Al^{**}, Fe^{***}, and Pb^{**} must be previously removed by means of (I). Large amounts of SiO₂ can be eliminated, without loss of

283

 BO_3''' , as SiO_2 gel under the conditions described. Application to the determination of H_3BO_3 in silicates is outlined. L. S. T.

Perchloric acid method of determining silica in Portland cement and its raw materials.—See B., 1943, I, 408.

Determination of free carbon (graphite) in carborundum.—See B., 1943, I, 401.

Determination of carbon dioxide in soap and soap products by loss in weight.--See B., 1943, II, 323.

Determination of small amounts of calcium oxide in chromate solutions.—See B., 1943, I, 401.

Rapid determination of magnesium with oxine in aluminium alloys. -See B., 1943, I, 418.

Determination of magnesium in aluminium alloys.—See B., 1943, I, 418.

Potassium mercuric thiocyanate in microchemical technique. D. Gramacho (Rev. Brasil. Quim., 1943, 15, 269-274), -K₂Hg(CNS)₄ is suitable for the photomicro-detection of Zn, Ni, Cu, Cd, and Co in presence of each other in minerals, except when Zn and Cd are in presence of each other in innerals, except singly, 22 μ g. of Zn, present in similar proportions. When present singly, 22 μ g. of Zn, 20 μ g. of Co, 41 μ g. of Ni, 25 μ g. of Cu, and 31 μ g. of Cd per c.c. F. R. G.

Rapid determination of small amounts of zinc.—See B., 1943, I, 416.

Determination of cadmium as cadmium sulphide. I. Sarudi (v. Stetina) (Z. anal. Chem., 1941, 121, 348-350).—Cd sulphide pptd. by H₂S from hot sulphate solutions containing initially 30 c.c by H_2S infinite solutions containing initially be c.o. of conc. H_2SO_4 per l. has the theoretical composition when the [Cd"] is > 0.2 g. per l. Such a solution is treated, while cooling, with H_2S for 45 min., diluted by half its vol. of cold H_2O , and treated with H_2S again for 20 min. The ppt. is washed with cold H_2O , EtOH, and Et₂O, dried at 100°, and weighed. Test data are recorded L. S. T. recorded.

Rapid determination of copper in very poor ores and flotation tailings.—See B., 1943, I, 415.

Rapid determination of small amounts of copper in high-grade antimony metal.—See B., 1943, I, 417.

Determination of aluminium by precipitation with phenylhydrazine. W. C. de Moraes Bastos (*Publ. Inst. Nac. Tecn., Rio de Janeiro,* 1942, 54 pp.).—Al is determined as Al₂O₃ by pptn. with NHPh·NH₂. In presence of large amounts of Fe and Mn, and small amounts of P, Ti, Zr, Ca, Mg, Zn, Co, and Cu, the error in the determination of Al is $\geq 0.5\%$. In Mn minerals TiO₂ and P₂O₅ are pptd. with Al₂O₃ and are determined by other methods, giving Al by difference.

Determination of aluminium oxide in copper-aluminium alloys by wet chlorination .--- See B., 1943, I, 418.

Potentiometric determination of aluminium in silicate ores.-See B., 1943, I, 417.

Identification and determination of small quantities of permanganate in presence of large amounts of chromate. F. Feigl and H. Sutter (An. Asoc. Quim. Brasil, 1943, 2, 1-4).—Quantities $\langle 0.3 \mu g$. of KMnO₄ in 0.05 ml. can be determined in presence of 0.02 g. of K₂CrO₄ by its coloration of filter-paper in comparison with a standard test. The method is rapid and requires little material. F. R. G

Diphenylmethylamine-p-sulphonic acid as redox indicator [in the dichromate-iron titration]. J. Knop and O. Kubelková-Knopová (Z. anal. Chem., 1941, 122, 183–201).—NPhMe·C₆H₄·SO₃H-p (I) (prep. of Ba and Na salts described) is more sol. in H₂O than NHPh₂, is insensitive to WO_3 , H_2O_3 and has a greater resistance to decomp. by oxidation, and hence a smaller indicator correction, than NHPh·C_gH₄·SO₃H-p (II). In dil. acid solution the colour change produced by oxidising agents is from colourless to purple-red. The colour change is induced by Fe^{*}, and is reversible. In presence of For the colour appears with a min. excess of $K_2Cr_2O_7$, $KMnO_4$, or $Ce(SO_4)_2$. In the Fe-K₂Cr₂O₇ system in 0.5—2N-acid (H₃PO₄ + H₂SO₄ or HCl), the colour change occurs at 0.51—0.59 v. in micro-titrations, or 0.52—0.63 v. in macro-titrations. The indicator is very sensitive; the first perceptible red colour appears at a $[K_2Cr_2O_7]$ very sensitive; the first perceptible red colour appears at a $[K_2Cr_2O_7]$ of 2—3 × 10⁻⁶N. Data showing the use of the indicator in macro-and micro-titrations of Fe", compared with potentiometric titrations, are recorded. In the titration of 0·05—0·2 g. of Fe by 0·05N- or 0·1N-K_3Cr_2O_7 the error is +0·05%, so that, in general, indicator corrections are unnecessary. The K₂Cr₂O₇ titration of Fe" after reduction of Fe" by SnCl₂, and the back-titration of K₂Cr₂O₇ by Fe^{II} solution, give accurate vals. without indicator corrections. In the micro-titration of 0·4—4 mg. of Fe" by 0·005 or 0·01N-K₂Cr₂O₇ for 0·02 c. of 0·1% indicator solution. The micro-titration of K₂Cr₂O₇ for 0.02 c.c. of 0.1% indicator solution. The micro-titration of $K_2Cr_2O_7$ by Fe^{II} solution gives accurate vals. without indicator corrections. Comparison shows the superiority of (I) over (II). The light

absorption curves of both indicators have been determined spectrophotometrically. L. Ŝ. T.

Determination of ferrous and ferric oxides in sponge iron.-See B., 1943, I, 411.

Applications of the spectrograph to steelworks analysis.-See B., 1943, I, 414.

Separation of cobalt from nickel using acetone as a solvent. M. M. Tillu (J. Indian Chem. Soc., 1943, 20, 139-140.-Separation of NiCl₂ from CoCl₂ can be effected by extraction with COMe₂, in which CoCl₂ is very sol., whilst NiCl₂ has the solubility 1 in 16,000 wt./wt. at 35°. L. J. J.

Determination of cobalt and nickel in intermediates and solid alloys based on tungsten carbides.—See B., 1943, I, 417.

Comparison of methods of determining small amounts of cobalt in ores, concentrates, and tailings.—See B., 1943, I, 417.

Analytical control of nickel-plating solutions.—See B., 1943, I, 416

Photoelectric determination of molybdenum in steel.—See B., 1943, I, 414.

Determination of tungsten in mineral fractions and minerals by comparison of their spectral energies.—See B., 1943, I, 417.

Determination of tin by titration with methylene-blue. E. Wohlmann (Z. anal. Chem., 1941, 121, 161-173).—Atack's method for determining Sn^{••} by titration with methylene-blue has been investigated and compared with the titration with I solution. Fe, which is unsuitable, and Zn, or Al have been compared as reducing agents for Sn^{***} in HCl. WO_4^{**} , VO_4^{***} , and MOO_4^{***} interfere with the methylene-blue titration and must be absent. Any Pb, or other metal pptd. by Al during reduction of the solution containing Sn. must be removed, and the reduction repeated. Alkali, Fe, and Ni in amounts resulting from a Na₂O₂ fusion of Sn ores do not interfere. L. S. T

Determination of tin, with special reference to tin ores.-See B., 1943, I, 416.

Determination of tin in ores and concentrates.-See B., 1943, I, 416.

Separation of tin from copper in the analysis of bronze.---See B., 1943, I, 415.

Reduction of titanic ion in the Jones reductor. L. Baumfeld (An. Asoc. Quim. Brasil, 1943, 2, 9-12).—Determination of Ti^{IV} by reduction with Zn-Hg (Jones), oxidation by Fe", and titration with KMnO₄ yields results in agreement with the gravimetric method. The effect of varying the rate of reduction and other conditions is described. FRG

Photometric determination of bismuth. Determination of the bismuth content of lead alloys by means of the Pulfrich photometer. K. W. Grosheim-Krysko (Z. anal. Chem., 1941, 121, 399–402). The colour that Bi^{***} gives with $CS(NH_g)_g$ is used for the colorimetric determination of Bi^{***} by the Pulfrich photometer. The colour is stable for <24 hr. and const. at $15-30^\circ$; the Lambert-Beer law holds. holds. Addition of conc. tartaric solution prevents interference by the colour due to Sb", and delays pptn. of the Pb compound with $CS(NH_2)_2$. Procedure and test data for determining 0.01-0.8% of Bi in Pb are given.

XI.—APPARATUS ETC.

Simple temperature control for laboratory electric furnaces. W. Hirst and C. G. Cannon (J. Sci. Instr., 1943, 20, 129-132).-The automatic furnace temp. control described uses a potentiometer bridge and a photo-cell relay unit. In addition to controlling the temp. to $\pm 1^{\circ}$, it will also control rate of heating. A circuit is given for the simultaneous control of a no. of furnaces by the same photocell unit. A. J. M.

Removal of unwanted image layer from one side of double-coated X-ray film negatives. G. W. W. Stevens (J. Sci. Instr., 1943, 20, 133-134).—The gelatin layer containing the unwanted image is removed by 10% NaOCI. A method is described by which the layer part of the solution of the so layer can be removed from one surface without the solution coming in contact with the other. A. J. M.

Photo-electric colorimeter. II. R. Havemann (Biochem. Z., 1940, 306, 224-235; cf. A., 1939, I, 389).—The apparatus and its application to the measurement of abs. vals. of light extinction, extinction coeffs. of solutions, and fluorescence are described. F. O. H

Tension-compression device for quantitative X-ray diffraction evaluation of strain in metals and a calibrated series of aluminium alloys. G. L. Clark, G. Pish, and R. Seabury (J. Appl. Physics, Or Mathematical Content of the series of the serie1943, 14, 284-290) .- A simple apparatus is described for applying

F. R. G.

tension and compression stresses to specimens under X-ray diffraction analysis. The back-reflexion technique for rapid photographing of diffraction patterns is employed. Patterns for an Al alloy under calibrated tensions are given to illustrate evaluation of residual strains in large castings without destruction. N. M. B.

Generalisation of the Bragg-de Broglie principle of rotatory focalisation for X-rays; application to two-crystal spectrographs; focalistion and mosaic structure. H. Tellez-Plasencia (Arch. Sci. phys. nat., 1943, [v], 25, 35—54).—An extension of the focalisation conditions. The condition of symmetry or equidistance of the collimator and film relative to the crystal is not necessary. For a singlecrystal, focalisation is obtained when the angular velocities of the collimator and film vary inversely as their respective radii. Focalisation thus becomes possible with a crystal used in transmission, or with two crystals, and angular apertures of the incident beam allowing strong illumination can be used. An analogous arrangement allows rays dispersed by a mosaic crystal to be regrouped, and the loss of power due to crystal imperfections to be eliminated. N. M. B.

Visual observations in the infra-red.—See B., 1943, II, 319.

Plate calibration problems. R. A. Sawyer and H. B. Vincent (J. Opt. Soc. Amer., 1943, 33, 247-251).—Neutral filters made by thermal evaporation of Sb on to quartz plates in vac. are suitable for light intensity-density calibration of photographic emulsions. The importance of checking self-consistency of calibration curves and avoidance of errors due to reciprocity law failure is emphasised. L. J. J.

Wave-length calibration of spectrophotometers. J. A. Van den Akker (J. Opt. Soc. Amer., 1943, 33, 257-259).—A method of finding effective $\lambda\lambda$ for spectrophotometers by the use of filters is described. L. J. J.

Theory of the electrostatic β -particle energy spectrograph. II. F. T. Rogers, jun., and C. W. Horton (*Rev. Sci. Instr.*, 1943, 14, 216-220; cf. A., 1940, I, 176).—An extension of Dempster's theoretical discussion of the electrostatic analyser. W. R. A.

Vibrating slide as an aid to electron-microscopy and microscopy. M. von Ardenne (Kolloid-Z., 1940, 93, 158-163).—The microscope slide is attached to one prong of a tuning fork which is kept vibrating at 100 cycles per sec. by means of an electromagnet. Disperse substances on the slide are thus able to dry uniformly without the particles adhering to form lumps. C. R. H.

Electrostatic electron microscope and its applications in colloid chemistry. H. Mahl (*Kolloid-Z.*, 1940, **91**, 105—117).—The construction and use of the instrument are described and illustrated by micrographs. A device for taking stereo-micrographs is described.

C. R. H. Thermostatically controlled glass electrode apparatus. L. F. Le Brocq (Chem. and Ind., 1943, 350-351). J. H. Ba.

Effect of temperature on charged condensers. B. Gross and L. F. Denard (An. Asoc. Quim. Brasil, 1943, 2, 13—17).—Change of temp. of a condenser with carnauba wax dielectric at 100 v. causes a variation in charge of corresponding sign. F. R. G.

Study of band-pass effect by cathode-ray oscillograph. S. P. Chakravarti (Indian J. Physics, 1943, 17, 7-17).—The method given can be applied to the determination of gain or attenuation, phase-shift angle and its sign, for all types of wave-filter. Advantages and disadvantages of the oscillographic method are discussed. A. I. M.

The Geiger-Müller counter in mining technology. B. Rajewsky (Z. Physik, 1943, 120, 627-638).—Design and applications of a portable counter apparatus are discussed and a practical model is described. L. J. J.

Use of the Geiger-Müller counter in the search for pitchblendebearing veins at Great Bear Lake, Canada. G. C. Ridland (Amer. Inst. Min. Met. Eng., Tech. Publ. 1614, 1943, 7 pp.).—The counter adapted for field use, and its operation, are described. It will detect a pitchblende ore shoot in a shear zone, and moderately radioactive host rock at a considerable distance from the ore body. L. S. T.

Combined voltage-regulating and quenching circuit for the Geiger-Müller counter. W. F. Bale and J. F. Bonner, jun. (*Rev. Sci. Instr.*, 1943, **14**, 222–223). W. R. A.

Mica window Geiger counter tube for measuring soft radiations. D. H. Copp and D. M. Greenberg (*Rev. Sci. Instr.*, 1943, 14, 205– 206).—The construction of the counter is described. It is as sensitive to soft radiations as a screen-walled counter, and as rapid to use as the normal metal-walled type. R. L. E.

Densitometer. J. Ciochina (Z. anal. Chem., 1941, 121, 350-353).—Apparatus and method for determining the sp. gr. of liquids are described. L. S. T.

Simple semi-micro-arrangement for the kinetics of hydrogenation. P. Hersch and J. Degmer (*Rev. Fac. Sci. Istanbul*, 1942, 7, 8997).—An apparatus for the rapid measurement of the rate of aborption of H_2 at room pressure is figured and described. H. W.

Air-conditioned experimental cabinet. T. T. Colquhoun and V. A. Stephen (J. Austral. Inst. Agric. Sci., 1943, 9, 77-80).—A cabinet of improved design is described. Humidity control is obtained by subjecting the air in the cabinet to small temp. variations over a large surface. R. H. H.

Simple accurate formula for barometric corrections. L. C. do Prado (Rev. Sci. Instr., 1943, 14, 221-222). W. R. A.

Apparatus for following the course of rapid chemical reactions in solution. E. O. Powell and J. H. Trendall (*Chem. and Ind.*, 1943, 368-369).—Two opposite arms from a 4-way tap are connected with the titrating reagent whilst the third and fourth arms are connected respectively with an air supply under a slight pressure and with a fine capillary dipping into the reaction solution containing indicator. When the tap connects the third and fourth arms escaping air stirs the solution. The tap is turned through 90° and the bore, which should have a calibrated vol. of ~0.02 c.c., becomes filled with reagent. A further turn through 90° causes the entrapped reagent to be forced into the solution by air pressure, the entering air stirring the solution. The procedure is continued to the end-point. C. R. H.

Filtration. I. A. Brieghel-Müller (Kolloid-Z., 1940, 93, 297– 318).—The theory of filtration is developed on the basis of Poiseuille's law. With turbulent flow, the initial resistance to flow is lowered. The resistance is also affected by the packing of the filter-cake and differences in the size and shape of the filtered particles. The effect of these factors on the rate of flow is investigated theoretically, and apparatus is described by which it can be determined.

New method for determination of viscosity for high shearing stresses and definite shearing velocities. I. F. Wachholtz and W. K. Asbeck (*Kolloid-Z.*, 1940, 93, 280–297).—Theories of flow of true and anomalous liquids, and methods of determining η , are summarised. Three types of viscometer were investigated for the determination of η at various shearing velocities for pigment-oil suspensions. A rotating-disc viscometer gives bad results owing to frictional temp. rises. A falling-sphere viscometer with a narrow space between sphere and wall of vessel showed that small quantities of suspended pigment favoured turbulent flow. A band viscometer with a horizontal band was constructed to fulfil the requirements of an ideal viscometer. Such an instrument is suitable for the determination of η of suspensions for high rates of shear. A. J. M.

Making crystal models. D. J. Fisher (Amer. Min., 1943, 28, 54). —An alternative method for deriving the edges is presented (cf. *ibid.*, 1941, 26, 718). L. S. T.

XII.---LECTURE EXPERIMENTS AND HISTORICAL.

Laboratory experiment on deliquescence and efflorescence. O. F. Steinbach (J. Chem. Educ., 1943, 20, 146). L. S. T.

Chemical philosophy of Thomas Sterry Hunt. E. R. Atkinson (J. Chem. Educ., 1943, 20, 244-245). L. S. T.

Carl Julius Fritzsche and the discovery of anthranilic acid, 1841. F. E. Sheibley (*J. Chem. Educ.*, 1943, 20, 115–117). L. S. T.

Robert Child's chemical book list of 1641. W. J. Wilson (J. Chem. Educ., 1943, 20, 123-129). L. S. T.

John Griscom, chemist, 1774—1852. E. F. Smith (*J. Chem. Educ.*, 1943, 20, 211—218). L. S. T.

XIII.—GEOCHEMISTRY.

Distribution of atmospheric ozone. O. R. Wulf (*Proc. 8th Amer. Sci. Congr.*, 1942, 7, 439-446).—Variations in the O_3 content of the atm. are partly explicable by air currents in the stratosphere arising from observed differences in temp., which is highest over the poles. Other factors influencing O_3 distribution are discussed. F. R. G.

Fluorinated waters. J. E. Muñoz (Proc. 8th Amer. Sci. Congr., 1942, 7, 203-207).—10 Bolivian sources of H₂O containing F are described. F. R. G.

Helium age measurement. I. Preliminary magnetite index. P. M. Hurley and C. Goodman (Bull. Geol. Soc. Amer., 1943, 54, 305—323).—He, Ra, and Th contents of magnetite separated from numerous magnetic rocks of various age are recorded and discussed. The He age measurements show a grouping and sequence in accordance with geological knowledge. Ages $(\times 10^6$ years) are: mean Miocene 19; mean Laramide 57; mean Nevadan 118; mean late Triassic 155; mean late Appalachian 215; mean Devonian 348; pre-Cambrian 500—1650. The scale is suitable as an index for the

287

preliminary investigation of the He-retentivity of minerals. Age measurements made directly on samples of igneous rocks are unsuccessful owing to the leakage of He from most of the common minerals. L. S. T.

Helium retention in common rock minerals. P. M. Hurley and C. Goodman (*Bull. Geol. Soc. Amer.*, 1941, **52**, 545—559).—Age determinations by the He method made directly on rock samples are likely to be largely in error owing to loss of He from some or all of the mineral constituents. Data obtained for pyroxene (I) and felspar (II) from six samples of Triassic diabase show that mineral species differ in their ability to retain He; (II) loses much of its He; (I) retains more of its He than does (II), but < magnetite (III). From the general agreement between the He age ratios shown by (III) and the existing time scale indicated by the Pb method, (III) appears to retain most, if not all, of its He.

L. S. T. Age measurements by radioactivity. C. Goodman and R. D. Evans (Bull. Geol. Soc. Amer., 1941, 52, 491-544).—The various radioactive age methods, particularly the He method, are critically reviewed. The retentivity of rocks for He is the main uncertainty in the present application of the He method. Analytical and other errors necessitate discarding much of the previous work on age determinations. Isotopic abundance measurements are essential in the determinations of ages by the Pb method. The Pb and He methods are still the most promising for quant. age determination. L. S. T.

Phosphate deposits in New Guinea. R. C. Hutchinson (New Guinea Agric. Gaz., 1941, 7, 239–248).—Two native sources of phosphate are described, one a rock phosphate containing 10.0—11.7% P₂O₅, the other from bat caves containing guano deposits. T. W. P.

Phosphatisation at Malpelo Island, Colombia. D. McConnell (Bull. Geol. Soc. Amer., 1943, 54, 707-715).—Three specimens from Malpelo have been examined petrographically. Two show appreciable alteration by phosphatic solutions from guano; one is an amygdaloid in which the felspars have been completely destroyed and replaced, and the other is a phosphate rock composed essentially of phosphosiderite and strengite, a dimorphous pair with the composition FePO₄, 2H₂O. L. S. T.

Identification of the opaque minerals by electrochemical methods. D. V. Dodge (*Amer. Min.*, 1943, 28, 103—109).—The effects of electrolysing a drop of a standard etching reagent while it is in contact with a polished surface of the "insol." mineral are observed. Some minerals, e.g., cassiterite, franklinite (I), sphalerite, and chalcopyrite, dissolve readily, and microchemical tests can be applied to the solution. Others stain readily and can be recognised; thus, intergrowths of (I) and magnetite can be distinguished, and hæmatite can be differentiated from ilmenite. Details of apparatus, and the behaviour of various minerals towards different reagents, are described. L. S. T.

Composition of some calcareous rocks of the São Roque series. B. A. Ferreira (An. Asoc. Quim. Brasil, 1943, 2, 5-8).—Analyses are recorded for 46 samples of limestones and dolomites from the state of São Paulo. F. R. G.

Pigeonite in the "abnormal" dolerite dykes of charnockitic areas in Mysore. P. R. J. Naidu (*Current Sci.*, 1943, 12, 114-115).— The pigeonite is of the enstatite-diopside series 3CaMgSi₂O₆,2Mg₅Si₂O₆ and is present to the extent of 60 parts to 40 parts of plagioclase. It has a small optic axial angle varying from almost uniaxial to $2V = 13^{\circ}$ and 18° ; the mineral is described. F. R. G.

Effect of chemical impurities on scheelite fluorescence. R. Greenwood (*Econ. Geol.*, 1943, **38**, 56—64).—Spectrographic analyses of 54 samples of scheelite (**I**) show the almost invariable presence of Si, Al, Fe, and Mg, in addition to Ca and W. Most samples contain Mo, Mn, and Cu. Sr, Y, and Yb occur frequently, and Pb, Ag, As, Bi, and Ti occasionally; Yb is always accompanied by Y. The presence of Mo, and, to a smaller extent, of Mn, is characteristic of all samples that fluoresce yellow, the Mo content of (**I**) increasing from a trace in those that fluoresce blue to a max. in those that fluoresce yellow. Mn acts similarly, but the other elements showed no systematic variation. L. S. T.

X-Ray petrology of some fine-grained foliated rocks [slate and shale]. H. W. Fairburn (Amer. Min., 1943, 28, 246-256).

8

Large and small garnets from Fort Wrangell, Alaska. A. Pabst (*Amer. Min.*, 1943, 28, 233-245).—Measurements of 133 garnets from this locality show good correlation of habit with size.

L. S. T. **Xenolithic minor intrusion at Slievenagriddle, Co. Down.** E. M. Patterson (*Geol. Mag.*, 1942, **79**, 297-311).—Chemical and spectrographic analyses are recorded; they establish the order of geochemical migration for the alkali metals. L. S. T.

Igneous rocks from the Central Libyan desert. S. I. Tomkeieff and R. F. Peel (*Quart. J. Geol. Soc.*, 1942, 98, 223-234).—Petrographical. Chemical analyses of the younger igneous rocks are recorded and discussed. L. S. T. **Rancièite, a valid mineral species.** W. E. Richmond and M. Fleischer (*Amer. Min.*, 1942, 27, 231).—Rancièite (**I**), usually regarded as a variety of psilomelane, is a distinct species. (**I**) from Cuba has the formula $(Ca,Mn)O,4MnO_2,3H_2O$; most of the H_2O is lost at $<250^\circ$, with the formation of a new phase. L. S. T.

Sphalerite-dolomite orientation relations. F. Robertson (Amer. Min., 1942, 27, 232).—Orientation of dolomite (I) and metasomatic sphalerite in two coarsely cryst., slightly foliated (I) specimens from the Renfrew Zinc Prospect, Ontario, is described. L. S. T.

Order of silicates in systematic mineralogy. A. F. Rogers (*Amer. Min.*, 1942, **27**, 232).—Discrete SiO_2 silicates (orthosilicates) should come first, and the network silicates (polysilicates) last. L. S. T.

Extreme hydrothermal alteration in the Buck Creek, N. Carolina, dunite body. C. S. Ross (*Amer. Min.*, 1942, 27, 233).—All variations between pure olivine (I) dunite and rocks^{*}in which (I) has been completely replaced are present. Alteration has resulted from the introduction of hydrothermal solutions which introduced Al_2O_3 and CaO, and removed MgO. L. S. T.

Rarer metallic constituents of some American igneous rocks. I, **II**. E. B. Sandell and S. S. Goldich (*J. Geol.*, 1943, **51**, 99–115, 167–189; cf. A., 1942, I, 380).—Data showing the abundance and distribution of some of the rarer metallic constituents in igneous rocks from six regions are recorded and discussed. Numerous chemical analyses and variation diagrams are reproduced. The distribution of the minor elements is influenced by the major constituents to a marked extent. This is probably due to isomorphous replacement of the major by the minor constituents in rock-forming minerals in accordance with the principles laid down by Gold-schmidt. Geological factors are also of importance in determining the behaviour of the minor as well as of the major constituents. Estimates of the probable abundance of the minor elements in the earth's crust are given. In the Kearsage and Greenstone flows of earth's crust are given. In the Rearsage and Greenstone nows of Michigan, Ni and Co show a close relationship to MgO and CaO, and Cu and Zn appear to be related to the distribution of Fe. With the exception of the Michigan Cu district, the Cu content of the igneous rocks from Minnesota is 3 to 4 times that of similar rocks from other regions. The marked similarities in the bulk chemical analyses of the granitic rocks from the St. Francois Mts. of Missouri and from the Linea write of the reflected in the heavy metal and from the Llano uplift of Texas are reflected in the heavy metal (Pb, Zn, Cu, Ni, and Co) contents of these rocks. Cu, Pb, and Zn contents of 10 rocks from Clear Lake area, California, give unusually smooth curves. Analyses of a granite from the White Mountain district of New Hampshire and of a Na₂O-amphibole separated from it show that all the Zn, but only small fractions of the Cu and Pb, present in the granite can be accounted for by the amphibole. Mo and Be show a strong affinity for high-SiO₂ granites. Pb in igneous rocks shows a close relationship to K_2O , although all the Pb is not present in K minerals. Zn has a strong affinity for Fe, and Is not present in R initialized as the storing animity for Fe, and enters minerals such as magnetite-ilmenite, pyroxenes, amphiboles, and biotites. Other factors, however, affect its distribution; MnO is an index element of Zn in igneous rocks. The average ratio Zn : Cd in some of the rocks studied is 500 : 1. Cu, like Zn, is affected by the distribution of Fe, but shows a preference for subsilicic rocks. Cu is present chiefly as sulphide, but a high S content is not a criterion of high Cu content in an igneous rock. Ni favours basic Mg-rich rocks, and olivine is the chief Ni-bearing silicate. Co varies linearly with Mg. The ratio Co: MgO = 0.00066: 1 can be used to predict the Co content of common igneous rocks with fair accuracy; it gives 0.0023 as the average % of Co in the igneous rocks of the earth's crust. L. S. T.

Unit cell and space-group of claudetite. M. J. Buerger (Amer. Min., 1942, 27, 216).—Claudetite from Jerome, Arizona, is monoclinic with a_0 5.25, b_0 12.87, c_0 4.54 A.; space-group $P2_1/n$ (C_{2h}^5), with ~4 As₂O₃ per unit cell. L. S. T.

New mineral resembling tantalite. C. P. Guimaraes (*Rev. Quim.* Ind., 1943, **12**, 14).—The mineral containing Ta_2O_5 (90—91%), Ni₂O₅ (1—2%), Al₂O₃ (3%), and CaO (3%) occurs in pegmatite deposits in Northern Brazil. The exceptionally high Ta content indicates suitability for its extraction. F. R. G.

Oregon's mineral industries and mineral resources. F. W. Libbey (Bull. Geol. Soc. Amer., 1940, **51**, 2026—2027).—Mineral industries, in order of importance, are (i) Au (Ag), Hg, Pt (osmiridium), Cu, and Pb, (ii) sand, gravel, and crushed rock, and (iii) limestone, clay, agates, semi-precious stones, diatomite, coal, monumental stone, SiO₂, pumice, mineral waters. Potentially valuable deposits of chromite, Fe ore, Mn, Ni, Sb, Zn, salines, marble, building stone, and peat are known. Production figures are recorded. L. S. T.

Mineral resources of the Northwest. E. T. Hodge (Bull. Geol. Soc. Amer., 1940, 51, 2025).—Small Fe ore deposits exist. Limestone can be obtained most economically from Dall Island, Alaska. Refractory and ceramic clays occur in Lane Co., Oregon, Cowlitz Co., Washington, and Latah Co., Idaho. Large deposits of SiO₂ occur near Spokane. Magnesite for refractories and metal occurs in a large deposit near Chewelah, Washington. Numerous small chromite deposits occur in Oregon and Washington. Occurrences of Co, Sn, W, molybdenite, and Ni are only prospective. Saline deposits are probably widespread. Large phosphate deposits occur in south-eastern Idaho. L. S. T.

J. E. Allen (Bull. Geol. Soc. Amer., 1940, Chromite in Oregon. 51, 2015).-Chromite deposits occur, always in peridotite, dunite, serpentine, or associated ultrabasic rocks, in the Klamath Moun-L. S. T. tains and in the Blue Mountains.

Treanorite, a new mineral from Crestmore, California. A. O. Woodford, J. D. Laudermilk, and E. H. Bailey (Bull. Geol. Soc. Amer., 1940, 51, 1965).—Treanorite occurs as black crystals in the pegmatites of the Commercial Quarry. It is probably monoclinic, and its composition and properties are similar to, but not identical with, those of allanite. L. S. T.

Geology and quicksilver deposits of Coso Hot Springs area. H. D. B. Wilson and N. W. Hendry (Bull. Geol. Soc. Amer., 1940, 51, 1965).—Granitic rocks form the core of the Coso Range. In the Hot Springs area these are overlain by rhyolitic flows, tuffs, and breccias. Extensive hot springs and fumaroles have altered the granite and volcanic materials to opal and clay. The acidic hot springs contain unusually large amounts of sulphate, Fe, Al, and SiO_2 . The Hg deposits are in another area of hot springs and fumaroles; the Hg is present as cinnabar (I) intimately associated with S and alum. (I) occurs as irregular deposits of low-grade ore in the granite and in the volcanic breccia. L. S. T.

Igneous rocks of the Highwood mountains, Montana. II. Ex-trusive rocks. E. S. Larsen. III. Dykes and related intrusives. B. F. Buie. IV. Stocks. C. H. Burgess. V. Contact meta-morphism. E. S. Larsen and B. F. Buie. VI. Mineralogy. E. S. Larsen, C. S. Hurlbut, jun., B. F. Buie, and C. H. Burgess. VII. Petrology. E. S. Larsen, C. S. Hurlbut, jun., C. H. Burgess, and B. F. Buie (Bull. Geol. Soc. Amer., 1941, 52, 1733-1751, 1753-1807, 1809-1828, 1829-1840, 1841-1855, 1857-1868).--Numer-uus chemical angluses are recorded and discussed ous chemical analyses are recorded and discussed. L. S. T.

Weathering of igneous rocks near Hong Kong. R. W. Brock (Bull. Geol. Soc. Amer., 1943, 54, 717-738).—Chemical analyses of fresh and of weathered rocks are recorded, and the chemical and mineralogical changes that have resulted under the tropical but monsoon climate are discussed. Except for one lamprophyre, the noise in the range of granite, syenite, and granodorite. The order of weathering losses is CaO, Na₂O, and MgO early; SiO₂ and K₂O next; and Fe₂O₃ and TiO₂ last. H₂O is regularly added, and Fe oxidised. The chief product approximates to kaolinite.

L. S. T.

Roberts Mountains, Nevada. C. W. Merriam and C. A. Anderson (Bull. Geol. Soc. Amer., 1942, 53, 1675-1727).—Some chemical analyses are recorded. L. S. T.

Ring structures of the Pliny region, New Hampshire. R. W. Chapman (Bull. Geol. Soc. Amer., 1942, 53, 1533-1567).--Chemical analyses of the minerals of White Mountain magma series are L. S. T. recorded.

Plagioclase twinning. R. C. Emmons and R. M. Gates (Bull. Geol. Soc. Amer., 1943, 54, 287-303).-Various aspects of plagioclase twinning are discussed, and an attempt is made to use twinning as a clue to environmental conditions at the time of crystal-L. S. lisation.

Elasticity of igneous rocks at high temperatures and pressures. F. Birch (Bull. Geol. Soc. Amer., 1943, 54, 263-285).—Measure-ments of rigidity, and the velocity of shear waves, at temp. up to 600° at pressures of 3000-9000 kg. per sq. cm. are recorded for certain igneous rocks. L. S. T.

Geology and mineralisation of the San Antonio mine, Santa Eulalia district, Chihuahua, Mexico. W. P. Hewitt (Bull. Geol. Soc. Amer., 1943, 54, 173—204).—The chief yield has been Pb and Ag ore, but Sn and V ores have been produced commercially. The bodies are unusual in that Pb and V are important products from a contact-metamorphic area and that Sn occurs in replacement deposits in limestone. The Sn and V ore bodies are described. Sn is probably the last ore element introduced and may have been pneumatolytic. V ore was probably derived from the breakdown of V-bearing silicates. L. S. T.

Spectroscopic distribution of minor elements in igneous rocks from Jamestown, Colorado. J. M. Bray (Bull. Geol. Soc. Amer., 1942, 53, 765-814).-Qual. and quant. spectrographic analyses of numerous igneous rocks and minerals from this district are recorded and disigneous rocks and minerals from this district are recorded and dis-cuesed. The results show that correlation of rocks within a district is possible by use of the spectrographic method. Each rock, regardless mage, is distinguishable by variations in content of Sc, La, e, No. Lr, V, Cr, Co, Ni, Pb, and Zn. Each mineral contains characteristic minor constituents which are related to the major constituents present; in general, the ions of minor elements occur VN.

as substituents (solid solution) for ions of the appropriate-sized major elements. Sr is highest in K and Ca minerals, particularly felenars, and Ra is K felspars, and Ba in K minerals. All quartz and sphenes contain Al. Sc is most abundant in Mg and Fe^{II} minerals (micas and herebland) hornblende). Sphenes contain noteworthy proportions of rare earths. Ti, Mn, V, and Cr are conc. in dark minerals and muscovite. Ni and Co occur almost exclusively in biotite. The SrO: BaO ratios decrease numerically in the order plagioclases, biotites, K-felspars and muscovite. felspars, and muscovites. Pegmatic K-felspars have larger SrO: BaO ratios than the parent rock samples. Each pegmatic mineral averages less of almost every minor constituent than the average for the same mineral from the parent rock. This is explained by L. S. T. temp.-crystal structure relations.

Geology of the zinc-lead deposit on Calumet Island, Quebec. W. W. Moorhouse (Buil. Geol. Soc. Amer., 1941, 52, 601-632).— The complex ores occur in metamorphic rocks representing argillaceous and calcareous sediments, contact metamorphosed and injected by a granitic magma. The sulphide minerals comprise pyrite, sphalerite, pyrthotite, galena, tetrahedrite, chalcopyrite, and marcasite, deposited in the order named. Paragenesis is discussed. L. S.

v. Economic geology of California and Southern Oregon. C. V Averill (Bull. Geol. Soc. Amer., 1940, 51, 2017). L. S. T.

Genetic history of pegmatites and associated rocks of the Carolina tin belt. T. L. Kesler (Bull. Geol. Soc. Amer., 1940, 51, 1999).

L. S. T. Heavy minerals and the history of the Coastal Plain. L. Dryden and C. Dryden (Bull. Geol. Soc. Amer., 1940, 51, 1993-1994). L. S. T

Granitisation in western New England. G. W. Bain (Bull. Geol. Soc. Amer., 1940, 51, 1989). L. S. T.

Stratigraphy, structure, and petrology of the Mt. Cube area, New Hampshire. J. B. Hadley (Bull. Geol. Soc. Amer., 1942, 53, 113-176).—Several chemical analyses are given. L. S. T.

Alkaline and carbonate intrusives near Bancroft, Ontario. F. Chayes (Bull. Geol. Soc. Amer., 1942, 53, 449-511).—Chemical analyses are recorded. L. S. T.

Chemical analyses are recorded. L. S. T.

Structure and metamorphism in the Mount Washington Area, New Hampshire. M. P. Billings (Bull. Geol. Soc. Amer., 1941, 52, 863-935).—Chemical analyses are recorded. L. S. T. 863—935).—Chemical analyses are recorded.

Mineralisation in the West Tintic mining district, Utah. B. F. Stringham (Bull. Geol. Soc. Amer., 1942, 53, 267-290).

Genesis of ore deposits of S.E. Maine. C. Y. Li (Bull. Geol. Soc. Amer., 1942, 53, 15-51).—The genetic relation between the ore deposits (Cu, Zn, Pb, and some Ag) and the granite intrusive of S.E. Maine is discussed. Mines, prospects, and paragenesis are L. S. T. described.

Structure and metamorphism of Lewiston, Maine, Region. L. W. Fisher (Bull. Geol. Soc. Amer., 1941, 52, 107–159).—Numerous chemical analyses [L. C. Armstrong; J. G. Thompson] are recorded. L. S. T.

Results of the Chilean mineralogical expedition of 1938. Results of the Chilean mineralogical expedition of 1555. I. Identity of lapparentite with tamarugite. II. Crystallography of metavoltine. III. Penfieldite from Sierra Gorda, Chile. IV. Identity of salvadorite with kroehnkite. V. Cadwaladerite, a new aluminium mineral from Cerro Pintados, Chile. S. G. Gordon (*Not. Naturæ*, 1940, No. 57, 9 pp.; No. 64, 5 pp.; 1941, No. 69, 8 pp.; No. 72, 4 pp.; No. 80, 4 pp.; cf. A., 1943, I, 168).—I. Lap-parentite is identical with tamarugite (I), the Chilean occurrences of which in Cerro Pintados, Alexandre and Outcore are of which in Cerro Pintados, Alcaparrosa, and Quetena are described. (I) has $\rho 2.07$, $\alpha 1.484$, $\beta 1.486$, $\gamma 1.497$ (all ± 0.001), and new chemical analyses (recorded) confirm the formula Na₂O,Al₂O₃,4SO₃,12H₂O.

II. Occurrences of metavoltine at Chuquicamata, Quetena, and La Compania are described; ρ is 2.51, and ω 1.595 and ϵ 1.581. The chemical analyses recorded agree with the formula

K₂O,3Na₂O,FeO,3Fe₂O₃,12SO₃,18H₂O + 2H₂O. III. Crystallography is described. Penfieldite, ρ 6.61, from Laurium, Greece, has the new formula Pb(OH)₂,3PbCl₂ (chemical analysis recorded).

IV. Crystallographic and optical data show that "salvadorite" is identical with kroehnkite (cf. Bandy, A., 1939, I, 163). V. Cadwaladerite, Al(OH)₂Cl,4H₂O, amorphous, lemon-yellow, vitreous lustre, isotropic n 1-513, ρ 1-66 is described, and a chemical analysis [W. Bitmanl given analysis [W. Pitman] given. LST.

Origin of petroleum. E. N. Tiratsoo (Petroleum, 1943, 6, 7-9, 12).-Org. matter of marine origin may have undergone the necessary chemical change under the action of a-rays from radioactive igneous or sedimentary rocks. A. R. PE.

INDEX OF AUTHORS' NAMES, A., I.

NOVEMBER, 1943.

Ackermann, I., 272. Adler, M., 280. Albrecht, E., 276. Allen, J. E., 291. Anand, B. M., 271. Angelszou, E., 277. Ardenne, M., 287. Asbeck, W. K., 288. Atkinson, E. R., 288. Averill, C. V., 292.

Averill, C. V., 292. BAHL, R. K., 282. Bailey, E. H., 291. Bailo, G. W., 292. Bale, W. F., 287. Bailo, N. K., 282. Bali, N. K., 282. Bailo, S. W., 281. Bente, P. F., 280. Bernardini, G., 270. Biltz, W., 283. Birch, F., 291. Birtz, W., 283. Birtz, W., 283. Borner, J. F., jun., 287. Bose, D. M., 281. Bose, C. 271. Bose, D. M., 281. Brieghel-Muller, A., 288. Brineham, J. H., jun., 292. Brock, R. W., 291. Brong, K., 269. Buerger, M. J., 290. Buit, B. F., 291. Buzagh, A., 276. CANNON C. G., 292.

Cannon, C. G., 286. Catani, R. A., 278. Chakrabarty, S. K., 270. Chakrabarty, S. K., 270. Chang, H. L., 278. Chapman, R. W., 291. Chatterjee, B., 276. Chaudbury, S. G., 276. Chayes, F., 292. Chowdhury, K., 271. Ciochina, J., 287. Clark, G. L., 286. Clark, R. E. D., 276. Colquhoun, T. T., 288. Cooper, G. R., 214, 277. Copp, D. H., 287.

Даміаномітсн, Н., 281. Datta, N. P., 276. Davis, T. W., 275. De Carvalho, H. G., 274. Degmer, J., 287. De Moraes Bastos, W. C., 285. Denard, L. F., 287. De Witt, T. W., 275.

Dickinson, R. G., 280. Dodge, D. V., 289. Donnay, J. D. H., 272. Do Prado, A., 273. Doss, K. S. G., 279. Dryden, C., 282. Dryden, C., 292. Duffendack, O. S., 272. Duggan, E. L., 278. Dunstan, A. E., 274. Dunsta, A. K., 274.

Евпеске, U., 277. Elgabaly, M. M., 275. Emmett, P. H., 275. Emmons, R. C., 291. Erényi, E., 276. Evans, R. D., 289. Ewald, H., 269.

FAIRBURN, H. W., 289. Failer, F. E., 283. Farr, J., 278. Feigl, F., 281, 283, 285. Ferguson, A. L., 279. Fischer, B. A., 289. Fischer, B. A., 289. Fischer, L. W., 282. Flammersfeld, A., 270. Forbes, G. S., 281. Fuchs, H., 283. Fuchs, P., 283. Fuchs, W., 269.

Fucks, W., 269. GAFFRON, H., 281. Gates, R. M., 291. Geib, K. H., 271. Gentner, W., 270. Gerthsen, C., 270. Ghosh, B., 281. Ghosh, B. B., 274. Giribaldo, D., 279. Goldinger, G., 279. Goldinch, S. S., 290. Goodman, C., 288, 280. Gordon, D. H., 273. Gordon, D. H., 273. Gordon, S. G., 292. Gorodetzky, S., 270. Gramacho, D., 285. Gray, C. G., 273. Greenberg, D. M., 287. Greenberg, D. M., 287. Greenberg, J. J., 279. Grösheim-Krysko, K. W., 286. Gross, B., 272, 287. Guimaraes, C. P., 290.

Насман, D., 269. Hadley, J. B., 292. Habn, F. L., 280. Habn, O., 269.

Havemann. R., 286. Haxel, O., 269, 270. Hedvall, J. A., 282. Heisenberg, W., 271. Hendry, N. W., 291. Hermann, E., 276. Hersch, P., 287. Hewitt, W. P., 291. Heymann, E., 276. Heyme, G., 284. Hileber, W., 288. Hille, E., 284. Hiltst, W., 286. Hodge, E. T., 290. Hodgson, H. H., 271. Horton, C. W., 287. Hurtig, G. F., 275, 280. Hurbley, P. M., 288, 289. Hurley, P. M., 288, 289. Havemann, R.

IRANY, E. P., 274. Isakson, N., 282.

JENNY, H., 275. Jensen, P., 270. Jentschke, W., 269. Jones, J. H., 278. Josefowitz, D., 279.

KALIA, P. N., 271. Kappel, H., 280. Kelley, C. J., 282. Kesler, T. L., 292. Khastgir, S. R., 273. Kiplinger, C. C., 283. Kohörster, W., 270. Komagata, S., 275. Kopferman, H., 269. Kosterlitz, H. W., 278. Kothari, D. S., 274. Kubelková-Knopová, O., 285. Kubo, T., 277. Kubo, T., 277. Kuhn, W., 275. Kulenkampff, H., 270.

LACEY, W. N., 274. Lander, G., 282. Larsen, E. S., 291. Laudermik, J. D., 291. Laudermik, J. D., 291. Lauder, P., 284. Lederice, P., 284. Leprince-Ringuet, L., 270. Li, C. Y., 299. Libbey, F. W., 290. Lopez, V. M., 292. Loring, F. H., 269.

McConnell, D., 284, McCusker, P. A., 282, Manegold, E., 276, Maresch, E., 269, Mark, H., 279, Martin, H., 275,

Mattuch, J., 269. Meisel, K., 283. Mencher, E., 292. Merriam, C. W., 291. Meyer, M., 282. Miranda, L. I., 281. Moglich, F., 271. Mollwo, E., 272. Morbouse, W. W., 270. Morgans, W. R., 270. Muiller, P. H., 282. Muñoz, J. E., 288.

NAGEOTTE, E., 270. Naidu, P. R. J., 289. Neurath, H., 277. Nissan, A. H., 274. Noyes, R. M., 280.

OLDS, R. H., 274. Olmer, F., 280, 283.

PABST, A., 289. PABST, A., 289. Palsson, S., 282. Patterson, E. M., 289. Paul, W., 269. Peel, R. F., 290. Petch, N. J., 272. Picard, R. G., 272. Pish, G., 286. Powell, E. O., 288.

Powell, E. O., 288. Rat, R. N., 274. Rajewsky, B., 287. Ram, M., 271. Ramachandran, G. N., 272. Rao, B. S., 279. Rao, W. V. B. S., 284. Reamer, H. H., 274. Rees, W. J., 278. Rich, J. E., 275. Richard-Foy, R., 270. Richmond, W. E., 290. Ridhand, G. C., 287. Riddand, G. C., 287. Rideke, F. F., 281. Robertson, F., 290. Rogers, F. T., jun., 287. Rompe, R., 271. Ross, C. S., 290. Rottgardt, J., 272. Roy, M. F., 276. Russell, C. D., 274.

SACHER, K., 274. Sage, B. H., 274. Sandell, E. B., 290. Sarudi, I. (v. Stetina), 285. Sastry, V. V. K., 284. Sawyer, R. A., 287. Schachinger, E., 269. Schaefer, F., 284. Scheink, P. W., 281. Scheink, F. W., 281. Schiebold, E., 280. Schleicher, A., 283. Schleicher, A., 283. Schmid, G., 273.

Schmidt, C. L. A., 278. Schmitz-Dumont, O., 282. Schrag, G., 274, 279. Schrewelius, N., 272. Schut, R., 271, 283. Schultz, G. V., 280. Seabury, R., 286. Seck, W., 277. Sen, A., 276. Sheibley, F. E., 288. Sie, C. S., 274. Sieverts, A., 284. Singh, S., 282. Smith, E. F., 288. Steinback, O. 272. Sille, U., 271. Strassmann, F., 269. Stringham, B. F., 282. Suting, H., 285.

TELLEZ-PLASENCIA, H., 287. Thomson, G. W., 274. Tillu, M. M., 286. Tiratsoo, E. N., 292. Tomkeieff, S. I., 289. Towns, M. B., 279. Trendall, J. H., 288. Tung, J. Y., 278.

VALLARTA, M. S., 270. Van den Akker, J. A., 278. Villar, G. E., 269. Vincent, H. B., 287. Volz, H., 270. Vosburgh W. C., 274. Vosskühler, H., 274.

Vosskühler, H., 274. WACHHOLTZ, F., 288. Walton, J. H., 280. Wang, S. N., 280. Weibke, F., 274, 279. Weibke, F., 274, 279. Weiser, H. B., 276. Weiser, C., 269. Welker, H., 273. White, W. C., 272. Wicke, E., 275. Wilde, W. T., 278. Wilde, W. T., 278. Wildon, H. D. B., 291. Winden, S., 273. Wintgen, R., 273. Wintgen, R., 273. Wintgen, R., 273. Wohlmann, E., 286. Woinarosky, A., 277. Woolford, A. O., 291. Wulf, O. R., 288.

YOFFE, A., 276.

ZUMBUSCH, M., 283.

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