BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

FEBRUARY, 1937.

I.—GENERAL; PLANT; MACHINERY.

Preparation of boiler feed water. K. Vogl (Z. Spiritusind., 1936, 59, 423—424, 426—427).—The nature of hardness constituents and of boiler scale is noted and various methods for softening H_2O for boiler use are described in some detail. I. A. P.

Calculation of the sodium number [for boiler water]. V. I. Vulfson (Repts. Inst. Metals, Leningrad, 1933, No. 15, 179—182).—A formula is given for calculating the amounts of free NaOH formed in boiler H_2O by hydrolysis of $NaHCO_3$ and Na_2CO_3. Ch. Abs (*p*)

Tests of a boiler plant operating with coke breeze, slack coal, and coke-oven gas. G. Croce (Engineering, 1936, 142, 633—635, 661—662).—In addition to normal tests for each type of fuel and load-changing tests, it was necessary, since the power station concerned had both coke-oven gas and coke breeze available as fuel and required to change frequently from one to the other, to carry out special tests on the assumptions that the load had to continue to be carried by coke-firing after failure of gas supply, and that full output was required at the moment the gas supply failed. Coke breeze proves particularly valuable fuel when prolonged shutting down is necessary; the effect of efficient zoning is well shown. D. M. M.

Corrosion of hot-water heating systems. C. N. Ridley (Steam Eng., 1936, 6, 12—13, 66—67, 71).—The cause of an unusual case of steel corrosion was traced to the presence of dissolved air in the heating system. R. B. C.

Storage of steam heat. E. G. Ritchie (Fuel Econ., 1936, 12, 59—61, 122—124).—The conditions for use of a steam accumulator are indicated and its method of working is described. D. K. M.

Economies of steam storage. J. W. Ogden (Paper Trade J., 1936, 103, TAPPI Sect., 316—318).—Steam accumulators in paper mills may increase boiler efficiency, reduce fuel and paper costs, and increase output of finished paper quite considerably. H. A. H.

Changes in adiabatic heat content of steam for small pressure differences. G. Forner (Arch. Wärmewirts., 1936, 17, 129—131).—Formulæ and diagrams are given. R. B. C.

Heat transfer and pressure drop of liquids in tubes. E. N. Sieder and G. E. Tate (Ind. Eng. Chem., 1936, 28, 1429—1435).—By introducing a term η_a/η_ω, in which η_a and η_ω are viscosities at the main-stream and tube-wall temp., respectively, formulæ for heat-transfer coeffs. and pressure drop for heating and cooling and for viscous and turbulent flow which agree with new and published data have been obtained. Methods to be used in heat-exchanger design are indicated. D. K. M.

Use of thermocouples. L. Scheepers (Rev. Univ. Mines, 1936, [viii], 12, 369—375).—The types of thermocouple available and their application to the measurement of the temp. of gases, liquids, and solids are discussed. R. B. C.

Temperature measurements with the disappearing-filament optical pyrometer. W. E. Forsythe (Trans. Amer. Inst. Min. Met. Eng., Iron and Steel Div., 1936, 120, 171—188).—The advantages, calibration, and applications of this instrument are discussed. R. B. C.

Intense cooling plants. K. Linge (Z. Ver. deut. Ing., 1936, 80, 1291—1297).—Refrigeration machines of the absorption and compression type, and the thermal properties of available refrigerants, are discussed. The thermal conductivities and η of air and 30% $CaCl_2$ brine are tabulated down to —50°. R. B. C.

Spun glass and kieselguhr [for insulation]. H. Wahls (Feuerungstech., 1936, 24, 210—213).—The thermal conductivities of these substances are tabulated, and the most economical thickness to use for insulating purposes is discussed. R. B. C.

Stability of sulphur dioxide–lubricating oil solutions. N. N. Otvagin (J. Chem. Ind. Russ., 1936, 13, 1178—1179).—Deterioration of the SO_2–oil mixture used in refrigeration is due to presence of H_2O, O_2, or S in the oil. Specifications are recorded for the oil. R. T.

Evolution of various types of crushers for stone and ore, and the characteristics of rocks as affecting abrasion in crushing machinery. W. T. W. Miller and R. J. Sarjant (Trans. Ceram. Soc., 1936, 35, 492—550).—A comprehensive account of jaw, gyratory, roll, disc, and hammer crushers (including a discussion of the metals for construction) is accompanied by a full account of the composition, structure, and crushing characteristics of a wide range of rocks and minerals. J. A. S.

Handling of semi-liquid materials. E. S. Rippon (Ind. Chem., 1936, 12, 550—552).—Material such as bitumen can best be handled by heating to a suitable temp. at which it is liquid. The heating is done by steam either dried or through jacketed pipes, or by direct flame, as is the case for long-distance rail wagons. D. K. M.

Resistance to filtration of compressible materials. II. I. M. Secchi (Chim. e l'Ind., 1936, 18, 563—564; cf. B., 1936, 1183).—With compressible filtering materials the filtration resistance increases with the filtration pressure and is accompanied by hysteresis effects, which depend on the pretreatment of the filtering material. O. J. W.

Detention of liquids being mixed in continuous-flow tanks. R. W. Kehr (Sewage Works J., 1936, 8, 915—923).—Detention in short, continuous-flow mixing tanks follows the theoretical curve, based on the assumption that the contents are at all times completely mixed. A mathematical expression is derived for the fraction of a substance, added to the first tank at a uniform rate, which will appear in the effluent of the last tank at a given time. This expression is utilised variously for determinations with unimol. reactions (*e.g.*, to calculate the theoretical dissolved-O_2 requirements throughout an activated-sludge plant, and the capacity requirements of digestion tanks to insure a specified gasification). O. M.

Vapour re-use process. Separation of mixtures of volatile liquids. D. F. Othmer (Ind. Eng. Chem., 1936, **28**, 1435—1438).—In the fractionation of volatile liquids, *e.g.*, dil. aq. $COMe_2$ (I), the liquid is fed into the top of a stripping column (*S*) operating under 60 lb./sq. in. pressure. The vapours from *S* are passed into a calandria at the bottom of another column (*C*) operating under atm. pressure, which they heat up, the vapours being thereby condensed. This condensate, richer in (I) than the feed, is fed into *C*, in which it is fractionated into H_2O and (I) in the usual way at an intermediate point. It is claimed that the vapours from *S* generate more steam than is required in *C*, and that this surplus steam is available for other uses; also that this system leads to considerable heat economy. Its application to the systems EtOH–H_2O–fusel oil and to the products of BuOH fermentation are described. D. K. M.

Estimation of the performance of vacuum pans. N. Smith (Internat. Sugar J., 1936, 38, 480—481).—Equations and ratios for comparing the performance of pans of all shapes and sizes are presented, among which are the circulation ratio (free area between coils and pan wall/area of well) and the heating-surface intensity [heating surface per coil/(area of pan × vertical distance between coils)]. Pan performance is the result of these two factors, and both together should form the basis of the design of pans (excepting where mechanical circulation is used). J. P. O.

Rules for efficiency tests on dedusters. R. Meldau (Fachausschuss f. Staubtech.; Verein deut. Ing., Berlin, 1936, 29 pp.).—Definitions of technical terms, abbreviations, and units, and useful data, *e.g.*, the falling speeds of dust particles of various diameters and *d* in air, are given. The procedure to be adopted in carrying out efficiency tests is discussed with reference to practical examples, *e.g.*, the electropurification of flue gases from a rotary cement kiln. R. B. C.

Simple forms of automatic regulators. E. Griffiths (Chem. & Ind., 1936, 974—977).—Apparatus for automatic control of voltage, humidity, temp. for maintaining a const. level of liquid in a tank, and for starting a pump are described. D. K. M.

Installation factor in automatic controls. D. W. Harrison (Chem. & Ind., 1936, 977—979).—The importance of local conditions, plant characteristics, and lag in the choice of automatic controls is emphasised. D. K. M.

Precision recording dilatometer. R. A. Ackley and F. M. Walters, jun. (Met. & Alloys, 1936, 7, 314—320).—A new, high-precision, recording differential dilatometer is described which records automatically and simultaneously a differential dilatation–temp. curve and a time–temp. curve. Minor changes permit recording of differential dilatation–time curves. The temp. gradient in the specimen may be kept very low ($\not<\frac{1}{4}$° in a 1-in. specimen). Specimen temp. may be kept const. within ±1°, or raised or lowered at accurately controlled and const. rates of $\frac{1}{8}$°, $\frac{1}{2}$°, or 2° per min. A. J. K.

Indentation hardness testing. V. E. Lysaght (Canad. Chem. Met., 1936, **20**, 380—384).—The Brinell, scleroscope, Rockwell, Vickers, and Monotron methods are discussed and the difficulties of interconverting the vals. pointed out. D. K. M.

Apparatus for m.-p. determination. % CO_2 in flue gases. Cylinder wear in engines. Steam heating of oil.—See II. **Corrosion-resistant Ni alloys.**—See X. **Determining p_H [of boiler H_2O].**—See XI. **Soap mills etc.**—See XII. **Wetting of solids by solutions.**—See XIII. **Mixing and compounding rubber.**—See XIV. **Evaporation of plant juices.**—See XIX. **Photo-thermometry.**—See XXI. **Anti-corrosion H_2O treatment.**—See XXIII.

See also A., I, 22, **Heat conductivity of solid insulators. Thermal conductivity of liquids.** 31, **F.p. of the system glycerol–MeOH–H_2O.**

Patents.

Regenerative furnaces. M. Steinheisser (B.P. 457,077, 5.12.35. Ger., 11.12.34).—In a furnace especially suitable for unheated gas of high calorific val. and heated air, the gas is admitted to a central air port at an angle of $\not>$90°, auxiliary air ports being placed on each side of and inclined to the central one; the two supplies of air are separately controlled, but may come from the same regenerator. B. M. V.

Furnaces for treatment of pulverulent materials. E. C. St.-Jacques (B.P. 456,706, 9.3.36. Fr., 12.3.35).—The material suspended in a fluid (air or a combustible mixture of air and gaseous or solid fuel) is injected tangentially into a conical chamber which increases in diameter downwards; the mixture takes a descending course, but a mixing is effected by the upward axial pull of a suction fan. Ignition takes place part of the way down the chamber, and the material drops through the roof of a reverberatory furnace of which the chamber forms an upward extension. B. M. V.

Apparatus for heating bulk material such as coal. F. Krupp A.-G. (B.P. 456,816, 21.2.35. Ger., 19.1.35).—Groups of alternate material chambers and heating gas chambers are mounted on frames and the groups are moved in succession to fixed places for charging, heating, and discharging. Operation is as described in B.P. 441,517 (B., 1936, 304).

B. M. V.

Recovery of waste heat from furnace gases. H. A. Brassert & Co., Ltd., H. C. Dawson, and T. Thomson (B.P. 456,999, 24.9.35).—Waste gases, especially from gas-fired metal-heating furnaces, are passed in series through $\nless 2$ heat exchangers which heat the ingoing gases and air separately. The first exchanger may be either a regenerator or recuperator, but the second (and others) must be a metallic recuperator. B. M. V.

Mercury-vapour generators. Brit. Thomson-Houston Co., Ltd. (B.P. 457,157, 26.2.36. U.S., 27.2.35).—A furnace chamber is lined with both up- and down-tubes, at the lower junction of which, outside the furnace, is a vapour-separating device and preferably also a circulating pump.

B. M. V.

Control of exothermic reactions. Houdry Process Corp., Assees. of E. J. Houdry (B.P. 456,091, 27.1.36. U.S., 13.2.35. Addn. to B.P. 449,050; B., 1936, 816).—Removal of a non-adjustable quantity of heat from the contact mass to the ingoing reactants is contemplated; after that the regulation is substantially as described in the prior patent. The process is applicable to reacting or absorbing as well as to catalytic masses.

B. M. V.

Control of catalytic operations. Houdry Process Corp., Assees. of T. B. Prickett (B.P. 456,637, 29.4.36. U.S., 13.5.35).—When a catalytic mass loses activity during the course of a reaction, the process is started at a comparatively low pressure and temp. and high gas velocity; the first two are then increased and the last is decreased (any or all being varied) in stages during the operation.

B. M. V.

Heat-exchange apparatus for effecting a catalytic reaction. Non-Poisonous Gas Holding Co., Ltd. (B.P. 457,155, 3.2.36. Switz., 24.12.35).—For the second stage of prep. of, *e.g.*, non-poisonous town's gas, as described in B.P. 438,757 (B., 1936, 180), the contact furnace (in the upper part) and a heat exchanger (below) are combined in the same insulated casing with the necessary pipe lines. B. M. V.

Temperature-measuring apparatus. R. E. Frickey, Assr. to Welding Service, Inc. (U.S.P. 2,032,407, 3.3.36. Appl., 2.10.33).—An apparatus is described by means of which a globule of fusible metal containing a thermocouple is held against the hot surface of which the temp. is required.

B. M. V.

Manufacture of sound- or heat-insulating materials. Isolants Union (B.P. 457,842, 12.2.36. Fr., 12.2.35).—Slag or mineral wool is impregnated with a 1 : 2 cold mixture of aq. Na silicate (*d* 1·33) and 2·5% aq. $(NH_4)_2SO_4$, moulded into the desired shape, and dried. A. R. P.

Heat-resisting products. R. Beyer Industrial Inventions, Ltd. From R. Beyer (B.P. 456,602, 19.8.35).—For the construction of, *e.g.*, resistance heaters, a mixture is made of C, heat-refractory material, and a solution of a salt of a metal of high m.p. or of B. Thorough penetration of the solution may be effected by application and release of vac., and the mixture is then heated to convert the salt into oxide. B. M. V.

Self-propelling fire-extinguishing charge containing a double halogen hydrocarbon compound. F. R. Bichowsky, Assr. to Gen. Motors Corp. (U.S.P. 2,021,981, 26.11.35. Appl., 23.6.30).—The charge consists of a compressed solution of CCl_2F_2 in CCl_4, which is discharged along with powdered $NaHCO_3$ when the extinguisher is released.

L. C. M.

Manufacture of metal-walled vacuum chambers. L. Mellersh-Jackson. From Shellwood–Johnson Co. (B.P. 455,923, 27.4.35).—A vessel formed of less fusible metal is assembled with its parts in juxtaposition and immersed in a bath of a more fusible alloying metal in a reducing atm., or the latter may be applied as powder diluted, if desired, with pyroxylin or other vanishing substance. The more fusible alloy serves for pore-sealing and joint-making purposes. B. M. V.

Purification of steam in steam-generating and -superheating installations. Superheater Co., Ltd., and J. E. Wood (B.P. 455,926, 29.4.35).—The saturated steam is brought in contact with coils heated to a materially higher temp. under such conditions that any entrained solid matter is induced to form deposit on the coils, the deposit being washed off at times when the boiler is not on load. B. M. V.

Refrigerant mixture. G. F. Zellhoefer (U.S.P. 2,031,087, 18.2.36. Appl., 20.3.33).—In a two-fluid, automatic absorption apparatus the permanently liquid solvent comprises *o*-, *m*-, and/or *p*-$C_6H_4Cl_2$ (preferably not *p*- alone), and the refrigerant is MeCl. B. M. V.

Cellular cooling plates for colloidal materials. H. Gäbler (B.P. 456,704, 27.2.36. Ger., 28.2.35).—A method of assembling two plates, a divided frame, and internal ribs to produce a zigzag passage for fluid is described. B. M. V.

Ore-crushing mill. G. H. Beers (U.S.P. 2,032,247, 25.2.36. Appl., 30.10.34).—Ore is delivered from a hopper to screens, whence the undersize falls to the back of the boot of an elevator and the oversize is passed directly into the rising buckets of the elevator, from the top of which it falls onto the ore in the hopper and is broken by impact. The fine ore is agitated with H_2O in the boot and overflows through a screen; pockets may be provided for trapping a limited quantity of very heavy vals.

B. M. V.

Grinding mills. W. C. Kemp and A. Leggett (B.P. 455,890, 2.3.36).—Chilled metal discs are provided with teeth or flutes and are relatively rotated, one being rigidly fixed to its carrier and the other permitted axial movement under control of springs. B. M. V.

Grinding mill. D. V. Law, Assr. to Powderco, Inc. (U.S.P. 2,031,289, 18.2.36. Appl., 19.1.32).—An apparatus comprising a centrifugal attrition rotor and delivery fan in separate chambers is described. B. M. V.

Grinding mill. A. W. Fahrenwald (U.S.P. 2,031,697, 25.2.36. Appl., 27.4.34).—The apparatus comprises a rotary, wet ball-mill with grating discharge $>$ a trunnion but $<$ the full diameter (*d*) of the mill. Beyond this outlet is a worm of diameter $\simeq d$, and the whole is placed in a feed tank from which the worm causes the ground undersize material to overflow; the oversize and new feed is scooped into the mill from the deepest part of the tank by scoops attached to and penetrating the mill, at its largest circumference. B. M. V.

Single-roll mills for grinding, refining, and other purposes. H. E. Cox (B.P. 456,160, 22.5.35).—The upper surface of the breast bar is substantially in a horizontal plane passing through the axis of the roll, and the feed hopper or throat is extended to that plane so as to produce a natural feeding pressure. B. M. V.

Pulverising apparatus. J. Ihlefeldt, Assr. to G. Polysius A.-G. (U.S.P. 2,031,710, 25.2.36. Appl., 20.8.32. Ger., 29.8.31).—In a tube mill, gas ports through the shell and apertured transverse partitions are placed at a point intermediate the length, so that while the solid material travels only in one direction currents of gas for heating, cooling, or otherwise treating may be caused to circulate con- and countercurrent in different zones. The construction of the intermediate outlet/inlet device is described but not claimed. B. M. V.

Edge-runner mills. H. E. Cox (B.P. 456,168, 7.6.35).—In addition to the rotation of the pan and/or the roll axis, gearing is provided by which the roll is positively rotated with freedom to rise and fall. B. M. V.

Mixing mill. D. L. White, Assr. to Hood Rubber Co., Inc. (U.S.P. 2,030,949, 18.2.36. Appl., 19.12.34).—In a twin-roller mill a rubber pad is placed between trunnion bearings of the rolls, and the upper bearings are pressed down by screws and shear pieces which will fail on overload. B. M. V.

Mixing machine. H. E. Cox (B.P. 456,591, 4.6.35).—Apparatus comprising an interchangeable pan which is rotated on a turntable, and suspended mixing devices which are given a compound rotation, is described. B. M. V.

Mixing machine. W. C. Blackmond, Assr. to J. H. Reynolds (U.S.P. 2,030,847, 18.2.36. Appl., 14.1.35).—A hopper is provided with a screw conveyor at the bottom and with false inner sides which are vibrated by the same mechanism that drives the conveyor. B. M. V.

Continuously-working mixing drums. J. Hubert (Hubert & Sigmund Stahl- u. Metallwarenfabr.), and L. Géza (B.P. 456,643, 8.6.36).—A horizontal rotating drum is divided by inclined transverse partitions which are provided with apertures in the portion nearest the feed end, the apertures being adjustable and wider at the leading end than at the trailing end. B. M. V.

Stirring and mixing apparatus. W. H. A. Thiemann. From E. A. Itterlein (B.P. 456,644, 11.6.36).—A bowl with stirring arms is formed in such a manner that the material is projected along the curved outer wall, then deflected upwards and backwards to the axis, and falls into the centre of the bowl. B. M. V.

Blending or mixing of grain or other materials. H. Simon, Ltd., and J. C. Brian (B.P. 456,852, 20.7.35).—The materials are delivered by individual bucket weighers (*W*) into a mixing device (*M*); when delivery from *W* is permitted, that from *M* is stopped, and *vice versa.* An additional mixer may be provided. B. M. V.

Apparatus for separating mixed materials. W. L. Remick, Assr. to Hydrotator Co. (U.S.P. 2,038,008, 3.3.36. Appl., 21.12.31).—A hydroseparator is provided with a downward, smaller extension at the centre, which also contains jets of washing liquid. B. M. V.

Quantitative and/or qualitative separation of materials, in grains or pieces, such as minerals, coals, and the like. L. Hoyois (B.P. 456,895, 12.4.35).—Adjustable currents of H_2O are utilised. B. M. V.

Separation of heterogeneous mixtures [of comminuted solids]. C. E. Wuensch (B.P. 455,856 and 455,888—9, 23.4.35).—Schemes for reconditioning the heavy pulp, *e.g.*, PbS in H_2O, used in a sand–pulp flotation process are described. B. M. V.

Separators and washing apparatus for coal and other minerals. A. France (B.P. 456,443, 4.2.35).—Electric control of the discharge of heavy product which is separated, by alluvial deposit in a launder, is initiated by a float in the launder-H_2O. B. M. V.

Washing of coal, ores, and similar materials. Colliery Eng., Ltd. From L. Hoyois (B.P. 456,770, 16.5.35).—An apparatus for the separation of (*a*) coarse gangue from (*b*) coarse coal mixed with (*c*) fine gangue and (*d*) fine coal by upward-current classification, then *b* from *c* and *d* by screening, and *c* from *d* by decantation, is described. B. M. V.

Flotation apparatus. A. C. Daman (B.P. 456,249, 24.2.36).—The feed pulp is subjected to vibrations from an electromagnetically operated diaphragm and a portion of tailing is rejected; the remaining pulp passes to a flotation cell of the agitator type and is again vibrated, only the suspended pulp being frothed with air. B. M. V.

Flotation apparatus. A. C. Daman (U.S.P. 2,031,590, 25.2.36. Appl., 5.10.31).—In a square cell, diagonal baffles, a hood, and an impeller are described. B. M. V.

Briquetting machines. J. H. Rice (B.P. 455,863, 27.4.35).—The cylinder of the compressing machine reciprocates (in addition to the piston) and serves as a measuring device. B. M. V.

Enamelling, cleaning, plating, and similar treatment of manufactured articles. Heat & Air Systems, Ltd., and J. D. McFarlane (B.P. 456,769, 16.5.35).—The apparatus comprises a dip tank below, and drying or stoving chamber above, the axis of a rotary frame which carries the goods. B. M. V.

Centrifugal separators. Ramesohl & Schmidt A.-G. (B.P. 455,909, 16.7.36. Ger., 22.7.35).—Skimming devices for frothless discharge are described, the claims referring to an air vent. B. M. V.

Centrifugal machines. Manlove, Alliott & Co., Ltd., and W. Gillespie (B.P. 455,988, 2.5.35 and 1.6.35).—A housing for a bearing is flexibly supported by straps or ties in various ways. B. M. V.

Centrifugal purification of liquids [*e.g.*, paper pulp]. A. Berges (B.P. 455,845, 16.3.36. Fr., 14.3.35).—The pulp is injected tangentially into a fixed container; the products, comprising upper (light) and lower (heavy) impurities and a middle (pure) pulp, are drawn off continuously. B. M. V.

(A) Centrifugal separation of solids from fluid suspension. (B) Separating and grading of solid particles from suspensions in liquids by centrifugal means. Bird Machine Co. (B.P. 456,353 and 456,420, 7.5.35. U.S., [A] 20.9.34, [B] 11.12.34).—(A) Clay or other finely-divided solid exhibiting electrophoresis is centrifuged to an impermeable wall which is charged with electricity to attract the solid, and the deposited layer is continually removed, *e.g.*, by a worm and the conicity of the bowl, to avoid impairment of the electro-attraction. (B) The feed pulp is successively centrifuged in separate machines at increasing speeds, the sediment being removed in fractions. B. M. V.

Filter device. L. E. Mallory and J. T. Nash (U.S.P. 2,032,140, 25.2.36. Appl., 21.10.33).—An inner cylindrical perforate wall is covered with filter medium and fixed to a base, and an outer imperforate shell is pressure-resisting and quickly detachable from the base. Both are provided with simple caps at the upper end, the passages for fluids being in the base; the cake accumulates in the annular space. B. M. V.

Filters and other apparatus containing porous parts. I. G. Farbenind. A.-G. (B.P. 457,035, 15.4.35. Ger., 14.4.34 and 9.3.35).—The porous parts are fixed to glass of different composition; *e.g.*, the porous parts may consist of SiO_2, Fe–Si, or SiC rendered porous by addition of dextrin and H_3BO_3 before drying and heating, but the first-mentioned could not be fused to quartz glass. B. M. V.

Filters. C. H. Cuno, Assr. to Cuno Eng. Corp. (U.S.P. 2,031,935—6, 25.2.36. Appl., [A] 21.4.33, [B] 10.2.34).—Filters embodying annular filter masses are described. B. M. V.

Filter. R. N. Burckhalter and J. M. Osburn, Assrs. to Michiana Products Corp. (U.S.P. 2,031,589, 25.2.36. Appl., 11.7.32).—A cylindrical grating is covered with a wire-mesh filter medium constructed with many longitudinal and few transverse wires; one end of the medium is resiliently secured so that on application of external pressure the wires bend, and on release of pressure they straighten out with a cleaning effect. B. M. V.

Filters. F. Titterton (B.P. 456,365, 9.5.35).—Means for staying filter bags against internal pressure are described. B. M. V.

Conditioning of precipitates and separating them from liquids [water softening]. C. H. Spaulding (U.S.P. 2,021,672, 19.11.35. Appl., 2.2.34).—H_2O is softened by treatment with Na_2CO_3 and activated C; the ppt. is allowed to settle in a form of conical thickener. L. C. M.

Disassociating the components of solutions and mixtures. W. M. Zorn and T. H. Eickhoff, Assrs. to Low Temp. Processing Co. (U.S.P. 2,032,785, 3.3.36. Appl., 20.6.32).—The liquid is mixed with a gaseous medium in a tapering centrifuge to such an extent that the solids become dry and are carried away in the gas stream. B. M. V.

Rotary mixing and emulsifying machines. H. G. Seegers (B.P. 455,891, 24.3.36).—A high-speed impeller is co-axial with and matches the shape of a conical bottom, but those parts are eccentric with the wall of the vessel. B. M. V.

Boiling pans and like heaters. South Metropolitan Gas Co., D. Chandler, and A. J. Skinner (B.P. 456,164, 29.5.35).—The setting for a gas-heated pan or the like comprises (1) an outer metallic shell forming the support, (2) insulating material in contact with (1), and (3) an inner metallic shell not in contact with (2), but in heat-conducting relation with the lower part of the pan by means of fins. B. M. V.

Apparatus for vacuum distillation. E. W. Fawcett, and Imperial Chem. Industries, Ltd. (B.P. 457,120, 21.5.35).—Apparatus for short-path (surfaces 1—5 cm. apart), high-vac. (10^{-2}—10^{-6} mm. Hg) distillation, the cooling H_2O being below room temp., comprises the following co-axial walls (outwards): (*A*) distilling surface, (*B*) condensing surface, being the inner wall of the refrigerant jacket, (*C*) outer wall of refrigerant jacket, (*D*) outermost wall. The space *C*—*D* is subjected to the same high vac. as *A*—*B* and serves as heat insulation. B. M. V.

Apparatus for fractional distillation. F. L. Maker, Assr. to Standard Oil Co. of California (U.S.P. 2,031,610, 25.2.36. Appl., 25.4.32).—A vertical tubular heater for insertion in a fractionating column is described. B. M. V.

Means for evaporation. H. E. A. Göth, Assr. to Industrikemiska Aktieb. (U.S.P. 2,032,087, 25.2.36. Appl., 4.2.31. Renewed 25.7.35. Swed., 6.2.30).—A multiple-effect evaporator is operated at atm. pressure on both sides of all the heat-transmitting surfaces by blowing permanent gas through the heated liquid in the evaporators proper and using the gas/vapour mixture to heat the next effect. B. M. V.

Emulsification of liquids and apparatus therefor. S. G. Bauer, L. Strangman, and J. H. Schulman (B.P. 457,058, 13.8.35).—A gear-wheel pump is formed with a clearance between the casing and gears for a definite leakage, and a difference of pressure is maintained between the outlet and inlet by a spring-loaded valve to induce back-flow through the clearance. B. M. V.

Viscosity regulator. W. Thomas, Assr. to Pneumercator Co. (U.S.P. 2,031,018, 18.2.36. Appl., 15.5.33).—A pear-shaped baffle is suspended on a rod which turns about a fulcrum to close electrical contacts. The rod is enclosed in a flexible tube to make a fluid-tight, frictionless joint with the casing, and the resistance of the baffle to the flow of liquid is adjusted by a screw and spring. B. M. V.

Comparative viscosity device. A. F. Blanchard, Assr. to Tryon Viscostor Corp. (U.S.P. 2,032,197, 25.2.36. Appl., 31.7.33).—Apparatus of the falling-ball type for quick comparison of two liquids, *e.g.*, old and new lubricating oil, is described. B. M. V.

Detection of suspended matter in fluids. H. C. Grant, jun., Assr. to W. Kidde & Co., Inc. (U.S.P. 2,032,746, 3.3.36. Appl., 26.10.28. Renewed 16.6.32).—Electromagnetically operated valves for passing any one of a no. of streams of fluid through a dust-detection device are described. B. M. V.

Cyclone apparatus for separating solid particles from gases. T. C. Biéth (B.P. 456,512, 11.11.35).—Details of an apparatus comprising an inner cyclone chamber and outer dust-collecting chamber in communication through ejector-like slots in the dividing wall are claimed. B. M. V.

Gas washer. T. C. Vincent, jun., Assr. to F. Page Contracting Co. (U.S.P. 2,031,437, 18.2.36. Appl., 21.2.33).—The gas is subjected to H_2O sprayed from nozzles; the H_2O is continuously re-used, additions being only = removals by evaporation and in the sludge. B. M. V.

Apparatus for liquid treatment of air and other gases, particularly air-conditioning apparatus. M. Berlowitz (B.P. 456,771, 16.5.35).—A unitary apparatus comprising a centrifugal pump for the treating liquid and a fan for the air on the shaft of the same motor is described. B. M. V.

Air-washing device. D. A. Barnie (U.S.P. 2,031,027, 18.2.36. Appl., 15.5.35).—The dirty air is admitted downwards upon the surface of a bath of H_2O below which it is dragged by a roller which also throws up a curtain of spray on the exit side. Devices for the removal of entrained spray from the air and mud from the liquid are provided. B. M. V.

Production of a dispersion of gas in a liquid. Allgem. Elektricitäts-Ges. (B.P. 456,581, 8.5.35. Ger., 8.5.34).—Gas or vapour is distributed in the liquid at a total or partial pressure of $\ngtr 0{\cdot}01$ atm., and the pressure is afterwards raised to increase the degree of dispersion. The diluting gas to produce a low partial pressure may be the vapour of the dispersing medium. B. M. V.

Dispensing of gas material. Linde Air Products Co., Assees. of M. P. De Motte (B.P. 456,209, 1.3.35. U.S., 28.3.34).—Liquid of b.p. $<0°$ is stored in a heat-insulated container; sub-cooled gas is drawn off to a transport container and sealed up therein until final delivery. Sub-cooling is effected by the expansion of another part of the liquid in heat exchange with the delivered part. B. M. V.

Piston pumps intended for the pauseless, uniform movement of liquids or gases. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 456,232, 24.7.35).—A double-cylinder pump is operated by a double-cylinder hydraulic engine the main slide valves of which are operated hydraulically by an auxiliary valve activated by the common piston rods in turn as the pistons approach the ends of their strokes. B. M. V.

Machines for testing materials for wear. H. W. Brownsdon, and Imperial Chem. Industries, Ltd. (B.P. 455,995, 2.5.35).—The test-piece is placed against a rotating or oscillating disc which is so shaped as to form, by wear, an oval depression. B. M. V.

Testing of materials. F. B. Dehn. From Losenhausenwerk Düsseldorfer Maschinenbau A.-G. (B.P. 456,587, 11.5.35).—The test-piece is subjected to a const. load on which are superposed pulsations in the opposite direction; a hydraulic apparatus for effecting the test is described. B. M. V.

Fluid-tight seals between machine members. N. Archer, and Imperial Chem. Industries, Ltd. (B.P. 455,852, 28.2.35).—A long gland (*G*) for a high-pressure piston rod (*P*) has no follower or stationary packing and is truly cylindrical, but *P* is formed with a reduced portion of length $>$ its stroke, beyond which in each direction are grooves containing metallic or soft packing; the final seal is made by oil or other liquid admitted under high pressure through a port in *G* to the annular space around *P*. B. M. V.

Rotary [hammer-]crushing, granulating, and pulverising machines. T. H. Miller, and E. Allen & Co., Ltd. (B.P. 456,445, 8.2.35).

Control of catalytic reactions.—See II. **Drying plant. Rotary-furnace lining. Heat-conducting walls.**—See VIII. **Alloy-steel articles. Metal powders. Treating discrete particles.**—See X. **Dialyser for dispersions.**—See XIV.

II.—FUEL; GAS; TAR; MINERAL OILS.

Physical and chemical survey of the national coal resources. Fractional gravity separation of the banded constituents of coal. H. Berry and J. H. Jones (Fuel, 1936, 15, 343—351).—Samples of durain and clarain have been separated, by flotation in aq. $CaCl_2$, into fractions the H content of which increased progressively with decreasing *d*, *e.g.*, from 4·9 to 7·4% with a W. Yorks. durain, and from 5·7 to 7·78% with Plessey clarain. The low-*d*, high-H fractions consisted mainly of spores. The high-*d*, low-H fractions of durain were almost entirely devoid of spores; the corresponding fractions of clarain consisted largely of vitrain. Vitrain was more nearly homogeneous than were the other constituents. The results obtained with fusain were inconclusive. The C content of the durain and clarain fractions remained relatively const. From estimates of the spore content of the fractions the H content of the spore remains was calc. to be approx. 8·5%. The fractions rich in spores possessed appreciable agglutinating and swelling properties. The ash content of the fractions decreased with decreasing *d* to a min. (about 1%) and then increased again to approx. 2% in the fractions of lowest *d*; this variation remains unexplained as yet, but is not due to retention of $CaCl_2$. A. B. M.

Significance of banded ingredients in [Illinois] coal. L. C. McCabe (Fuel, 1936, **15**, 351—353; cf. B., 1936, 353).—The proportions of the banded constituents in columns cut from a no. of Illinois coal seams have been determined. The coals consisted mainly of clarain and vitrain, with little fusain; only a few contained appreciable proportions of durain. The characteristics of the different constituents and the possibility of separating or concentrating them, *e.g.*, by washing or sizing, are briefly discussed. A. B. M.

Austrian coals in the Grout coalification diagram. E. Bierbrauer (Sparwirts., 1936, **14**, 236—237).—Coals ranging in rank from peat to anthracite are classified by means of the Grout ternary diagram, which shows H, C, and O contents and calorific vals. R. B. C.

Coals of some of the Spitzbergen deposits. V. A. Kotlukov (Chim. Tverd. Topl., 1935, **6**, 195—201).—Analytical data are given. Ch. Abs. (*e*)

Broken coal. J. G. Bennett (J. Inst. Fuel, 1936, **10**, 105—119).—A discussion on a paper abstracted previously (B., 1936, 1136). Additional data are presented indicating that the exponential law of size distribution holds for all naturally-won coals, from brown coals to anthracite. H. C. M.

Relative grindability of coal. H. J. Sloman and A. C. Barnhart (Carnegie Inst. Tech. Min. Met. Coöp. Bull., 1935, **72**, 19 pp.).—A simplified test is described, based on the principle of increase of new surface measured in accordance with Rittinger's theory of crushing. Ch. Abs. (*e*)

Coal washing and the Baum jig. G. L. Arms (Trans. Amer. Inst. Mech. Eng., 1936, **58**, 697—698).—Problems encountered in the prep. of coal by jigs, and recent developments in this type of apparatus, are discussed with reference to the Baum jig. R. B. C.

Rheslaveur coal-cleaning process. J. Griffen (Trans. Amer. Inst. Mech. Eng., 1936, **58**, 705—710).—Data showing the efficiency of this process when applied to Illinois and Pittsburgh coals are given. Tables show the ash contents of the various sizes of clean coal obtained. R. B. C.

Washability studies of coal from the Henry Ellen bed at Acmar No. 5 mine, Acmar, Ala. B. W. Gandrud and G. D. Coe (U.S. Bur. Mines, 1936, Rept. Invest. 3315, 23 pp.).—The Henry Ellen bed consists of an upper 6-ft. bench and a lower 5-ft. bench, separated by a 20-in. shale band and containing 15·8 and 7·5% of ash, respectively. Washability data obtained by means of screen-sizing and float-and-sink tests indicate that an average jig plant under normal conditions would wash the coal to 13·2 and 5·9% of ash, respectively, and that the average washer yield should be $\not<$95% of the theoretical. Recrushing of the top bench coal coarser than ¾ in. prior to washing would only result in a possible additional ash reduction for the total bench of 0·7%. H. C. M.

Removal of clay from coal slurries by flotation. A. van Ahlen (Brennstoff-Chem., 1936, **17**, 446—451).—The ash content of a coal slurry, originally 12·1—12·5%, was reduced by 4·5, 7·5, and 18% by washing in a current of H_2O alone, H_2O containing NaOH, and H_2O containing NaOH and K xanthate, respectively. Addition of Na silicate had only a slight effect on clay removal. The action of the xanthate is attributed to its preferential adsorption on the coal, whereby it displaces adsorbed clay which passes into suspension in the solution (cf. Petersen, Glückauf, 1931, **67**, 1445). Flotation experiments in a laboratory-scale apparatus confirmed this hypothesis; in presence of NaOH and K xanthate higher yields of coal of lower ash content were obtained. A. B. M.

Importance of pulp density, particle size, and feed regulation in flotation of coal. J. T. Crawford (Amer. Inst. Min. Met. Eng., 1935, No. 86, 11 pp.).—The best results were obtained with a feed-pulp density of 12% of solids. Operating conditions are described and discussed. Ch. Abs. (*e*)

Drying of coal. O. Knabner (Wärme, 1936, **59**, 664—667).—Surface H_2O can be partly removed by centrifuging; its complete removal and partial or complete elimination of inherent H_2O can be effected only by evaporation. Removal of surface H_2O facilitates the dedusting and grinding of coal. The effects of H_2O in processes such as briquetting, carbonisation, and hydrogenation, and the degrees of drying desirable in coals for these purposes, are discussed. R. B. C.

Changes in coal on drying. A. P. Schachno and D. A. Podsharskaja (Chim. Tverd. Topl., 1935, **6**, 379—403).—Drying at 105° may lower the heating val. by "80 cal." The best results were obtained by drying in a stream of dry air at 50—65°. Ch. Abs. (*e*)

Methods of analysing solid fuels. A. N. Baschkirov, G. A. Ziliberg, and A. A. Pavlinov (Chim. Tverd. Topl., 1935, **6**, 113—115).—Analytical data are recorded showing the effect of digesting the coal with 10% HCl prior to analysis. Ch. Abs. (*e*)

Discrepancies in determining ash in brown coals. R. Schomburg (Braunkohlenarch., 1936, No. 46, 73—75).—Samples (1 g.) of different types of brown coal were incinerated (*a*) in a crucible over a direct gas flame, (*b*) in a gas-heated, open or closed muffle both in a crucible and in a dish, and (*c*) in an electrically heated open or closed crucible oven. Results differing by as much as 4% were obtained by these methods. The lowest and most accurate

results were obtained by incinerating the sample for 2 hr. at $\not>$800° in a dish inside a closed muffle. Even by this method the particles were visible in the ash when viewed through a microscope.
R. B. C.

[Coal] ash and clinker troubles. F. J. Matthews (Brit. Clayworker, 1935, **44**, 173—174).—The Fe_2O_3 content of coal is responsible for the low fusion point of coal ash. Furnace gas containing CO acts as a reducing agent and may lower the fusion point by 95°. H_2O in the pit will reduce clinkering.
Ch. Abs. (*e*)

Calorific value of pure coal. H. Leider (Arch. Wärmewirts., 1936, **17**, 185—187).—The need for some correction to allow for the effect of ash when calculating calorific val. to the dry, ash-free basis is discussed. This val. so calc. of various coals, to which increasing proportions of their own ashes had been added, were found to decrease as the ash content increased. This is attributed to the latent heat of fusion of the ash.
R. B. C.

Plasticity of coals. Its measurement and relation to quality of coke produced. R. E. Brewer and R. G. Atkinson (Ind. Eng. Chem. [Anal.], 1936, **8**, 443—449).—Modified apparatus and procedure for the determination of plastic properties by the Davis plastometer and the Agde–Damm and Layng–Hathorne tests are described. The best results for bituminous coking coals are given by the modified Agde–Damm test for the pre-plastic range, and by the modified Davis plastometer for the plastic range. The modified Layng–Hathorne test is less satisfactory. The quality of coke produced can be predicted from the plasticity data for the coal.
E. S. H.

Experimental results of a subterranean gasification of coals. N. I. Sazonov (Chim. Tverd. Topl., 1935, **6**, 17—28).—The generation of gas by injecting air into subterranean coal deposits is described. The gases were high in N_2 and low in heating val.
Ch. Abs. (*e*)

State of methane in coal. E. Audibert (Rev. de l'Ind. Min., 1936, No. 372, 662—673).—Sorption isotherms of CH_4 on coal at 4°, and at pressures up to 150 atm., are given. It is concluded that practically all CH_4 in coal is present in the dissolved state.
R. B. C.

Oxidation of coal. H. Lefebvre and R. Faivre (Compt. rend., 1936, **203**, 881—883).—At 150—300° O_2 penetrates easily and rapidly into coal, and particularly into vitrain, the coal becoming gradually impoverished in H and more resistant to oxidation. Numerous fissures develop in the coal, especially in a direction perpendicular to the plane of stratification. Part of the O_2 is absorbed by the coal, and is evolved as H_2O, CO, and CO_2 at 350°.
J. W. S.

Wood from the viewpoint of fuel upgrading and production of [liquid and gaseous] fuels. I. Scientific basic principles. F. Schuster (Brennstoff-Chem., 1936, **17**, 451—453).—The small differences in ultimate composition between the wood of conifers and of deciduous trees is due to the different proportions of the principal constituents (cellulose, lignin, resins, etc.). The methods of working up wood for the production of fuels etc. are briefly summarised.
A. B. M.

Phosphorus in peat and in peat coke. V. Lanin and V. Nozdrev (Chim. Tverd. Topl., 1935, **6**, 408—414).—Coke formed in the carbonisation of peat at 500° contains 34—87% of all the available P. At 700° only 16·9—75·6% of the original P remains.
Ch. Abs. (*e*)

Dependence of the tendency of peat to spontaneous ignition on its chemical composition. E. V. Kondrateev and I. M. Vener (Chim. Tverd. Topl., 1935, **6**, 107—113).—Spontaneous ignition and self-heating in peat are independent of its cellulose content. The Fe combined with the humic substance of the peat is closely related to self-ignition.
Ch. Abs. (*e*)

Changes in chemical composition of peat in self-heating. E. V. Kondrateev and S. K. Kutuiev (Chim. Tverd. Topl., 1935, **6**, 403—408).—On heating peat under artificial conditions or in stacks, the carbohydrate complex of the peat decreases in amount, as also does its residue, which is a mixture of lignin with humic substances. In the first stage of heating (below 85°) bitumens sol. in $EtOH–C_6H_6$, and humic acids, increase. Both of these decrease above 200°.
Ch. Abs. (*e*)

Briquette research. IV. Comparative physical and chemical properties of different brown-coal deposits from the viewpoint of briquetting properties. H. Hock, O. Schrader, and C. Mühlhausen (Braunhohle, 1936, **35**, 449—451, 471—474; cf. B., 1936, 817).—The adsorption capacities for aq. PhOH of various types of crude brown coals were of approx. the same order. Adsorption was 40% higher when the coals were predried at 105°, but fell to the initial val. on further drying for 3—6 hr. at 75—95°. No relation between adsorption and resistance to weathering of briquettes could be established. Coals least easily wetted appeared to be most resistant to weathering, but no general rule could be formulated. The total humic acid content of various types of dry brown coals averaged 75%. The ratio free acid/combined acid varied considerably from coal to coal. Coals containing a high % of free acid appeared to be more easily briquetted and weather-resistant than those containing a high % of humates. The resistance to weathering of a briquette can be roughly estimated from the p_H of a suspension of the coal in H_2O.
R. B. C.

Appelbech [coal-]briquetting process. J. Iliwitzki (Braunkohle, 1936, **35**, 597—600, 618—621).—The above process, and a ternary diagram which enables an estimate to be made of the suitability of a given coal for briquetting, are described.
R. B. C.

Waterproofing of briquettes pressed from sulphite-cellulose waste. K. A. Belov and G. V. Kagan (Ukrain. Chem. J., 1936, **11**, 264—269).—Directions for the production of waterproof fuel briquettes, using sulphite lye residues as binder, are given.
R. T.

Developments in the use of solid smokeless fuels. J. Roberts (2nd Nat. Coal Conv., London, Oct., 1936, 26—36).—The various fuels available, *e.g.*, anthracite, high- and low-temp. cokes, and developments in the use of coke in the London area are discussed. The author's method of determining the ignition temp. of solid fuels (B., 1936, 530) is described and ignition points of typical fuels are tabulated. R. B. C.

Dissolution of bituminous coals in heavy oils. A. Gillet (Brennstoff-Chem., 1936, **17**, 421—429).—Previous work, in particular that of the author and his collaborators, is summarised and discussed (cf. B., 1936, 50, and prior papers). A. B. M.

Production and utilisation of domestic coke. (A) Domestic coke by alkali activation. P. J. Askey. **(B) Production of reactive coke in coke ovens.** R. A. Mott. **(C) Production of domestic coke in gasworks.** H. H. Thomas (Gas J., 1936, **216**, 677—678, 678—680, 680—681).—(A) The possibility of producing reactive open-grate cokes in gas retorts and coke ovens, under normal carbonising conditions, by alkali activation is discussed. Addition of CaO, to neutralise the acidic constituents of the ash (B., 1935, 884), and of Na_2CO_3, the activating agent, should preferably be made before carbonisation.

(B) The characteristics desirable in open-grate cokes are enumerated. Semi-large-scale experiments on the production of alkali-activated cokes in coke ovens, and the assessment of the val. of the cokes so produced, are described. Addition of 0·5—1·0% of Na_2CO_3 to the coal before carbonisation produced a marked reduction in the crit. air-blast val. (B., 1934, 5) of the resultant coke.

(C) Experiments on the production of activated cokes in horizontal and vertical retorts are discussed. The reactivity of such cokes was quickly reduced by excessive heat treatment. H. C. M.

Production and utilisation of domestic coke. Devices for enabling refractory cokes to be burned in ordinary open domestic grates. A. Blackie (Gas J., 1936, **216**, 847—848).—Two different devices which can be fitted to ordinary coal-burning grates to enable high-temp. coke to be burned satisfactorily are described. H. C. M.

Production and utilisation of domestic coke. E. C. Evans (Gas J., 1936, **216**, 848).—The increasing use of oven coke as a domestic fuel is discussed in relation to the supplies of coke for the Fe and steel industry. It is suggested that a further increase in the domestic consumption may lead to a coke deficiency. H. C. M.

Rational production and utilisation of gas coke. W. L. Boon (Gas J., 1936, **216**, 792—796).—The increasing use of high-temp. gas coke for domestic heating purposes is discussed. H. C. M.

High-temperature oven coke and the open fire. J. Taylor (Gas World, 1936, **105**, Coking Sect., 143—147).—High-temp. oven coke can be satisfactorily burned in the well-type grate under shallow fuel-bed conditions by enclosing the ash pit with heat-insulating material, leaving only an air inlet at the bottom so that the space underneath the fire is converted into a chimney. In this way the air for combustion recuperates as preheat most of the heat radiated downwards from the fuel bed. The height of the enclosed ash box, which should be well insulated, should be $\nless$ 6 in. H. C. M.

Low-temperature carbonisation of bituminous coal in conjunction with gasworks. A. Thau (Gas- u. Wasserfach, 1936, **79**, 885—891, 912—917).—The advantages of operating low- with high-temp. carbonisation plants at gasworks are discussed, and the following new processes are described. B.T. process: the coal is carbonised in narrow vertical chambers having Fe walls which are movable laterally so that the charge can readily be discharged when carbonisation is complete. The chambers are heated at $\ngtr$600° by circulating hot inert gases through the walls. The plant can readily be modified to carbonise briquettes if desired. Krupp–Lurgi process: the coal is carbonised in flat, vertical, steel cells, a series of which alternate with heating walls within a surrounding chamber. Berg process: the coal is charged into containers which are then placed in the retort; the latter is conveniently heated by waste gases from the high-temp. carbonising plant. Hinselmann process: the coal is charged into trays having suitably shaped cavities, and the charged trays are propelled through externally-heated horizontal chambers. The coke is discharged as shaped briquettes. Otto process: the retorts consist of vertical chamber ovens into which steel partitions are introduced to facilitate heat transfer. Weber process: the coal is admixed with a binding agent, *e.g.*, sulphite liquor, and a small proportion of clay suspension (to strengthen the ash "skeleton" and prevent disintegration in the fire), and is briquetted before carbonisation. Kaul–Steinmetz process: the coal is carbonised in a current of activated N_2. It is claimed that the N_2 is atomically decomposed with the production of H_2 and He, and that the carbonisation is accompanied by a hydrogenation; details of the process are lacking. A. B. M.

Distillation of Rumanian coal at low temperatures and reduced pressure. N. Dănăilă and (Mme.) J. M. Cornea (Bul. Chim. Soc. Române, 1935–6, **38**, 9—36).—The distillation of two samples of the coal, one from Lupeni and the other from Schitu–Goleşti, was undertaken at 0·1 mm. Hg pressure and up to a max. temp. of 350°. Analyses of the distillation products and of the residue are tabulated. It is concluded that the tars obtained are decomp. products and are not comprised of substances present as such in the original coals, and that decomp. begins even before tar begins to distil over. Evolution of H_2S, CO_2, and large amounts of N_2 occurs at 170°, at which temp. only H_2O has come over. From 170° to 186°, when tar begins to come over, the decomp. process is even more apparent from evolution of CO and CH_4 and an increased evolution of CO_2 and H_2S. At 190° the latter coal and at 280° the former are rapidly decomposing together with the products split off from them, and unsaturated hydrocarbons begin to appear in the gases evolved. The decomp. is much more pronounced and begins earlier with Schitu–Goleşti coal than with Lupeni coal, the gases from the former reaching their max. CO_2 content (92·2%) at 150° and a H_2S content of 27·6%

at 220°. CO first appears at 170° (before CH_4) and unsaturated hydrocarbons at 190°, when the distillation of tar begins. The aromatic hydrocarbons which occur so largely in the vac. tar cannot be regarded as synthetic products, but afford evidence of thermal decomp. (splitting off of CO_2H groups, depolymerisation, and dehydrogenation of the aromatic substances originally present in the coal substance). This supports F. Fischer's lignin theory of the origin of coal.

H. C. R.

Commercial coking of Tkvartschelski and Tkvibulski coals. A. Agroskin, S. Aronov, G. Dmitriev, and I. Kopeliovitsch (Chim. Tverd. Topl., 1935, **6**, 207—217).—The coking temp. should be 1350—1360° for 20 hr. The moisture of the charge should be 7—8%. Up to 5% of mud obtained in concentrating the coal may be added. The ash and S in the coke were 14—16 and 1·1—1·2%, respectively.

Ch. Abs. (*e*)

Quality and preparation of coke. H. Deringer (Schweiz. Ver. Gas- Wasserfachmänn. Monats-Bull., 1936, **16**, 87—93).—Factors influencing the appearance, size, *d*, strength, and other qualities of coke are discussed, and screen analyses given of cokes from different coals and coal mixtures. Hammer crushers produce a more favourable distribution of ash in the various coal sizes than roll crushers. Notes are given on coke quenching and on the utilisation of coke breeze.

R. B. C.

Connexion between conductivity and quality of coke. A. S. Bruk and M. V. Afanasiev (Koks i Chim., 1936, No. 8, 31—36).—κ varies directly with the graphite, and inversely with the ash, content.

R. T.

Iron-containing coke. N. Tschishevski, D. Nagorski, A. Vlasov, and P. Neverov (Chim. Tverd. Topl., 1935, **6**, 415—428).—Coal containing up to 40% of Fe-ore breeze can produce a satisfactory metallurgical coke after preliminary ramming. Coal and ore must be thoroughly mixed. Duration of coking is prolonged and the ore completely reduced to Fe, producing a very hard coke high in S. The yields of gas and C_6H_6 during coking are increased.

Ch. Abs. (*e*)

Production of active carbon from metallic carbides. T. Ionescu and A. Soare (Bul. Chim. Soc. Române, 1935/6, **38**, 145—153).—An active C, of great purity, produced by treatment of CaC_2 with Cl_2, is much inferior as an adsorbent to that produced from beech wood. It is suggested that this is due to the high temp. at which the former is produced.

D. C. J.

Laboratory method of determining the ignition temperature of low-temperature coke. E. V. Voitova and E. M. Verezemskaja (Chim. Tverd. Topl., 1935, **6**, 353—362).—A discussion.

Ch. Abs. (*e*)

Determination of carbon in the products of low-temperature carbonisation. A. N. Baschkirov and S. G. Kostel-Janskaja (Chim. Tverd. Topl., 1934, **5**, 850—852).—The sample is burned in O_2 at 25 atm. in a bomb containing 25—30 c.c. of $2N$-NaOH, the CO_2 formed being determined by subsequent dilution and titration with $0·02N$-HCl.

Ch. Abs. (*e*)

Determination of volatile matter in coke for electrodes. M. E. Neimark and I. G. Petrenko (Koks i Chim., 1934, **4**, No. 8, 66—69).—The sample is heated for 2—30 min. in vac. at 950—1100°.

Ch. Abs. (*e*)

Thioether sulphur in the organic sulphur compounds of coal. I. J. Postovski and A. B. Charlampovitsch (J. Appl. Chem. Russ., 1936, **9**, 1476—1481).—Powdered coal is heated with S at 125—130° for 1—30 hr., after which uncombined S is removed from the product by heating with 25% aq. Na_2SO_3. The final product, with a combined S content of about 1%, is allowed to react with MeI during 3 days at room temp., unaltered MeI is removed by extraction with $COMe_2$, and I determined in the dry residue; the % content of thioether S is given by $32,100/127c$, where $c = a - 142b/127$, $a =$ wt. of residue taken, and $b =$ g. of I found. The results indicate that the greater part of the combined S is present in thioethers; in untreated coals thioethers, determined analogously, represent 18—32% of the total org. S content.

R. T.

Destructive hydrogenation of coal. I. B. Rapoport and M. S. Sudzilovskaja (Chim. Tverd. Topl., 1935, **6**, 40—66).—The most active catalysts were $Sn(OH)_4$, S, Fe_2O_3, CuO, and aq. $(NH_4)_2MoO_4$. The process should be carried out in two stages, first the coal being liquefied at approx. 400° and then the liquid product obtained in the liquefaction (b.p. 220—320°) being destructively hydrogenated.

Ch. Abs. (*e*)

Use of brown-coal briquettes for production of town's gas. J. Gülich (Braunkohle, 1936, **35**, 267—273).—A 1 : 1 mixture of bituminous coal and brown-coal briquettes, of 43 × 52 × 38 mm. size, was charged into the lower part of a vertical retort. A thin layer of sized coke was placed over the charge, and steam injected at the base of the retort, the temp. not being allowed to exceed 1180°. 1 kg. of charge yielded 55—58 cu. m. of gas of calorific val. 4658 kg.-cal./cu. m. and containing CO_2 5·8, O_2 0·4, C_nH_m 3·2, CO 16·4, CH_4 20·0, H_2 50·2, and N_2 4·0%. The tar and coke yields were 5 and 63%, respectively. The coke was homogeneous and more reactive than bituminous coke. Distillation analyses of the light oil and tar, and diagrams of the apparatus, are given.

R. B. C.

Complete gasification of solid fuels with oxygen under high pressure. F. Danulat (Thesis, Tech. Hochschule, Berlin, 1936, 63 pp.; cf. B., 1936, 1186).—The theory of the process is discussed, and further details of laboratory and large-scale experiments, carried out by the Lurgi Ges. f. Wärmetechnik m.b.H., on the complete gasification of various brown coals in O_2–steam mixtures, at 1—20 atm. pressure, are given. The experimental tube apparatus, and the large-scale plant developed therefrom, are diagrammatically described, and tables are given showing analyses of the gas, tar, and gas spirit, and the heat balance of the process.

R. B. C.

Gasification of Ukrainian lignites under pressure. G. B. Kagan and V. M. Schtscherbina (Ukrain. Chem. J., 1936, **11**, 250—252).—The gas, obtained at $\ngtr$1000°/25 atm., contains CO_2 41·6, CO 22·6, CH_4 5·5, and H_2 26·1%. R. T.

Making coal, water-, and carburetted water-gas simultaneously. J. Keillor (Gas Age-Rec., 1935, **76**, 139—140).—In a 36-chamber plant at Vancouver 530-B.Th.U. coal gas is made for the first 12 hr., water-gas (300 B.Th.U.) by admitting steam for the next 4 hr., and carburetted water-gas (465 B.Th.U.) by spraying liquid hydrocarbons for 4 hr. Deposition of cracking C is minimised by the effect of steam. Ch. Abs. (*e*)

Dilution of horizontal coal gas. C. A. Deas (Gas J., 1936, **216**, 672—676, 736—738; cf. B., 1932, 168).—The economics of the various methods for the dilution of horizontal coal gas are critically discussed. At Hereford dilution is effected with producer gas made in a converted water-gas set from a mixture of coke breeze, slurry, and large coke, the cost of producer gas being 1·35d. per therm. The combustion characteristics of the diluted coal gas are also discussed, special reference being made to the Ott no. H. C. M.

Rapid calculations concerning the combustion of coal. VII. Percentage of carbon dioxide required in flue gases for maximum boiler efficiency. R. L. Rees (Ind. Chem., 1936, **12**, 558—560; cf. B., 1936, 1026).—In a given boiler and with a given fuel the boiler efficiency is a max. when the sum (M) of the sensible heat lost in the flue gases and that due to incomplete combustion is a min. A nomograph is derived by which M can be obtained from the flue-gas temp. and the combustible matter in it. By plotting M against the CO_2 content of the flue gases the best operating conditions can be determined. D. K. M.

Combustion of carburetted water-gas in luminous flames. R. J. Altpeter and O. L. Kowalke (Gas Age-Rec., 1935, **76**, 109—114).—The % CO was determined at various distances above the burner and for various rates of gas feed. Ch. Abs. (*e*)

Radiation from non-luminous combustion gases. M. Fishenden (Engineering, 1936, **142**, 684).—Experiments were carried out at 1000—2000° F. on the products of combustion of town's gas with varying excess of air, the gases flowing at 2—3 in. per sec. There was some unexplained residual radiation beyond that for CO_2 and H_2O vapour. Above 1000° F. radiation is more important in heat transmission than convection. J. W.

History and development of Mond gas for industrial purposes in South Staffordshire. H. A. Humphrey (J. Inst. Fuel, 1936, **10**, 95—104).—An historical review. Gas of gross calorific val. 155—160 B.Th.U. per cu. ft. is distributed through steel mains at a pressure of 7 lb. per sq. in. Examples of the many technical applications of Mond gas are given. H. C. M.

Utilisation of commercial gases from the viewpoint of combustion technology. H. Brückner and H. Löhr (Z. Ver. deut. Ing., 1936, **80**, 1275—1279; cf. B., 1936, 305). R. B. C.

Sewage gas as motor fuel for municipal transport. W. Ryssel (Z. Ver. deut. Ing., 1936, **80**, 1290).—Sewage gas containing CH_4 75·0, CO_2 22·0, N_2 2·7, H_2 0·2, and H_2S 0·1%, and having an upper calorific val. of 7200 kg.-cal. per cu. m., has been successfully employed as motor fuel at Stuttgart (1 cu. m. of unpurified gas ≡ 11 c.c. of petrol). After removing CO_2 and H_2S the gas is compressed into cylinders. R. B. C.

Relation of exhaust-gas composition to air–fuel ratio. B. A. D'Alleva and W. G. Lovell (J. Soc. Auto. Eng., 1936, **38**, 90—96).—Analyses of exhaust gases from petrol engines operating under various conditions of load, speed, and carburettor setting have been made in order to provide data enabling the air–fuel ratio to be determined from the accurate measurement of any one constituent in the exhaust gas. R. B. C.

Evaluation of flue-gas tests. H. Kolbe (Arch. Wärmewirts., 1936, **17**, 263—265).—Equations relating the % CO_2, O_2, CO, H_2, and incombustibles in dry waste gases, the max. CO_2 corresponding to the fuel in use, and the excess air ratio are given. An alinement chart facilitates rapid evaluation of the equations and determination of the excess air ratio. R. B. C.

Latest methods in flue-gas analysis. D. Brownlie (Steam Eng., 1935, **4**, 511—513, 530).—The best practice for large plants is to use combined CO_2 and CO, or CO_2 and O_2, recorders. Ch. Abs. (*e*)

Measurement of flue-gas temperature. E. Graf (Feuerungstech., 1935, **23**, 100—102).—An instrument comprising three thermocouples of different diameter in one head is described. The true gas temp. is determined by extrapolation. R. B. C.

Select methods of chemical analysis. J. Albinson (Gas J., 1936, **216**, 743—744).—The various methods available for the determination of phenols in NH_3 liquor and oils, of CS_2 in benzols, coal gas, and air, of Cl in coal and tars, and of p_H vals. are critically discussed. H. C. M.

Measurements by gas analysis of the efficiency of the locomotive furnace. P. Lewis-Dale (J. Inst. Fuel, 1936, **10**, 68—78).—A method for continuously assessing with a high degree of accuracy the furnace efficiency of a locomotive under actual service conditions is described in detail. The amount of unburnt C emitted with the smoke gases was determined by adding air to the gas, of which the CO_2 content was known, determining the CO_2 in the diluted gas, passing the air–gas mixture still carrying unburnt C particles through a furnace heated to 950°, and then determining the CO_2 content of the resulting gases. The loss of heat due to unburnt C fluctuated widely, but for a complete trip was approx. 5%. For the max. furnace efficiency, the excess air should be $\nless$20% of the total exhaust gases. A graphical size–wt. distribution method for estimating the total unburnt C from the amount actually found in the smoke box at the end of the trip is described. H. C. M.

Combustion control by means of electrical meters. V. Binns and S. Bairstow (J. Inst. Fuel, 1936, **10**, 79—85; cf. preceding abstract).—The validity of the thermal-conductivity method of gas analysis for continuously determining the % of CO_2, CO, H_2, and O_2 in the flue gases from a locomotive boiler has been investigated. Accurate results can be obtained if the appropriate corrections are applied to the meter readings; the calculation and method of application of these corrections are illustrated in detail and by a rapid graphical method. The use of the CO_2 content of the flue gases alone as a means of controlling the efficiency of combustion is discussed. It is shown that the CO_2 content of the smoke gases, when the $[O_2]$ is low, can give a false indication of the completeness of combustion since CO and H_2 in appreciable quantities may be present. Although the O_2 content is the most suitable criterion of the efficiency of combustion, nevertheless, for boiler-plant control, a combination of an electrical CO_2 meter and H_2 meter is suggested as being preferable to an O_2 meter, mainly on account of the simplification of apparatus. H. C. M.

Control of benzol-recovery plant. Direct determination of benzol in gas by means of the photoelectric cell. R. Delsol (J. Usines Gaz, 1936, **60**, 470—471).—The method is based on the fact that the illuminating power of coal gas is a function of its C_6H_6 content. One portion of the gas passes to a burner of the non-luminous type, while another portion is burned in a similar burner after removal of C_6H_6. Photoelectric cells are arranged in front of each burner. The method can be adapted to the determination of the C_6H_6 content of debenzolised wash oil. R. B. C.

Sodium carbonate liquid purification process at Brussels gasworks. Siron (J. Usines Gaz, 1936, **60**, 241—248).—A process for removing H_2S from town's gas is given, based on the reaction: $Na_2CO_3 + H_2S = NaSH + NaHCO_3$. A year's experience with a commercial plant indicates that the method compares favourably with the usual dry (oxide) method. R. B. C.

Cleaning high-sulphur gases. M. J. Leahy (Refiner, 1936, **15**, 276—279).—The Fe_2O_3, $Fe(OH)_3$ suspension, Feld, Seaboard, and Leahy processes are described. The first four processes are considered unsuitable for natural gas containing a high proportion of S. The Leahy process, which comprises absorbing H_2S in H_2O, bringing the latter in contact with SO_2, and flocculating the S formed with electrolytes, is being successfully operated on natural gas containing 9·2% of H_2S. R. B. C.

Preparation of acetylene from methane. N. A. Kliukvin and S. S. Kliukvina (Chim. Tverd. Topl., 1935, **6**, 130—146).—Natural gas ($CH_4 + N_2$) gave a 48·3% yield of C_2H_2 (based on the CH_4 reacting) with a V catalyst at 1050°. With a kaolin catalyst the yield was 16·9%. In cracking CH_4 without catalysts C_2H_2 is first formed at 1000—1100° (max. at 1250°, 4·2% of original CH_4). In an electric discharge the C_2H_2 yield was 39·2%. Ch. Abs. (*e*)

Simple firedamp-testing apparatus. L. Altbürger (Glückauf, 1936, **72**, 987—988).—The reduction in vol. which occurs when CH_4 contained in mine gases is burnt to CO_2 in a modified Broockmann combustion burette is measured. A mixing burette is used to dilute rich mixtures with air before testing. Four instruments mounted side by side are used in rotation. R. B. C.

Crystallisation of concentrated [ammonia] liquor. W. F. Thorne (Gas J., 1936, **216**, 903—904).—Crystallisation temp. have been determined for three conc. liquors containing 3, 6, and 9 wt.-% of H_2S, respectively, the NH_3 and CO_2 contents covered ranging from 16—20 and 11—19 wt.-%, respectively; the data obtained have been plotted isothermally. If the crystallisation temp. is to be $\nless 10°$, then, where the % H_2S is low, the liquor must consist of $(NH_4)_2CO_3$, $(NH_4)_2S$, and free NH_3, whereas if the % H_2S is high, appreciable amounts of NH_4HCO_3 can be present. H. C. M.

Gas hydrates and their relation to pipe-line corrosion. W. M. Deaton (Gas, 1936, **12**, No. 6, 20, 58—59; cf. B., 1934, 948).—A review of investigations made by the U.S. Bureau of Mines and the Amer. Gas Assoc. R. B. C.

Extraction and purification of paraffin from tar of the Achinsk sapropelites. A. N. Baschkirov and M. V. Ugrjumov (Chim. Tverd. Topl., 1934, **5**, 547—553).—5·85% of paraffin (on the tar) was obtained by separating fractions of high b.p., crystallising, and sweating. Ch. Abs. (*e*)

Electrochemical separation of non-superheated lignite tar. B. G. Šimek and J. Ludmila (Chem. Listy, 1936, **30**, 298—302).—Electrolysis of an emulsion of tar in aq. NaOH results in migration of acid and neutral components to the anode, to yield two fractions of variable composition, analogous to those obtained by acid pptn. of the tar. R. T.

Separating phenol mixtures in the phenol tar fractions. II. V. I. Zabavin (Chim. Tverd. Topl., 1935, **6**, 116—130; cf. B., 1935, 56).—By hydrolysis of the urethanes of the phenol fractions of peat tars the almost pure *o*-cresol can be separated, and mixtures high in guaiacol and phenol can be produced. Ch. Abs. (*e*)

Phenols from primary tar. III. A. N. Baschkirov and L. P. Kraeva (Chim. Tverd. Topl., 1935, **6**, 217—221).—The kerosene distillate from the low-temp. tar of Cheremchov coals contains pyrocatechol, resorcinol, and β-$C_{10}H_7$·OH. The phenol fractions (b.p. 90—125°), reduced with H_2 in presence of Mo oxide, gave $C_{10}H_8$, 1- and 2-$C_{10}H_7Me$, $C_{10}H_6Me_2$, and quinoline. Ch. Abs. (*e*)

Destructive hydrogenation of phenols in a continuous apparatus. I. B. Rapaport, M. P. Mintschenkov, and V. P. Konov (Chim. Tverd. Topl., 1935, **6**, 146—161).—The catalysts were MoS_3, MoS_2, S, and $Al_2O_3 + S$. With rise in temp. the reaction goes in the direction $PhOH \rightarrow C_6H_6$ and $C_6H_4Me{\cdot}OH \rightarrow PhMe$. The phenols should first be converted into a mixture of hydroaromatic and aromatic hydrocarbons at 370—430°/90 atm. and then dehydrogenated in the vapour phase at 450—500° and relatively low pressures. Ch. Abs. (*e*)

Hydrogenation of anthracene fraction of coal tar. F. E. Schtraler and V. M. Moiseenko (Chim.

Tverd. Topl., 1935, 6, 161—171).—Anthracene can be hydrogenated in one operation at 475°/300 atm. A 54% yield of products of b.p. $<150°$ is obtained with 3 recyclings with withdrawal of the light fraction after each cycle. MoO_3 is the best catalyst. H_2 from coke-oven gas may be used without purification. Ch. Abs. (e)

Destructive hydrogenation of peat producer tar. A. V. Lozovoi and A. B. Charlampovitsch (Chim. Tverd. Topl., 1934, 5, 791—805).—A yield of up to 45% of gasoline and kerosene was obtained at 420—480°/200—250 atm. with a $MoO_3 + Al_2O_3 + Ni$ catalyst. The S and phenols (2—3%) in the product are readily removed with caustic. More vigorous cracking occurs with catalysts containing MoS_3. MoO_3 promotes the hydrogenation of C_6H_6-insol. compounds of tar. The most active phenol-reducing catalysts are $MoS_3 + Al_2O_3$ and $MoO_3 + Al_2O_3 + Ni$. Removal of phenols and solid paraffins before hydrogenation did not give better results. Ch. Abs. (e)

Influence of tar-insoluble and solvent-insoluble constituents on the physical properties of coal tars. E. W. Volkmann (Thesis, Columbia Univ., New York, 1935, 80 pp.).—A more detailed account is given of work already reported (B., 1936, 774). R. B. C.

Manufacture of straight asphalts. XI. Conclusion. Y. Ichikawa (J. Soc. Chem. Ind. Japan, 1936, 39, 374).—A discussion of earlier papers (cf. B., 1937, 10).

Liquid asphaltic road materials. R. H. Lewis and W. O'B. Hillman (Public Roads, 1935, 16, 97—118).—Asphaltic materials of high *d* and their residues are generally more susceptible to temp. changes. Hardening and other changes not due to loss of volatile matter occur more readily on exposure than on distillation. Bonding strength is roughly $\propto$ the consistency of the original materials. Rates of volatilisation under exposure parallel distillation curve data. Ch Abs. (e)

Shales of Lower Volga and their investigation. V. V. Tschelincev (Abh. Staatsuniv. Saratov, 1936, 1, 37—46).—A review. J. J. B.

Abiogenetic synthesis of carbohydrates. N. A. Orlov (Abh. Staatsuniv. Saratov, 1936, 1, 3—14).—Examples are reported of the formation of (unidentified) carbohydrates during weathering of ozokerite, oleic acid, etc. (cf. B., 1935, 1032). CH_2O is believed to be an intermediate compound. J. J. B.

Determination of paraffin wax in crude oils. I. Blum (Bul. Chim. Soc. Române, 1935—6, 38, 155—158).—Asphalt and paraffin wax are determined in the same sample of crude oil by separating the oil from asphalt by extraction with boiling $COMe_2$ and cooling the extract to $-20°$, filtering, and washing the wax obtained with cooled solvent. If coloured, the wax is purified by washing with abs. EtOH. It is then redissolved in warm C_6H_6 and weighed after removal of the solvent. Much higher and more probable results are obtained in this way than by the usual methods involving distillation to cracking, and the method is quicker and simpler. H. C. R.

Cracking of paraffin oil on glowing graphite. K. Peters and K. Winzer (Brennstoff-Chem., 1936, 17, 429—430; cf. B., 1936, 133).—The cracking of Kogasin II by means of an electrically-heated graphite rod gave 14·7% of liquid and 85·3% of gaseous products. The latter contained unsaturated hydrocarbons 69·0, saturated hydrocarbons 18·3, H_2 12·7%. The results are similar to those obtained by cracking the oil by means of an electrically-heated Pt wire, which in fact becomes coated with a thin layer of graphite in the course of the experiment. A. B. M.

Hydrocarbons of paraffin and ceresine. S. S. Nametkin and S. S. Nifontova (Bull. Acad. Sci. U.R.S.S., 1936, No. 1, 3—31).—Examination of the products of nitration with dil. HNO_3 (*d* 1·075) indicates that lignite paraffin consists chiefly of *n*-paraffins, of a mean mol. wt. corresponding with $C_{26}H_{54}$, with approx. 5% of *iso*paraffins, $C_{22}H_{46}$. Paraffin from Grosni petroleum contains 65—75% of *n*- and 25—35% of *iso*-paraffins (mean composition $C_{24}H_{50}$). Surachani ceresin contains almost exclusively *iso*paraffins, of a mean composition $C_{45}H_{92}$, with an admixture of $C_{22}H_{46}$. Natural paraffins of high mol. wt. are considered to be chiefly *iso*paraffins, converted into *n*-paraffins by the action of heat. R. T.

***cyclo*Pentadiene in the products of pyrolysis of paraffin products.** L. S. Dedusenko (Bull. Acad. Sci. U.R.S.S., 1936, No. 1, 59—64).—Maleic anhydride is added to cracking benzine, and the cryst. compound with *cyclo*pentadiene (I) is collected after 8 hr. and weighed. The fraction of b.p. 20—60° contains 2·2% of (I), present chiefly in the fractions of b.p. $<40°$. R. T.

Conditions of the test of evaporation loss and relations between the loss and flash point of petroleum oils. I. Optimum heating temperature for the test of evaporation loss. T. Kurosawa (J. Soc. Chem. Ind. Japan, 1936, 39, 372B).—Using a glass container with internal dimensions the same as those of the oil cup of the Pensky–Martens flash-point tester, for evaporation loss tests, it was found that for Japanese oil products having flash points between 50° and 250° the optimum temp. of heating are 100°, 150°, and 200° for flash points of 50—150°, 150—200°, and 200—250°, respectively. H. C. R.

Free sulphur in petroleum distillates. Effect of peroxides on the copper-strip method. Determination of free sulphur. S. Comay (Ind. Eng. Chem. [Anal.], 1936, 8, 460—462).—Free S in aq. suspension with H_2 (Fe dust–HCl) affords H_2S, which is absorbed in $CdCl_2$–aq. NH_3 and determined titrimetrically with I. Peroxides inhibit the corrosion of Cu by oils containing S; corrosion is marked after treating the oil with SO_2. J. L. D.

Physical and chemical properties of petroleum fractions. II. Relations between mol. wt. and concentration in dilute solution. H. T. Rall and H. M. Smith (Ind. Eng. Chem. [Anal.], 1936, 8, 436—439; cf. B., 1936, 1076).—An empirical relation is deduced, whereby the mol. wt. of an oil if determined at one concn. is used to calculate its mol. wt. at zero concn. J. L. D.

Determination of lead in doctor solution. E. W. Ellis (Refiner, 1936, **15**, 335—336).—25 c.c. of doctor solution are diluted with H_2O, neutralised with AcOH, warmed, and titrated with a solution of $(NH_4)_2MoO_4$ (1 litre ≡ 0·025 g. of PbO). R. B. C.

Natural gas as a chemical raw material. I. N. Beall (Refiner, 1936, **15**, 264—268).—A comprehensive review. R. B. C.

Kinetics of the vapour-phase cracking of petroleum products. A. I. Dintzes, M. P. Eschevskaja, and T. I. Klabina (Chim. Tverd. Topl., 1935, **6**, 428—438).—For 10—15% decomp. the rate of the cracking reaction is practically independent of the time or degree of cracking. The decrease in activation with increase in mol. wt. of the hydrocarbon is questioned (cf. Pease and Morton, A., 1933, 1017). Ch. Abs. (*e*)

Thermodynamic reactions involved in cracking of propane gases. H. C. Hays (Oil & Gas J., 1936, **34**, No. 49, 39—42).—The heats of reaction of possible changes occurring during cracking are calc. from the heats of formation, entropies, etc. of C_3H_8, C_3H_6, C_2H_4, and CH_4. R. B. C.

Vapour-phase cracking. III—V. Cracking of gas oils containing or not containing aromatic components. H. Otsuka (J. Soc. Chem. Ind. Japan, 1936, **39**, 380—383B; cf. B., 1935, 886).—Two samples of gas oils of boiling range 200—300° were examined, no. 2 being the aromatic-free components of no. 1. A vertical electric cracking furnace (cf. B., 1934, 707) was used. The sample was fed to the vaporiser heated at 350° at a const. rate of flow. The conversion ratios of the component paraffins and naphthenes are very similar over a wide range of cracking temp., conversion starting at 400° and increasing to over 90% at 700°. The degree of conversion of paraffins and naphthenes is scarcely affected by the presence of aromatics. The yield of cracked petroleum increases at first to a max. and then gradually falls. The higher is the cracking temp., the lower is the mean b.p. of the cracked petrol and the higher its *d*. Aromatic and unsaturated hydrocarbons are the main constituents, the content of the former increasing with rise of cracking temp. The gas from high-temp. cracking contains much CH_4. Paraffins and naphthenes undergo decomp. reactions, aromatics (except those with long side-chains) being the more stable, but these condense to complex compounds at high temp. The yield of high-boiling constituents is therefore much greater with aromatic charging stock. The behaviour of naphthenes depends on the size of the ring. Those containing 6-membered rings are subject to dehydrogenation to aromatics. The naphthenes remaining in cracked petrol are mainly pentamethylene derivatives. Light aromatics are formed (1) by decomp. of substituted aromatics of high mol. wt., (2) by synthesis from lower olefines, (3) by dehydrogenation of naphthenes. Products from (2) predominate in vapour-phase cracking. H. C. R.

Measurement of flow rates of hot oil streams by the dilution method. Naphthenic acid as diluent. T. A. Mangelsdorf, B. L. Sowers, and A. J. Deutser (Ind. Eng. Chem. [Anal.], 1936, **8**, 440—442).—The dilution method is applicable when naphthenic acid is used as diluent. Charge rates determined by this procedure on a commercial cracking unit are correct within 2%. E. S. H.

Preparation of artificial gasoline from unsaturated gases by vapour-phase cracking. A. S. Osokin (Abh. Staatsuniv. Saratov, 1936, **1**, 15—27).—Gases from cracking processes, containing 1—16% of C_2H_4, C_3H_6, or C_4H_8, were subjected to polymerisation; in presence of pumice stone above 600° the yield of liquid products is almost quant. J. J. B.

Gasoline synthesis from carbon monoxide and hydrogen at atmospheric pressure. I. I. B. Rapoport, A. P. Bliudov, L. Schevjakova, and E. Frantzuz (Chim. Tverd. Topl., 1935, **6**, 221—235).—The most active catalysts were Co–Th, Co–Mn, Ni–Mn–Cr, and Ni–Mn–Al. The optimum temp. is that at which 7—10% of CH_4 is formed. A small amount of NH_3 in the reaction gas increases the gasoline yield, particularly with catalysts pptd. on fuller's earth. An asbestos carrier yielded the best catalysts. Ch. Abs. (*e*)

New Forward process makes 75% of substituted benzenes. W. Kaplan and W. E. Forney (Nat. Petroleum News, 1936, **28**, No. 28, 35—42).—Gas oil, preheated to 482°, is passed through a cracking coil consisting of 2300 ft. of 1-in. tubing at a rate of 180 gals./hr. The temp. of the issuing vapours was 579° and the pressure 225 lb./sq. in. The condensible products (*d* 14·1° A.P.I.) on redistillation gave: gasoline 51·6, benzine bottoms 5·8, and residuum (*d* 1·2) 41·7%. The composition of the gasoline fraction was: olefines 4·8—8·6, aromatics 85·4—91·4, naphthenes 9·8—10·0%, and paraffins nil. C_6H_6, PhMe, $C_{10}H_8$, and alkylbenzenes, up to *n*-amylbenzene, were identified in the aromatic fraction. R. B. C.

Cracking of kerosene in presence of various catalysts. Z. I. Torgashina (Abh. Staatsuniv. Saratov, 1936, **1**, 29—35).—The yields of gaseous and liquid products at 640° in presence of Fe filings, limestone, pumice stone, marl, clay, or ash of bituminous shales were measured. J. J. B.

Hydrogenation of hydrocarbons. R. Fussteig (Refiner, 1936, **15**, 331—335).—Results of hydrogenating a cracked kerosene distillate containing 63% of olefines and 7% of aromatics are tabulated. It is necessary to use a catalyst with a large surface, and a relatively high pressure and temp. to effect complete hydrogenation of olefines and partial hydrogenation of aromatics. A process is outlined in which heavy petroleum oil, heated at 475—485°, is passed to a reaction chamber wherein partial cracking occurs. The cracked products are passed to a reactor, containing a catalyst, and treated with CH_4 decomposed by heating to 720°. Gasoline of high C_8H_{18} no., high volatility, low S content, and containing mainly aromatics and olefines is obtained in good yield. R. B. C.

Synthetic petrol and its derivatives. G. Hugel (Ann. Off. nat. Comb. liq., 1936 **11**, 719—733).—

The coal-hydrogenation process employed by the Comp. de Béthune, the Fischer process, and the products obtained therefrom are described. R. B. C.

Motor fuel from catalytic treatment of cracked gases. G. Egloff (Oil & Gas J., 1936, **35**, No. 22, 58, 60—61).—A description, including a flow chart, is given of a commercial polymerisation unit. The C_8H_{18} nos. of various types of hydrocarbons are tabulated, and the properties of "polymer" petrol discussed. R. B. C.

New high-octane blending agent [for motor fuels]. H. E. Buc and E. E. Aldrin (J. Soc. Auto. Eng., 1936, **39**, 333—340T, 357T).—The physical properties of Pr^{β}_2O (I), *iso*-C_4H_{10} (II), and C_6H_6 are compared. Results of engine trials with (I) and (II) each blended with aviation petrol, containing 3 c.c. of $PbEt_4$ per gal., to give a 100-C_4H_{10} fuel showed the blends to be equal in power output and consumption. The characteristics, *e.g.*, stability, H_2O-tolerance, distillation analyses, etc., of various 100-C_4H_{10} aviation fuels in use are compared. R. B. C.

Knock-rating [of motor fuels]. D. B. Brooks (J. Soc. Auto. Eng., 1936, **39**, 22—24).—The reliability of the C.F.R. standard method for this purpose was investigated. Results are not appreciably affected by normal variations in atm. conditions with the exception of H_2O vapour; humidity in air supplied to the engine should therefore be controlled. Engine C affects the rating of sensitive fuels, and engine overhauls should be made after 50 hr. operation. The intensity of detonation used has a material effect on the knock rating of representative fuels. R. B. C.

Knock-ratings. IV. Effects of [lead tetra]ethyl on cracked petrols. R. Kobayasi and S. Kajimoto (J. Soc. Chem. Ind. Japan, 1936, **39**, 354—356B; cf. B., 1937, 11).—The low Pb response of cracked petrol is due partly to its large proportion of aromatic and unsaturated hydrocarbons which are less responsive to the effect of $PbEt_4$ in increasing the C_8H_{18} no., but much more to the high org. S content of these petrols. Some of the unsaturated compounds easily form stable org. S compounds (sulphonates and sulphates) during refining with H_2SO_4. The depressing effect of Me_2SO_4 (I) on the Pb response of both straight-run and cracked petrols was proved by adding small amounts of (I) to them and measuring the Pb response of the blends. The quality of cracked petrols, both as regards gum formation and Pb response, can be improved by hydrogenation. H. C. R.

Thermodynamic properties of working fluid in internal-combustion engines. R. L. Hershey, J. E. Eberhardt, and H. C. Hottel (J. Soc. Auto. Eng., 1936, **39**, 409—424).—Charts showing the thermodynamic properties of air–C_8H_{18} mixtures before combustion, and of equilibrium mixtures after combustion, are developed, allowance being made for variation of sp. heats with temp. and for dissociation at high temp. R. B. C.

Influence of compression ratio and preheating of mixture on behaviour of fuels containing alcohol in the internal-combustion engine. B. Stefanowski and B. Szczeniowski (Bull. Assoc. Chim. Sucr., 1936, **53**, 547—553).—Graphs, based on bench tests with a Ford engine, show dependence of fuel consumption and power developed on the composition of ternary mixtures of petrol, C_6H_6, and EtOH from 0 to 100% of each, and others show the behaviour of various mixtures at different compression ratios and preheating temp. With compression ratios suitable for petrol alone the use of 20% of EtOH did not increase fuel consumption. With higher compression ratios admixture of EtOH had important advantages; proportions up to 60% could be used without increasing fuel consumption, provided the air was preheated. With EtOH alone the best preheating temp. was 115°, compared with 65° with petrol alone. J. H. L.

Cylinder wear in gasoline engines. C. G. Williams (J. Soc. Auto. Eng., 1936, **38**, 191—196).—Wear decreased with increasing fuel–air ratio. Cylinder wear when using medicinal paraffin (I) as lubricant was investigated. At a cylinder-wall temp. of 55° wear was high, but was reduced by adding 1% of oleic or palmitic acid, or 10% of rape oil, to (I). At a cylinder-wall temp. of 110° (I) gave a low rate of wear = that obtained when using commercial lubricants; addition of fatty oils did not effect any marked improvement. R. B. C.

Cylinder wear in Diesel engines. G. D. Boerlage and B. J. J. Gravesteyn (J. Soc. Auto. Eng., 1936, **38**, 197—199).—Heavy fuels caused slightly more wear than light fuels. Addition of 0·005 wt.-% of quartz dust, 2% of H_2O, and 3% of sea-H_2O to the injection air increased the wear 6-, 2-, and 3-fold, respectively. Wear was not affected by addition of org. acids to the fuel. R. B. C.

Undue cylinder wear in internal-combustion and steam engines. H. J. Young (Proc. Inst. Auto. Eng., 1935–36, **30**, 69—80).—The relation between the metallographic constitution and wearing properties of various types of Fe is discussed with reference to photomicrographs. S increases the wear-resisting properties of cast Fe more than any other element. R. B. C.

History and present status of research and specifications of Diesel fuel. A. E. Becker and M. J. Reed (Trans. Amer. Soc. Mech. Eng., 1936, **58**, 589—592).—A comprehensive review. R. B. C.

Diesel engines and Diesel oils. L. J. Le Mesurier (J. Inst. Fuel, 1936, **10**, 86—94).—The general features of the design of fuel pumps, injectors, and combustion chambers for Diesel engines are described. The characteristics desirable in Diesel oils are also discussed. H. C. M.

Diesel fuels. J. R. MacGregor (J. Soc. Auto. Eng., 1936, **39**, 217—223).—Engine tests of fuels of widely different ignition characteristics showed that no correlation was possible between the laboratory rating and service behaviour of Diesel fuels. R. B. C.

A 5-h.p. "National" Diesel engine converted into an apparatus for determining the cetene value of Diesel oils. P. M. van Bemmel and D. J. W. Kreulen (Fuel, 1936, **15**, 336—342).—The engine has been modified to permit measurement of the lag between fuel injection and ignition under standard running conditions. The cetene no. is the vol.-% of cetene in a mixture thereof with 1-$C_{10}H_7Me$ which has the same lag as the fuel under test. The engine modifications and mode of operation are described. A. B. M.

Applicability of laboratory methods for determining the ease of ignition [cetene number] of Diesel fuels. R. Heinze and H. Hopf (Brennstoff-Chem., 1936, **17**, 441—446).—The cetene nos. (*C*) of 44 fuels of varied origin, ranging from 38·5 for a brown-coal tar oil to 103 for a Fischer–Tropsch synthetic oil, have been determined in a C.F.R. engine, and the vals. compared with the "Diesel indices" (*I*) (cf. Becker and Fischer, S.A.E. Jour., 1934, **35**, 376), the η–*d* const. (*V*) (cf. Moore and Kaye, Oil Gas J., 1934, **33**, 108), the *d*, and the sp. parachors (*P*) of the oils (cf. B., 1935, 934, 1031). The correlation between each of these quantities and *C* is closest in the case of the *P* and falls off in the order *d*, *I*, and *V*. The simplest method of determining *C* in the laboratory is to use the *C*–*d* curve; if greater accuracy is required the γ must also be determined and the *C*–*P* curve used. The correlation between *d* and the other quantities determined is discussed. A. B. M.

Effect of oil fogging on gum deposits and naphthalene. H. R. Mathias (Gas Age-Rec., 1935, **76**, 151—157).—Application of fogging oil containing an oxidation inhibitor to the gas entering the holder controls gum formation and eliminates polymerisation following holder storage. Ch. Abs. (*e*)

Preparation of lubricating oils by hydrogenation of primary tar from Barzass coals. I. I. B. Rapoport and E. I. Silitschenko (Chim. Tverd. Topl., 1935, **6**, 331—340).—Fractions of b.p. <200° were removed. The product was hydrogenated with a MoO_3 or $BaMoO_4$ catalyst at 380—410°. Ch. Abs. (*e*)

Lubricants for motor cars. G. Roberti (Ric. Scient., 1936, **7**, 444—453).—Processes for obtaining lubricants starting from C are discussed. Results are given of treating olive oil either alone, or in presence of aromatic hydrocarbons, with $AlCl_3$. Fluorescent oils were obtained when $C_{10}H_8$ or anthracene was employed. R. B. C.

Lubricating oil fractions. Acetone extraction of constant-boiling fractions. B. J. Mair and S. T. Schicktanz (Ind. Eng. Chem., 1936, **28**, 1446—1451; cf. B., 1936, 308).—The separation, with respect to the type of mol., effected by solvent extraction with $COMe_2$ of almost const.-boiling fractions of a water-white lubricating oil is described. This oil had previously been extensively distilled. Each charge of about 500 g. was separated by extraction in 14-m. columns into 25—35 fractions. η at 100° F. and 210° F., and n_D^{25} were determined on all fractions. In addition C/H ratios, mol. wts., *d*, dispersions, optical activities, b.p., and NH_2Ph points were determined on about 30 key fractions. The extracting columns and their mode of operation are described. H. C. R.

Comparison of lubricating oil fractions with synthetic hydrocarbons. Physical properties and chemical constitution. B. J. Mair and C. B. Willingham (Ind. Eng. Chem., 1936, **28**, 1452—1460).—A correlation is given of the physical properties of a series of petroleum fractions in the lubricating oil region prepared from a Mid-Continent crude by distillation and extraction (see preceding abstract) with each other and with those of synthetic hydrocarbons of high mol. wt. The material corresponding with the most highly refined product obtained by any good solvent-extraction process consists mainly of naphthenes containing from 1 to 3 rings in the mol. together with the necessary alkyl radicals. The somewhat more sol. portion consists of naphthenes with more rings and some unsaturated and possibly some aromatic hydrocarbons. There is no evidence of the existence of branched-chain paraffins in these fractions. Because of the similar solubility relations, it is possible that in the extraction processes used at present one-ring aromatic hydrocarbons are being discarded to waste with the undesirable naphthenes containing about 6 rings to the mol. These may be a valuable constituent of good lubricating oil. H. C. R.

Susceptivity of mineral lubricating oils in use. S. J. M. Auld (Chem. and Ind., 1936, 1014—1020).—A brief historical survey is given of investigations into the chemical structure of lubricating oil, and the changes which occur during use are discussed. With low-temp. oxidation, *e.g.*, in a turbine oil, solid condensation products, sol. or insol. in the oil, may be formed and these result either in sludging or in deposits of a varnish-like nature (probably anhydrides or lactones of polynaphthenic acids). Fatty acids of low mol. wt. may also be formed from aliphatic (branched) chains. The normal acidity of turbine oils probably results from oxidation of side-chains attached to aromatic nuclei. In turbine oils which do not form sludge or deposits, there is probably a preferential formation of oil-sol., high-mol. wt. acids which largely remain as such, do not induce sludge, and have little tendency to polymerise. Neutralisation val. is no guide to the condition of a turbine oil. Under high temp., cracking occurs, but the olefines condense to more complex substances. Oxidation at high temp. (*e.g.*, in internal-combustion engines) results in the formation of hard, insol., resinous material which passes into asphaltenes, carbenes, carboids, and ultimately into coke. The normal reasons for deterioration of crank-case oils are summarised. It would appear that the changes in used oils affect only a relatively small proportion of the oil. There is some evidence that under boundary conditions, the lubricating val. of a used oil is > that of the original oil. Reclaiming, however, should be confined to high-grade oils. C. C.

Relationship between chemical constitution and properties of mineral oils for internal-combustion engines. I. Properties and causes of the low value of Rumanian mineral lubricating oils. I. L. Blum and T. Săndulescu. **II. Attempts to make mineral lubricating oils from Rumanian crudes.** I. Blum and T. Săndulescu (Bul. Chim. Soc. Române, 1935—6, **38**, 37—59, 61—75).—I. The bases for judging the practical val. of mineral lubricating oils are reviewed and the importance of the η index, setting point, stability against oxidation, and η–d const. is emphasised. Two Rumanian oils were compared with a high-grade Pennsylvanian oil in a 450-h.p. Lorraine aëro-engine under identical conditions. Wear of engine parts was rather greater with the Rumanian oils. Piston rings were also gummy with these oils, which show a considerably higher consumption. Increases in η, free C, and hard asphalt were much more marked with the Rumanian oil, the low quality of which is ascribed to the presence of unsaturated and aromatic hydrocarbons.

II. Fractions were prepared by distillation and refining with H_2SO_4 and fuller's earth from 9 different crudes, and their characteristics were determined. The more promising oils were improved by solvent extraction with $PhNO_2$, after removal of asphalt and wax by the usual methods. The analytical characteristics of the oils obtained are tabulated in comparison with those of American oils of known good quality. Four Rumanian crudes gave 3—5% yield of good lubricating oils with η index (Dean and Davis) 93—110 and no unsaturated hydrocarbons after two treatments with $PhNO_2$. Two aviation oils of high η also were made, the characteristics indicating their equality with the best American products. It is concluded that highly satisfactory lubricating oils can be made from Rumanian crudes if the unsaturated components are removed or saturated. The paraffinic crudes are the most suitable and give the highest yields. H. C. R.

Petrolatum problems in Russia in connexion with the new sources of raw material and new refining methods. V. E. Tokmanov and V. D. Rodzaevskaja (Azer. Neft. Choz., 1934, No. 11—12, 107—113).—Crude petrolatum (170—770 pts.) is treated with 150—750 pts. of $PhNO_2$. To produce a final yellow petrolatum (*a*) 80 pts. of the $PhNO_2$-treated product (I) is filtered through infusorial earth, and 50 pts. of oil are added to 75 pts. of the filtrate; (*b*) white petrolatum is prepared by treating 80 pts. of (I) with 10% H_2SO_4 + 20% of adsorbent, followed by filtration and addition of 50 pts. of white oil to 70 pts. of the filtrate. Ch. Abs. (*e*)

Insulating oils. A. L. Reed (Petroleum Times, 1936, **35**, 646—647).—Chemical and physical properties desirable in these oils are discussed, and a table is given showing the characteristics, *e.g.*, *d*, η, % resin, and setting point, of typical low-tension cable compounds. R. B. C.

Oxidation of transformer oil. D. T. J. ter Horst and C. Krijgsman (Physica, 1936, **3**, 1082—1084).—A theoretical discussion of previous data (B., 1935, 484). A mechanism involving an intermediate oxidation product is proposed. A. J. E. W.

Ageing of regenerated transformer oils. F. Skala (Petroleum, 1936, **32**, No. 50, 1—6).—It is confirmed that used transformer oils which have been regenerated with H_2SO_4 and fuller's earth and satisfy the Baader test give high tar vals. This behaviour is proved to be due, not to the formation of unstable products by the regenerative treatment, but to the removal of certain resinous S compounds which are present in unused oils and act as a natural protection against the oxidation of the oil. If these substances are extracted from unused oil and 13—20% is added to regenerated oils, the mixtures give satisfactory tar vals., as also do mixtures of regenerated oil with 30—50% of unused oil. Experiments are in hand to make protective substances artificially by treating regenerated oil with small amounts of S. H. C. R.

Regeneration of used mineral oils. B. Katzenberger (Petroleum, 1936, **32**, No. 49; Motorenbetr., **9**, 2—4).—Two processes are described which can be used on the small scale. Both consist of a treatment with H_2SO_4 to remove unsaturated decomp. products and suspended C, followed by filtration through granulated floridin bleaching earth, the size of the granules being varied according to the η of the oil under treatment. If volatile fuel residues are present they are removed by passing superheated steam through the oil heated electrically to 140—160°. Plants for dealing with 50 litres by the Wara process and 1000 kg. by the Bensmann floridin process are illustrated. The product (yield 80—90%) in each case is stated to be as good as or better than the original unused oil. H. C. R.

[Transformer] oil acidity pipette. W. F. Davidson (Ind. Eng. Chem. [Anal.], 1936, **8**, 483). E. S. H.

Steam-heating of viscous oil. A. H. Hayes (Fuel Econ., 1936, **12**, 105—107).—The method of calculating the dimensions of steam coils for heating viscous oils is described. D. K. M.

Stability of SO_2–lubricating oil solutions. Handling semi-fluid materials. [Air-]dedusters. —See I. **Chlorinating C_5H_{12} from petroleum. Determining evaporation of solvents. Purity of PhMe.**—See III. **Impregnations of paper.**—See V. **CO indicators and analyser.**—See VII. **Fused SiO_2 in heating processes. Combustion-chamber window materials. Refractories and gas etc. industry.**—See VIII. **Corrosion by flue-gas condensate, and by non-electrolytes.**—See X. **Toxic dusts and fumes.**—See XXIII.

See also A., II, 1, **Pyrolysis of C_3H_8, propylene, and butanes. Hydropolymerisation of ethylenic hydrocarbons.**

Patents.

Apparatus for separating dust from coal or like coarse material. B. Norton (B.P. 455,787, 27.4.35).—The coal is fed to a reciprocating screen (*S*) along which the oversize continues; the undersize passes first along an imperforate deck, then over a second perforated device (*e.g.*, a series of steps) which is reciprocated out of phase with *S*. Both zones are provided with a hood and suction pipe to produce air currents. B. M. V.

Process and coke oven for coking hydrocarbon material. A. H. Gallaher, Assr. to Barrett Co. (U.S.P. 2,029,865, 4.2.36. Appl., 22.4.30).—Pitch or other liquid hydrocarbon material is charged into a hot beehive coke oven having a layer of insulating material (*e.g.*, diatomaceous earth) beneath and contiguous to the oven floor, so that the flow of heat into the base of the pitch mass is retarded and foaming of the charge thereby almost completely eliminated. The heat necessary for coking the charge is supplied by the combustion within the oven of the volatile constituents of the pitch, coking taking place progressively downwards through the charge. H. C. M.

Destructive hydrogenation of coal. H. E. Potts. From Internat. Hydrogenation Patents Co., Ltd. (B.P. 457,198, 23.4.35).—Finely-broken brown or bituminous coal is treated with an aq. solution of caustic alkali or alkaline carbonate and then with an aq. solution of sol. compounds of Fe (Fe^{II}) or with finely-divided metallic Fe. The mass is then dried and ground to a paste with oil and hydrogenated with free H_2 at 380—500°/$\nless$50 atm.; Co compounds may replace Fe. D. M. M.

Production of products from solid carbonaceous materials by destructive hydrogenation. Internat. Hydrogenation Patents Co., Ltd., Assees. of I. G. Farbenind. A.-G. (B.P. 457,211, 16.7.35. Ger., 31.7.34).—Solid carbonaceous material, *e.g.*, bituminous coal, is hydrogenated in liquid phase under usual conditions of temp. and pressure, having been first mixed with Pb or compounds thereof ($PbCl_2$), together with free halogen or a substance (CCl_4) splitting off halogen or H halide under reaction conditions. Part of the Pb compound and part of the halogen compound may be added before and part after preheating the original material. D. M. M.

Hydrogenation of distillable carbonaceous materials. M. Pier, W. Simon, and W. Kroenig, Assrs. to Standard-I. G. Co. (U.S.P. 2,028,348, 21.1.36. Appl., 22.12.32. Ger., 2.1.32).—Coal, middle oils, etc. are hydrogenated under suitable conditions of temp. and pressure, *e.g.*, 450°/200 atm., in presence of a catalyst consisting of a halogen compound of Mo, W, or V, preferably in admixture with other metal compounds, *e.g.*, Mo bromide + W sulphide. A. B. M.

Hydrogenising and/or splitting of coal, tars, mineral oils, and the like. W. Rittmeister, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,029,895, 4.2.36. Appl., 1.6.33. Ger., 2.6.32).—Highly efficient catalysts, extremely resistant to poisoning, for carrying out such processes are obtained in a sol. form by dissolving MoS or WS_3 in a strongly basic, primary or *sec.* amine, *e.g.*, piperidine, *cyclo*hexylamine, or butyldecylamine. The hydrogenation is effected with H_2 at 200—550°/>20 atm. The efficiency of such catalysts is $\gg$ that of the metal sulphides on which they are based. H. C. M.

Gas producer consuming wood and other ligneous materials. G. Biaudet (B.P. 457,959, 18.3.36).—The producer claimed has top and side connexions to a H_2O-sealed chimney with a strong draught controlled by dampers in each connexion. The side connexion is well above the air-inlet ports. D. M. M.

Controlling temperature in horizontal gas-retort settings. Koppers Coke Oven Co., Ltd., and G. A. Phillipson (B.P. 457,251, 2.4.36).—In the type of horizontal retort setting with built-in producer and return passages from the down-take flues in the retort chamber to the central combustion space, a positively-acting blower is provided, delivering a const. supply of air to the producer independent of the resistance of the fuel bed, thus assuring const. conditions in the heating system. D. M. M.

Production of water-gas. Non-Poisonous Gas Holding Co., Ltd. (B.P. 457,181, 4.9.35. Switz., 9.8.35).—The process is carried out in an electrically-heated producer, the current which supplies the heat necessary to effect the water-gas reaction being employed, however, only at intervals, preferably at times of low current requirements for other purposes. The temp. is so regulated that no clinker is formed in the producer, and that a gas is obtained which may be catalytically converted into town's gas or motor fuel. A. B. M.

Adsorption or absorption processes [for coal gas]. Carbo-Norit-Union Verwaltungs-Ges.m.b.H. (B.P. 456,506, 18.6.36. Ger., 24.6.35).—In, *e.g.*, the adsorption of C_2H_4 and C_3H_6 from coal gases, minor quantities of H_2 and CH_4 will also be adsorbed. On regeneration of the adsorbent the first portion of the emitted gases, containing nearly all the H_2 and CH_4, is passed (after an intermediate treatment, if desired) over nearly saturated adsorbent, thus making the adsorbed substances nearly pure olefines. The intermediate treatment may comprise cooling, compression, or chemical treatment to separate selected constituents. B. M. V.

Manufacture of non-poisonous protective gases for industrial purposes. Non-Poisonous Gas Holding Co., Ltd. (B.P. 456,873, 7.4.36. Austr., 29.1.36).—Combustion gases containing H_2 + CO approx. = the desired H_2 in the final protective gas are treated catalytically with steam to remove CO. B. M. V.

Separation and purification of gaseous mixtures. J. A. Shaw, Assr. to Koppers Co. of Delaware (U.S.P. 2,028,124, 14.1.36. Appl., 24.10.31).—Gases are freed from H_2S, CO_2, and HCN by scrubbing them with a conc. aq. alkaline solution or emulsion of PhOH and/or its higher homologues. The liquid is regenerated by heating it to a temp. at which the H_2S is expelled, but at which no substantial loss of PhOH occurs. The liquid should contain an excess of PhOH so that an appreciable amount separates to form a phase immiscible with the aq. solution at the temp. at which the gas is scrubbed. A. B. M.

Apparatus for determination of small proportions of carbon gases in gaseous mixtures. P. E. M. Chovin and L. P. R. Gion (B.P. 457,910, 5.3.36. Fr., 5.3.35).—The gas, first freed from CO_2, is passed over CuO heated by a Pt wire and then bubbled through a reagent which becomes coloured on absorption of CO_2, *e.g.*, 25 vols. of 1% malachite-green, 120 vols. of EtOH (*d* 0·816), and enough aq. solution of guanidine to decolorise the solution. The intensity of the coloration is measured by a photo-electric device and serves as a direct measure of the C gases present. D. M. M.

Manufacture of acetylene. Brit. Celanese, Ltd., H. Dreyfus, and W. H. Groombridge (B.P. 458,160, 11.6.35).—A mixture of 10—25% of CH_4 with 90—75% of H_2 is heated at $>1000°$ (1350—1650°) for 0·1—0·005 sec., whereby the CH_4 is decomposed, giving an improved yield of C_2H_2. D. M. M.

Manufacture of acetylene. J. C. Morrell, Assr. to Universal Oil Products Co. (U.S.P. 2,030,070, 11.2.36. Appl., 10.5.34).—Hydrocarbon gases, *e.g.*, from an oil-cracking process, are cracked at 800—1200° under reduced pressure (*e.g.*, 50 mm. Hg) and for time factors $<0·10$ sec. to obtain high yields of olefine hydrocarbons, particularly C_2H_4. Olefines of higher mol. wt. than that of C_2H_4 are then removed by polymerisation or alkylation in presence of catalysts to give liquid hydrocarbons, which are recovered. The residual gases, containing a large proportion of C_2H_4, are then converted into C_2H_2 by pyrolysis at $>1100°$ (1400°). H. C. M.

Recovery of ammonium compounds from ammoniacal liquors or the like and manufacture of a grease solvent. A. G. Black and P. Evans (B.P. 457,082, 7.1.36).—A small quantity of a low-boiling alcohol, *e.g.*, about 4% of methylated spirit, is added to the liquor, which is then distilled at $<100°$. A solid condensate of $(NH_4)_2CO_3$ and a liquid condensate suitable for use as a grease solvent are produced. A. B. M.

Recovery of phenols. C. A. Kerr, J. W. Woolcock, and Imperial Chem. Industries, Ltd. (B.P. 457,139, 23.5.35).—Phenols are recovered from oils, tars, etc. by extraction with (25—30%) aq. NH_3 containing a dissolved salt [*e.g.*, KNO_3, $NaNO_3$, $LiNO_3$, NH_4NO_3, $Ca(NO_3)_2$, $Sr(NO_3)_2$, $NaNO_2$, NaCl, NaBr, $CaCl_2$] to increase its density, and recovered from the extract by evaporation of the NH_3. It is claimed that PhOH is selectively extracted. H. A. P.

Distillation of tar. A. A. MacCubbin and J. Zavertnik, Assrs. to Barrett Co. (U.S.P. 2,029,883, 4.2.36. Appl., 14.8.30).—The tar is pumped continuously through a pipe coil of a pipe-coil still (*P*), the heated tar being used to heat by indirect heat transfer material being distilled in a vac. still (*V*). The undistilled tar, after being again reheated in *P*, is discharged into a vapour still where the vapours are separated from the unvaporised residue. This residue is pumped to *V* where it is further distilled under high vac., heat being supplied from fresh heated, untreated tar from *P*. Plant for continuous distillation is claimed. H. C. M.

Production of oxidised asphalts. E. G. Ragatz, Assr. to Union Oil Company of California (U.S.P. 2,029,504, 4.2.36. Appl., 6.11.33).—Asphaltic oil is converted into asphalt by oxidation with air at 230—260°, and the product mechanically agitated at 320—400° and at a sufficient pressure to prevent material distillation of vaporisable oil fractions (*e.g.*, 25 lb. per sq. in.), when certain polymerisable fractions polymerise into ductile products which are retained by and improve the quality of the finished product. The charge is then steam-blown to obtain the desired m.p. and penetration of the asphalt. Apparatus is described and figured. H. C. M.

Aqueous [bituminous] dispersion. J. M. Fain, Assr. to Patent & Licensing Corp. (U.S.P. 2,027,582, 14.1.36. Appl., 24.1.31).—Stable dispersions containing $\not<50\%$ of bitumen are produced by using as emulsifying agent $<1\%$ (by wt. of the dispersion) of a mixture of sol. soap and a mineral powder, *e.g.*, bentonite. A. B. M.

Simultaneous coking of hydrocarbons, and of mixtures of the resulting distillates with coal. H. A. Brassert & Co., Ltd., and A. Fisher (B.P. 457,971, 5.3.35).—A liquid hydrocarbon, *e.g.*, coal tar or pitch, and a mixture of liquid and solid hydrocarbons, *e.g.*, a suspension of finely-divided coal in the heavy oil from a previous distillation, are coked in separate coking ovens, the distillates from both processes being treated in a common fractionating tower where desired fractions are recovered, one or more of which forms part or all of the liquid constituent of the mixture. Alternatively, the distillates may be cracked. D. M. M.

Controlled pyrogenic decomposition of hydrocarbons. O. E. Roberts, jun. (U.S.P. 2,027,552, 14.1.36. Appl., 23.9.33).—Hydrocarbon mixtures are fractionated and the fractions decomposed in the vapour phase in passing through a reaction zone where they come in contact with a liquid metal catalyst flowing countercurrent to the vapours. Each fraction is introduced separately into the reaction zone to make contact with the catalyst at points which afford the optimum conditions for pyrogenic decomp. and coupling necessary for stabilisation. The catalyst is a bivalent metal possibly alloyed with 10% of univalent metal. Seven examples are cited. C. C.

Catalyst and process for decomposition of hydrocarbons. F. J. De Rewal, Assr. to Atmospheric Nitrogen Corp. (U.S.P. 2,030,283, 11.2.36. Appl., 13.4.31).—The production of H_2 by the decomp. of hydrocarbon gases (*e.g.*, natural gas or coal gas) is effected by passing the gases admixed with (1) steam, or (2) steam and air, when the resultant gas is to be used for NH_3 synthesis, over a Pd catalyst at 450—550°. The activity of the catalyst is greatly accelerated by adding the oxides of two of the following metals, Mg, Be, Ce, Ti, Cr, Th, W, the Pd being pptd. in an alkaline medium. A typical catalyst has the composition Pd 5, CeO_2 93, ThO_2 2%. H. C. M.

Control of catalytic reactions [for hydrocarbon gases]. J. W. Harrison and T. B. Prickett, Assrs. to Houdry Process Corp. (U.S.P. 2,031,600, 25.2.36. Appl., 18.5.32).—Catalyst masses for the endothermic transformation of hydrocarbons are divided into an even no. (6) of parts, and the feed hydrocarbon and thereafter the successive residues from a fractionating column are passed through the catalyst at successively raised temp. (430—540°) and also at increased velocity and decreased time of contact, the conditions being obtained by the use of half of the catalyst mass in the early passes and $<$ half in the later passes. B. M. V.

Natural gas conversion process. M. P. Youker, Assr. to Phillips Petroleum Co. (U.S.P. 2,027,460, 14.1.36. Appl., 11.9.30).—Hydrocarbons gaseous at room temp. and 1 atm. are converted into liquid products by feeding at >500 (2000—3000) lb. per sq. in. through a non-catalytic heating zone at 370—538°. A hydrocarbon liquid heavier than gasoline is then added to the stream, which is thus cooled. Gasoline, permanent gases, and hydrocarbon vapours are separated, the gases being then vented and the vapours returned under pressure to the inlet. C. C.

Treatment of hydrocarbon oils. N. V. de Bataafsche Petroleum Maats. (B.P. 457,997, 5.2.36. U.S., 8.10.35).—Liquid hydrocarbon mixtures are refined while still in the liquid phase by treatment at 200—400° with a catalyst consisting of a carrier, *e.g.*, metallurgical coke, impregnated with a 60% aq. solution of H_3PO_4. The catalyst may be regenerated by extraction with a lower aliphatic ketone or an ether of high O content, after which fresh H_3PO_4 solution is poured over the carrier. H_2S and mercaptans are removed separately by the usual reagents. D. M. M.

Treatment of hydrocarbon oils. (A) A. V. Grosse, (B) J. C. Morrell, and (C) R. B. Day, Assrs. to Universal Oil Products Co. (U.S.P. 2,029,100, 2,029,115, and 2,029,256, 28.1.36. Appl., [A] 5.10.31, [B] 14.12.31, [C] 25.8.33).—(A) Hydrocarbon oils containing S are refined by treatment with H_2 in presence of a thio-molybdate or -tungstate catalyst supported, if desired, on an inert or active carrier, *e.g.*, pumice, C, SiO_2 gel. A suitable catalyst is Co tetrathiomolybdate at 260°/150 lb. per sq. in. (B) Light petroleum distillates are treated in the vapour phase with a solution of H_2SO_4 and a sulphonated hydrocarbon, preferably aromatic. The treatment may be counter- or co-current, and any of the usual forms of packed towers may be used, the temp. being 93—316° and pressure 1 atm.—300 lb. per sq. in. A suitable solution is H_2SO_4 45, H_2O 20, and $PhSO_3H$ 35%. (C) Hydrocarbon oils of motor fuel boiling range are refined by treatment at 93—316° (177—260°)/100—200 lb. per sq. in. with HCl and H_2O in presence of a natural Zn-bearing clay, preferably containing 20—25% Zn. The oil should be in mixed liquid and vapour phase, about 25% being vapour. D. M. M.

Treatment of hydrocarbon oil. J. C. Morrell, Assr. to Universal Oil Products Co. (U.S.P. 2,029,785, 4.2.36. Appl., 18.2.32. Renewed 8.4.35).—Colour- and gum-forming components are removed from cracked oils of motor fuel boiling range, and the S content is reduced, by subjecting them in the vapour phase to the action of a mixture of H_2SO_4 and H_3PO_4 or to a solution containing these acids. Other P acids may be used. H. C. R.

Treatment of mineral oil distillates. R. H. Crosby and B. R. Carney (U.S.P. 2,030,245, 11.2.36. Appl., 10.11.33).—The petroleum distillate is almost completely freed from H_2S by treatment with an excess of an aq. suspension containing 2—5 wt.-% of CaO, in a mixer operated in absence of gas and at $\nless 12$ lb. (20—25 lb.) per sq. in., so that the formation of emulsions due to gas-bubble formation is eliminated. The mixer consists of a series of U-bends. By further treatment of the distillate with dil. aq. NaOH, under normal temp. and pressure conditions, complete removal of H_2S and naphthenic acids is effected. H. C. M.

Desulphurising a petroleum oil distillate. V. Kalichevsky, Assr. to Standard Oil Development Co. (U.S.P. 2,028,335, 21.1.36. Appl., 10.4.31).—The distillates are treated with an anhyd. mixture of NaOH and KOH containing about $1\frac{1}{4}$ lb. of NaOH per lb. of sour S and $\frac{1}{3}$—$\frac{2}{3}$ lb. of KOH per lb. of corrosive S in the distillate. A mutual org. solvent for oil and alkali may be present, *e.g.*, alcohols, ethers. A H_2SO_4 treatment may follow the alkali process. C. C.

Desulphurising petroleum oils. F. M. Rogers, Assr. to Standard Oil Co. (U.S.P. 2,028,995, 28.1.36. Appl., 15.12.28. Renewed 23.2.34).—Gasoline is treated in vapour phase with catalytic adsorbed clay at 343—400° at a flow rate of 12—20 barrels of oil per hr. per ton of catalyst. Difficultly removable S compounds are thus converted into a more easily removable form. C. C.

Sweetening of hydrocarbon oils. W. A. Schulze and L. V. Chaney, Assrs. to Phillips Petroleum Co. (U.S.P. 2,028,998, 28.1.36. Appl., 2.12.33).—Hydrocarbon fluids containing mercaptans (I) are sweetened by treatment with OCl′ solution in absence of O_2 carriers. Part of the (I) are converted into disulphides and the remainder into alkyl S chlorides (II), the latter remaining in the hydrocarbon layer. This is treated with a strongly reducing solution of an alkali and a H_2O-sol. alkaline salt, *e.g.*, alkali or alkaline-earth sulphites, cyanides, or stannites. The (II) are thus reduced to disulphides. C. C.

Treatment of cracked petroleum distillates. E. B. McConnell, Assr. to Standard Oil Co. (U.S.P. 2,030,033, 4.2.36. Appl., 10.6.33).—Gum formation in cracked petroleum distillates (motor fuels) is inhibited by addition of 0·004—0·5% of 2-, 6-, 7-, or 8-hydroxyquinoline, or the corresponding tetrahydro-bases. A. H. C.

[Stabilising] treatment of hydrocarbons. E. W. McMullan, Assr. to Gasoline Antioxidant Co. (U.S.P. 2,027,394, 14.1.36. Appl., 10.12.30).—Gum formation in cracked gasoline is inhibited by addition of a small amount (0·1 wt.-%) of azo-, azoxy-, or hydrazo-benzene. C. C.

Obtaining products from [hydrocarbon oil] acid sludge. J. C. Bird, Assr. to Standard Oil Development Co. (U.S.P. 2,028,185, 21.1.36. Appl., 9.1.32).—Acid sludge is treated with an oxygenated org. solvent not completely miscible with sludge or H_2O, *e.g.*, *tert.*-C_5H_{11}·OH. H_2O is added and H_2SO_4 separated, leaving the org. material in solution in the solvent. Alternatively, the sludge may be diluted with H_2O to remove H_2SO_4, the washed sludge neutralised with alkali or NH_3, and the neutral sludge treated with an aq. alcohol, *e.g.*, $Pr^{\beta}OH$. Tarry matter, inorg. salts, and a solution of sulphonates in aq. alcohol are thus obtained. The sulphonates are recovered. From the tar a difficultly combustible plastic material is obtained as a residue after extraction with light hydrocarbon solvent. C. C.

Separating the constituents of gaseous [hydrocarbon] mixtures. Air Reduction Co., Inc., Assees. of W. Wilkinson and J. L. Schlitt (B.P. 456,773, 17.5.35. U.S., 1.8.34).—Separation of C_2H_4 and C_3H_6 from CH_4, C_2H_6, C_3H_8, and other constituents of a complex gaseous mixture is effected by obtaining two liquid fractions (*a*, *b*) by successive condensation without change of pressure, *a* containing substantially all the C_3H_6 and *b* the major part of the C_2H_4. *a* and *b* are then rectified, the refrigeration being maintained by recompression of the separated constituents. B. M. V.

Solvent extraction of lower-boiling hydrocarbons. Standard Oil Development Co. (B.P. 456,958, 1.4.36. U.S., 10.9.35).—Lower-boiling hydrocarbons, *e.g.*, naphtha, kerosene, and light gas oil, are separated into relatively more paraffinic and more aromatic constituents by extraction with 3—5 vols. of a (mono-, di-, or tri-ethylene) glycol at 10—66°. The aromatic fraction is recovered either by chilling until the hydrocarbons separate from the solvent or by adding H_2O. This fraction may be used as motor fuel. C. C.

Burning of emulsified compounds. R. H. Russell, Assr. to Gas Fuel Corp. (U.S.P. 2,033,010, 3.3.36. Appl., 25.3.31).—An emulsion of gas, H_2O, and heavy oil, obtained as in U.S.P. 1,970,771 (B., 1935, 759), is mixed with air preheated to 425°, both being under pressure, and the mixture is burned after expansion, the principal object being to use still bottoms as fuel. B. M. V.

Quenching oils. G. C. Shepherd, jun., Assr. to Union Oil Co. of California (U.S.P. 2,031,431, 18.2.36. Appl., 9.1.33).—For quenching metals a cracked hydrocarbon fraction, flash point $\not<121°$, η 75—200 sec. at 37° (Saybolt Universal), is claimed. B. M. V.

Lubricating oils. E. I. Du Pont de Nemours & Co. (B.P. 458,105, 12.6.35. U.S., 15.6.34).—Lubricating oil containing waxy material in solution and therefore having a high pour point may have this val. depressed by addition of 0·25—2·0% of a substance consisting of either a dehydration condensation polymeride of octadecanediol or a condensation product of a chlorinated paraffin with a polycyclic phenol ether, *e.g.*, the condensation product of a monochlorinated paraffin (C_{40}) with α-$C_{10}H_7$·OMe. D. M. M.

Production of high-mol. wt. compounds from petroleum oil. D. R. Merrill, Assr. to Union Oil Co. of California (U.S.P. 2,029,382, 4.2.36. Appl., 20.11.33).—Hydrocarbons of high mol. wt. suitable for lowering the pour point and imparting a green fluorescence to lubricating oils are extracted from cracked residuum pitch with an oily solvent at 204—232°; the extract is diluted with a highly aromatic solvent, treated with H_2SO_4 (up to 93% concn.) to remove undesirable impurities, and the solvent subsequently removed. C_6H_6, PhMe, xylene, heavy solvent naphtha, hydrocarbons sol. in liquid SO_2, CCl_4, $C_2H_4Cl_2$, $C_2H_3Cl_3$, or CS_2 may be used as the solvents. H. C. R.

Refining of South Texas lubricating oil. W. H. Beardsley, Assr. to Sinclair Refining Co. (U.S.P. 2,029,605, 4.2.36. Appl., 9.3.32).—The separation of the acid sludge where the acid val. is $>0·2$ is facilitated by partial neutralisation insufficient to reduce the acid val. to 0·2, followed by treatment with H_2SO_4 and addition of H_2O (up to 1·5—3·0 vol.-% of the oil). H. C. R.

Purification of oxidation products [for lubricant production]. J. H. James, Assr. to C. P. Byrnes (U.S.P. 2,029,619, 4.2.36. Appl., 15.7.33).—The liquid lubricant containing oily, partial oxidation products (alcohols and acids) may be purified from gum-forming substances by treating with a small proportion of H_2SO_4 at above 45° and removing excess of acid with Na_2SO_4 and sol. sulphonates with a 1 : 1 EtOH–H_2O mixture. The oxidised mixture is previously fractionally distilled and the heavier fractions are alone treated. H. C. R.

Preventing the separation of solid or semi-solid substances from liquid organic lubricants on the cylinder walls of internal-combustion engines. J. T. Shevlin. From Siemens & Halske A.-G. (B.P. 455,790, 4.5.35).—The surface of the cylinder wall is modified by treatment with S at elevated temp., *e.g.*, at 100—350°, with oil containing 0·1% S and with air if desired, *i.e.*, the treatment may be effected while the engine is running. B. M. V.

Preparation of ceresine. P. J. Wiezevich, Assr. to Standard Oil Development Co. (U.S.P. 2,028,307, 21.1.36. Appl., 13.6.32).—Ozokerite is treated at above the m.p. (*e.g.*, at 88°) with light hydrocarbon solvent, C_3—C_5 (*e.g.*, C_3H_8, C_4H_{10}), under sufficient pressure to retain the hydrocarbon in the liquid phase at the working temp. Material insol. at this temp. is removed and the solution heated almost to the crit. temp. of the solvent. Part of the ozokerite is pptd. and with it a large proportion of the coloured material. The solution is filtered through finely-divided clay and the ceresine recovered. C. C.

Lubrication of bearings. E. R. H. Johnson, Willey & Co., Ltd., and United Gas Industries, Ltd. (B.P. 456,522, 10.4.35).

Apparatus for heating coal. Control of catalytic reactions. Heat-exchange apparatus [for making gas]. Separating coal etc. Washing coal etc. Comparative viscosimeter.—See I. **Polymerising unsaturated hydrocarbons. Sulphating olefines.**—See III. **Separating H_2 [from water-gas]. Converting H_2S into S. SO_2.**—See VII. **Filling voids etc.**—See IX. **Gaseous atm. for heat-treating metals. Oil–metal dispersions.**—See X. **Asphaltic material. Plastics containing rubber.**—See XIII. **Explosive cartridges.**—See XXII. **H_2O purification.**—See XXIII.

III.—ORGANIC INTERMEDIATES.

Hydrocarbon fraction of fusel oil residues. P. P. Schorigin and S. V. Savenkov (J. Gen. Chem. Russ., 1936, 9, 1437—1441).—The unsaturated hydrocarbon, $C_{15}H_{26}$, b.p. 80—81°/5 mm., and three isomeric saturated hydrocarbons, $C_{15}H_{28}$, b.p. 128—130°/12 mm., 117—118°/12 mm., and 106—107°/12 mm., respectively, have been isolated from the neutral fraction of fusel oil residues. The substances appear to be dicyclic sesquiterpenes. R. T.

Chlorination of pentane from petroleum. S. S. Nametkin and A. G. Serebrianikova (J. Appl. Chem. Russ., 1936, 9, 1428—1431).—Apparatus for the continuous chlorination of C_5H_{12} at 250° is described. R. T.

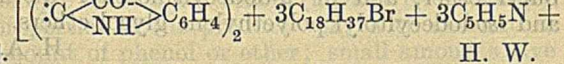
Synthesis of methyl alcohol at low pressures. D. A. Pospechov (Mem. Inst. Chem. Ukrain. Acad. Sci., 1936, 3, 403—413).—The mixture 60 Cu–35·6 ZnO–4·4 Cr_2O_3 (cf. Plotnikov *et al.*, B., 1931, 751; 1932, 137) accelerates the prep. of MeOH from CO and H_2 at 200°/40—30 atm. At higher temp. or pressures the activity of the catalyst decreased within a few hr., a large part of the CO and H_2 being converted into CH_4 and CO_2. J. J. B.

Determination of evaporation rate of solvents at high temperatures. F. C. Thorn and C. Bowman (Ind. Eng. Chem. [Anal.], 1936, 8, 432—435).—Apparatus and procedure for petroleum solvents are described. E. S. H.

Degree of purity of toluene. N. A. Cholevo and I. I. Eitingzon (J. Appl. Chem. Russ., 1936, 9, 1465—1475).—PhMe is determined in the crude product from petroleum by shaking with 2 vols. of 3% oleum, and measuring the vol. of undissolved hydrocarbons after 15 min. Alternatively, aromatic hydrocarbons are determined by adding the product from a burette to 100 ml. of nitration mixture (H_2SO_4 89, HNO_3 6, HNO_2 0·5, and H_2O 5%), with const. stirring, to the appearance of a permanent red coloration, when the PhMe content is given by $100(1 - AT/1{\cdot}37)$, where A = g. of product taken, and $T = 1{\cdot}37 - (a - b)/A$, a and b being the wts. of the reaction vessel before and after addition of the PhMe. Unsaturated compounds may be determined by the $KMnO_4$ test in solutions of the product in 96% EtOH, freshly distilled after shaking with cryst. $KMnO_4$. This method is, however, laborious and inaccurate; determination of the Br no. is preferred, in conjunction with the sulphonation test, for determining whether a given sample of PhMe is pure enough to be used for nitration. R. T.

Separation of mixtures of cresols (isolation of *m*-cresol). P. P. Schorigin, A. A. Simanovskaja, and N. G. Vereschtschagina (J. Appl. Chem. Russ., 1936, 9, 1442—1445).—86% *m*-cresol (I) is obtained in 89% yield from mixtures of *m*- and *p*-cresol by a modification of Raschig's distillation procedure (using steam at atm. pressure instead of superheated steam). Oxidation ($KMnO_4$ in aq. H_2SO_4) of a mixture of *m*- and *p*-$C_6H_4Me\cdot OMe$ gives 67% yields of pure *m*-$C_6H_4Me\cdot OMe$, with 20% yields of anisole. Darzens' method (A., 1931, 1288) for isolation of (I) is not recommended. R. T.

Textile auxiliaries and dyes. F. Seidel and O. Engelfried (Ber., 1936, 69, [*B*], 2567—2591).—Chemically defined substances are examined from the viewpoint of utility as textile auxiliaries and dyes, it being assumed that acid wool dyes are generally mol. dissolved substances which may contain colloidal particles of varying magnitude and that cotton dyes become increasingly efficient as the particle size increases and are most powerful when colloidally dispersed; further, that dyes with marked affinity for cellulose must have unbranched, extended, and not spherical form. C_6H_6 and a large excess of stearyl chloride (I) with $AlCl_3$ in CS_2 or $PhNO_2$ give only monostearylbenzene, which is unaffected by 15% oleum and very rapidly decomposed by a more conc. acid. Octadecylbenzene, from *n*-octadecyl bromide (II), C_6H_6, and $AlCl_3$, is transformed by 15% oleum at 0° into *octadecylbenzenesulphonic acid*, the *Na* salt (III) of which behaves like an acid dye to wool and cotton and imparts a soft texture to artificial silk. (III) is transformed by the successive action of PCl_5 and NH_3 into *octadecylbenzenesulphonamide*, m.p. 99—100°, which could not be converted into the corresponding $\cdot SO\cdot NCl_2$ compound (for comparison with Aktivin and Peraktivin). (I), *o*-$OH\cdot C_6H_4\cdot CO_2H$, and $AlCl_3$ in $PhNO_2$ give 2-*hydroxy-5-stearylbenzoic acid*, m.p. 117—119° (*Na* salt, decomp. about 240°), which forms clear, foaming solutions in NaOH or Na_2CO_3 and has slight affinity for cotton. *p*-$NH_2\cdot C_6H_4\cdot SO_3H$ and (II) (1 : 2 mols.) in C_5H_5N at 150° give *dioctadecylsulphanilic acid*, m.p. 150—160°, which has marked affinity for cotton and less for wool or artificial silk. Under defined conditions and after purification from C_6H_6 the reactants give the *complex*, $SO_3H\cdot C_6H_4\cdot NBr(C_{18}H_{37})_3 + 3C_5H_5N + 2C_6H_6 + HBr + 3H_2O$, which is stable towards boiling H_2O. *Octadecylpyridinium bromide* ($+1H_2O$), m.p. 145—150° (decomp.) after softening at 70°, rising (when kept) to m.p. 240—245°, is obtained from (II) and C_5H_5N at 150—160°. p-*Stearamidobenzenesulphonic acid*, softens at about 80° but does not melt when more strongly heated, from (I) and *p*-$NH_2\cdot C_6H_4\cdot SO_3H$ in C_5H_5N at 100°, has marked affinity for wool and artificial silk, but little for cotton. *p*-$C_6H_4(NH_2)_2$ and (II) (mol. ratio 1 : 6) in C_5H_5N give the *complex*, $C_6H_4[NBr(C_{18}H_{37})_3]_2 + 4C_5H_5N + 4HBr + 5H_2O$, or $C_6H_4(NH\cdot C_{18}H_{37})_2 + 4C_5H_5NBr\cdot C_{18}H_{37} + 2HBr + 5H_2O$; the extended mol. confers marked affinity for animal and vegetable fibres, particularly cellulose. Benzidine and (II) yield *dioctadecylbenzidine*, m.p. 111—113°, which is insol. in H_2O and without textile interest, and, mainly, the *complex*, $[\cdot C_6H_4\cdot NBr(C_{18}H_{37})_3]_2 + 4C_5H_5N + 4HBr + 5H_2O$, or $(\cdot C_6H_4\cdot NH\cdot C_{18}H_{37})_2 + 4C_5H_5NBr\cdot C_{18}H_{37} + 2HBr + 5H_2O$, which is sol. in H_2O and has good affinity for the various fibres. $C_{10}H_8$, (I), and $AlCl_3$ in CS_2 give α-, m.p. 52—54·5°, and β-stearylnaphthalene, m.p. 66—67° (red *dinitrophenylhydrazone*); the last-named substance is readily sulphonated to stearylnaphthalenesulphonic acid, the *Na* salt of which has marked affinity for animal fibres. (I), β-$C_{10}H_7\cdot OH$, and $AlCl_3$ in CS_2 give exclusively 2-*naphthyl stearate*, m.p. 72—74°, also obtained from (I) and β-$C_{10}H_7\cdot OH$ in C_5H_5N and decomposed by $AlCl_3$ in $PhNO_2$ at room temp. (I), α-$C_{10}H_7\cdot OH$, and $AlCl_3$ give 1-*naphthyl stearate*, m.p. 64—66°, and an unidentified *isomeride*, m.p. 86·5—88°, which is unaffected by 2 : 4-$(NO_2)_2C_6H_3\cdot NH\cdot NH_2$. 1 : 4-$NH_2\cdot C_{10}H_6\cdot SO_3Na$ and (II) in C_5H_5N at 140° afford the *substance* $C_{18}H_{37}\cdot NH\cdot C_{10}H_6\cdot SO_3H,C_5H_5N$, m.p. 112°, which possibly exists in two forms characterised by differing solubility in $COMe_2$, which has similar affinity for wool, cotton, and viscose. Since many of these auxiliaries are fast to light and milling the possibility of their improvement in the similar properties of substantive dyes on vegetable fibres has been examined in the case of viscose and Sirius-blue G; no improvement is observed and, in certain cases, the pretreatment completely inhibits absorption of the dye from the bath. With wool dyed with Crocein-scarlet the products from p-$NH_2\cdot C_6H_4\cdot SO_3H$ in contrast with those from benzidine inhibit bleeding of the dye and its deposition on undyed wool also present. NH_2- and NH-dyes also react with (II), the products retaining their colour after repeated crystallisation. Dyes insol. in H_2O become thereby readily sol. in H_2O and act directly towards cotton. The new dyes are somewhat paler than their parents, but the shades are permanent and pleasing; further, they impart a full, soft, and smooth feeling to the fabrics. Thus p-aminoazobenzene, Benzopurpurin 4B, and indigotin with (II) in C_5H_5N yield the respective *complexes* $[PhN_2\cdot C_6H_4\cdot N(C_{18}H_{37})_2 + C_5H_5N + 3HBr + 3H_2O]$, $[(\cdot C_6H_3Me\cdot N_2\cdot C_{10}H_6\cdot NBr(C_{18}H_{37})_3)_2 + C_5H_5N + 4HBr + 7H_2O]$, and $[(\cdot C_6H_3Me\cdot N_2\cdot C_{10}H_6(NH\cdot C_{18}H_{37})\cdot SO_3H)_2 + C_5H_5N]$, and



$$\left[\left(:C{<}\genfrac{}{}{0pt}{}{CO-}{NH-}{>}C_6H_4\right)_2 + 3C_{18}H_{37}Br + 3C_5H_5N + HBr\right].$$

H. W.

Separation of volatile liquids.—See I. **Chemical analysis. C_2H_2 from CH_4. Phenols from tars. Hydrogenation of phenols and anthracene. Hydrocarbons, and *cyclo*pentadiene, from paraffin. Cracking of C_3H_8.**—See II. **PhOH derivatives from bagasse.**—See V. **Urea synthesis.**—See VII. **Synthetics.**—See XIII. **$COMe_2$ and EtOH by fermentation. Denatured EtOH.**—See XVIII. **Compounds of Tl with NO_2-compounds.**—See XXII. **Toxic dusts and fumes. Purifying effluents from salicylic acid and β-$C_{10}H_7\cdot OH$ factories.**—See XXIII.

See also A., II, 1, **Prep. of diethyltetradecane.** 3, **Explosions arising from ethers.** 4, **Prep. of aminoguanidine. Electrolysis of MgMeI in $Bu^a{}_2O$.** 36, **Prep. of p-$NEt_2\cdot C_6H_4\cdot CHO$.** 41, **Determination of camphor.**

PATENTS.

Polymerisation of unsaturated hydrocarbons. C. R. Wagner, Assr. to Pure Oil Co. (U.S.P. 2,028,886, 28.1.36. Appl., 19.1.29).—Gases containing $\nless 50\%$ of olefines afford liquid polymerides by passage through a reaction zone without catalysts at 500—1500 lb./sq. in. and at 340—540°. K. H. S.

Production of [β-]chlorobutadiene. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 458,100, 12.6.35).—Gases containing vinylacetylene, *e.g.*, those obtained by passing C_2H_2 over a Cu^I salt, are passed with the appropriate amount of HCl gas, or substances which form it, *e.g.*, $COCl_2$ and steam, at 50—200° (100—150°) over active C that carries halogen compounds of the (mixed) base metals of groups II and IV, which may be formed *in situ* from the metals, and may also contain Hg (Hg_2Cl_2, Hg_2Br_2, $PbCl_2$, $CdCl_2$, $ZnCl_2$, $SnCl_2$). β-Chlorobutadiene, practically free from chlorobutene, is obtained. E. J. B.

Manufacture of chlorohydrins. Usines de Melle (B.P. 458,061, 2.3.36. Fr., 6.3.35).—A gaseous olefine (I) and Cl_2 are each led into H_2O in separate vessels (equipped with centrifugal agitators) interconnected by two H_2O-cooled pipes, so arranged that efficient transfer and mixing of the two liquids is obtained (at 15—20°). The aq. chlorohydrin (II) formed is continuously withdrawn from the vessel into which the (I) is led. Only a small amount of dichloride is formed, which is extracted from the neutralised solution by a liquid that is a non-solvent for (II) (petroleum spirit, b.p. 105—110°). The aq. liquid is freed from the latter and the (II) extracted by a solvent that will subsequently dehydrate it by azeotropic distillation (C_6H_6). 90—95% yields are obtained. Apparatus is claimed. E. J. B.

Sulphation of olefines. R. F. Le Baron, Assr. to Standard Alcohol Co. (U.S.P. 2,028,226, 21.1.36. Appl., 4.4.30).—C_4H_8 mixtures obtained by fractionation of cracked hydrocarbons under pressure are sulphated at 20° in the liquid phase (autoclave). Stepwise sulphation with 55—60% and then with 65—70% aq. H_2SO_4 separates the *tert.* and *sec.* olefines, respectively. Fractionation and sulphation plant as well as the processing of C_3 and C_2 olefine fractions are described. A. H. C.

Separation of acylatable constituents of a mixture. Schering–Kahlbaum A.-G. (B.P. 456,210, 4.4.35. Ger., 6.4.34).—Mixtures containing OH-compounds are treated with sulphocarboxyl chloride in a *tert.* base; the salt of the resultant ester, $SO_3H\cdot R\cdot CO_2R'$, and the base may then be pptd. by Et_2O etc. The separation of myristyl alcohol and paraffin by m-$COCl\cdot C_6H_4\cdot SO_2Cl$, of cetyl Et ether and alcohol by 2 : 1 : 4-$SO_2Cl\cdot C_6H_3Me\cdot COCl$, and of hydrofarnesol and farnesane by 3 : 4 : 1-$SO_2Cl\cdot C_6H_3Cl\cdot COCl$ in C_5H_5N is described. R. S. C.

Production of organic disulphides. L. B. Turner, Assr. to Standard Oil Development Co. (U.S.P. 2,028,303, 21.1.36. Appl., 29.10.32).—Alkylmercaptans ($<C_5$) are oxidised to disulphides (50—92% yield) by limited oxidation of the vapour with air over a mild catalyst (activated C or a metallic oxide) at 100—250°. A. H. C.

Alcohol sulphation process. [Manufacture of alkyl hydrogen sulphates.] Carbide & Carbon Chemicals Corp., Assees. of G. H. Law and R. W. McNamee (B.P. 456,214, 4.5.35. U.S., 9.5.34).—An alcohol having $\nless C_8$ is treated with an anhyd. sulphonating agent in an ether of high b.p. which acts as a common solvent. *E.g.*, $ClSO_3H$ (116·5 pts.) in ββ'-$O(C_2H_4Cl)_2$ (I) (300 pts.) is added at 16—23·5° to β-methyl-η-ethylundecan-δ-ol (214 pts.) in (I) (210 pts.) in a stream of air, the product is neutralised (2N-NaOH), and the aq. layer is evaporated under reduced pressure. It is claimed that the process is particularly applicable to *sec.*- and *tert.*-alcohols which tend to dehydrate rather than form H_2SO_4 esters. H. A. P.

Concentration of acetic acid. M. H. Carpmael. From Soc. des Prod. Chim. de Clamecy, and Etabl. Lambiotte Frères (B.P. 456,921, 13.7.35).—The process of extraction with a solvent (*e.g.*, $EtCO_2Me$, EtOAc, $Pr^{\beta}{}_2O$) is combined with that of azeotropic distillation with liquids immiscible with H_2O (*e.g.*, BuOAc, BuOH) in apparatus (figured) which effects economy in heat. K. H. S.

[Production of maleic acid by] catalytic oxidation of turpentine oils. W. Schrauth, Assr. to Deuts. Hydrierwerke A.-G. (U.S.P. 2,030,802, 11.2.36. Appl., 18.5.34. Ger., 29.5.33).—Passage of (atomised) (preferably sulphate) turpentine oil in a large excess of air over the oxide of a multivalent metal (*e.g.*, Th) at 250—500° (350—400°) gives maleic acid. R. S. C.

Manufacture of organic chlorine and bromine derivatives. C. and H. Hunsdiecker, and E. Vogt (B.P. 456,565, 6.4.36. Ger., 8.4.35).—Interaction of Cl_2 or Br with the salts of carboxylic acids combined with metals of groups I—III (Ag) results in elimination of CO_2 to give an alkyl halide where the α-position is unsubstituted, an aldehyde from an α-OH-acid, and an acid chloride from an α-keto-acid. *E.g.*, Ag palmitate with Br (+ air) at 30—50° gives n-$C_{15}H_{31}Br$ (80% of theory), Ag_2 sebacate with $Br-CCl_4$ gives αθ-$C_8H_{16}Br_2$, Ag Et sebacate gives Et θ-bromononoate, b.p. 118°/2 mm., and Ag α-hydroxypalmitate gives pentadecanal. The reaction with Br appears to proceed less readily with Hg^I palmitate. H. A. P.

Esterification process. W. J. Bannister, Assr. to Commercial Solvents Corp. (U.S.P. 2,029,694, 4.2.36. Appl., 30.7.34).—Aliphatic esters (b.p. $>120°$) of relatively non-volatile carboxylic acids (*e.g.*, Me, Et, and Bu lactates) are prepared by introducing the esterifying alcohol, at a temp. slightly $<$ the b.p. of the ester, into the anhyd. acid containing 1% of a non-volatile esterifying catalyst (H_2SO_4) and collecting the vapours of ester, H_2O, and excess of alcohol. A. H. C.

Manufacture of esters of lævulic acid. G. L. Cox and M. L. Dodds, Assrs. to Niacet Chemicals Corp. (U.S.P. 2,029,412, 4.2.36. Appl., 19.12.34).—Crude lævulic acid syrup, obtained by treating carbohydrates with mineral acid, is esterified without preliminary purification. A. H. C.

Manufacture of alginates [from seaweed]. A. H. Gruart (B.P. 456,342, 3.5.35. Belg., 5.5.34).—Alginic acid, pptd. from a crude alkali alginate, is dried to a concn. of $\not<90\%$ and mixed in the cold with a base or metallic salt, *e.g.*, Na_2CO_3, aq. NH_3, $Al_2(SO_4)_3$. The alkali salts form a paste which may be further dried if desired. H. A. P.

[Preparation of] assistants for use in the textile, leather, paper, and like industries. I. G. Farbenind. A.-G. (B.P. 456,142, 3.5.35. Ger., 4.5.34).—Compounds constituted as those claimed in B.P. 455,310 (B., 1937, 21), but containing an acidic group in the hydrophilic part of the mol., are claimed. Examples are the products obtained by heating (*a*) Me α-bromolaurate (I), NaOH, and $NH_2{\cdot}CHMe{\cdot}CO_2H$ in 50% MeOH, (*b*) Bu α-bromostearate (II), sarcosine, NaOH in 50% MeOH, (*c*) (I) and Na taurate in xylene, and (*d*) (II), 20% Na methyltaurate, and NaOH in MeOH. Successive treatment of α-NH_2-acids with $CH_2Cl{\cdot}COCl$ and Na_2SO_3 gives stable assistants. R. S. C.

Manufacture of washing, wetting, emulsifying, softening, and like agents. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 456,517, 5.4.35). Polyether-carboxylic acids are claimed having at least one aliphatic, *cyclo*-aliphatic, or araliphatic radical of $\not<C_8$ attached by O, S, N, or a group containing $\not<1$ of these, to a polyether group containing $\not<2$ ether O and $\not>3$ alkyleneoxy-groups, and derived from polyhydric alcohols of C_{2-4}. *E.g.*, the Na derivative of (mono)dodecyl triethylene glycol ether (I) is condensed with $CH_2Cl{\cdot}CO_2Na$ to give a detergent and wetting agent unaffected by hard H_2O; a similar product is obtained from the corresponding octadecyl ether (II). Other examples are the products from ethylenebisglycollic anhydride and octadecenylamine or dodecyl alcohol, oxidation products (HNO_3, *d* 1·4, at 80°) of (I) and (II), the hydrolysis product of the nitrile from the CH_2Cl ether of (II) and CuCN, β-phthalmethylamino-β′-dodecyloxydiethyl ether, the (mono)phthalates of (mono)dodecyl diethylene glycol and δδ′-dihydroxydibutyl ether, and of β-dodecylthioethyl diethylene and *iso*dodecyltolyl polyethylene glycol ethers. H. A. P.

[Preparation of] phosphoric esters of fatty acid monoglycerides. B. R. Harris (U.S.P. 2,026,785, 7.1.36. Appl., 8.1.34). Non-nitrogenous salts of the mixed phosphoric fatty acid esters of polyhydroxy-compounds are claimed as wetting etc. agents. Methods of prep. are indicated. Examples are $(NH_4)_2$ glycerol αα′-dihexoyl β-phosphate, Na_2 ββ′-stearoxyethoxyethyl phosphate, Na_2 sorbitol 1-melissate 6-phosphate, etc. R. S. C.

Preparation of α-methylacrolein [α-methylacraldehyde]. Röhm & Haas A.-G. (B.P. 457,174, 12.5.36. Ger., 18.5.35).—β-Methylallyl alcohol is oxidised with SeO_2 (in $C_6H_{13}{\cdot}OH$ at the b.p.) or H_2SeO_3 (in dioxan at 90°); the yields claimed are 51·3 and 59% of theory. H. A. P.

Manufacture of glyoxal semiacetals. H. Fischer (B.P. 458,000, 2.3.36. Switz., 2.3.35).—A compound containing $\vdots C(OH){\cdot}CH(OH){\cdot}CH(OR)_2$, where R is a hydrocarbon residue, preferably alkyl or aralkyl, is oxidised with an agent proposed for the splitting of α-glycols, particularly an org. Pb^{IV} salt, whereby fission occurs between the C atoms carrying the OH groups. *E.g.*, glyceraldehyde Et_2 acetal with $Pb(OAc)_4$ in C_6H_6 yield *glyoxal semi-Et_2 acetal* (b.p. 43—44°/11 mm.) and CH_2O. (Cf. A., 1935, 733.) E. J. B.

Manufacture of ketones. F. M. Archibald and C. M. Beamer, Assrs. to Standard Alcohol Co. (U.S.P. 2,028,267, 21.1.36. Appl., 5.4.33).—Dehydrogenation of *sec.*-alcohols to ketones in the vapour phase by brass catalyst at 400—600° is more readily effected and the catalyst rendered more resistant to S corrosion by incorporating 1—2% of Sn, Cr, or Ni. Removal of polymerides and S impurities from the alcohol feed by passage through a baffle chamber is recommended. *E.g.*, *sec.*-$C_6H_{13}\cdot OH$ is converted (feed rate 6·5 gals./hr., 75% yield) into ketone on passing over a catalyst (Cu 60, Zn 38·5, Sn 1·5%; chamber 7 × 36 in., depth 18 in.) at 475—485°. A. H. C.

Manufacture of halogenoalkylamines or their salts. COUTTS & Co., and F. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 456,338, 3.5.35).—Salts of hydroxyalkylamines are caused to interact with thionyl halides ($SOCl_2$ in an inert diluent, *e.g.*, $CHCl_3$) (cf. A., 1935, 849). H. A. P.

Solvent-recovery device. G. A. MOTT and (A) C. C. JONES, (A) Assr. to H. S. LYNN (U.S.P. 2,032,299, 25.2.36. Appl., 11.12.34).—Dry-cleaner's sludge (*e.g.*) is treated with steam at a low temp., and the condensed steam with any H_2O originally present is allowed to rise to another compartment, carrying with it bubbles of solvent. After scrubbing with clean H_2O to ensure complete condensation of solvent, the liquids are separated by settlement. B. M. V.

Manufacture of polymeric products derived from aromatic vinyl hydrocarbons. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 456,359, 8.5., 14.5., 12.7., and 25.7.35).—Aromatic vinyl hydrocarbons are polymerised by acid catalysts, *e.g.*, $SnCl_4$ or borofluoroacetic acid (I), in presence of phenols or their simple or complex ethers (usually 8—12 mols.). The properties of the product vary with the nature and amount of phenol or ether; small amounts give solid "artificial resins," sol. in lacquer benzines, turpentine, and drying or non-drying oils; larger amounts give oils useful as softeners or intermediates. Products from phenols with a free *p*-position are also sol. in polymerised linseed and wood oil, and are used for lacquers and as adjuvants to cellulose derivatives, chlorinated rubber, etc. Examples are the products given by styrene (100) and small amounts of $SnCl_4$ or (I) with PhOH (10) in light petroleum (II) (50), *p*- or *m*-cresol (10) in CCl_4 (100—120), guaiacol (10) in CCl_4 (150), PhOH (100) in CCl_4, $(2\text{-}OH\cdot C_6H_4\cdot)_2$ (11) in (II) (50), PhOMe (16·6) in CCl_4 (80), PhOEt (11·6) in CCl_4 or (II) (80), *m*-cresol (12·5) in (II) (40—50), *m*-4-xylenol (10) in CCl_4 or (II) (50—75), *m*-$C_6H_4(OMe)_2$ (13·2) in C_6H_6 (80), $OPh\cdot[CH_2]_2\cdot OH$ (13·3) in CCl_4 (83), *m*-$C_6H_4Me\cdot OMe$ [123 alone or 12 in CCl_4 (80)], $OPh\cdot CH_2\cdot CH(OH)\cdot CH_2\cdot OH$ (20) in CCl_4 (120), β-$C_{10}H_7\cdot O\cdot C_5H_{11}$ (20) in CCl_4 or C_6H_6 (75), *m*-$C_6H_4Me\cdot O\cdot CH_2\cdot CO_2Et$ (20) in CCl_4 (75), *o*-$C_6H_4Me\cdot OMe$ (133) in C_6H_6 or CCl_4 (120), crude $C_6H_4Me\cdot OEt$ (131) alone, or $(OPh\cdot CH_2)_2CH\cdot OH$ (24) in CCl_4 (80 pts.). $C_6H_4(CH{:}CH_2)_2$ (100) with crude cresol (151) and (I) (3) in CCl_4 (100) or β-$C_{10}H_7\cdot OEt$ (128) and $SnCl_4$ (3) in CCl_4 (117 pts.) gives similar products. Reaction temp. are usually raised finally to 90°. R. S. C.

Reacting alkali metals with aromatic hydrocarbons. N. D. SCOTT, Assr. to E. I. DU PONT DE NEMOURS & Co., INC. (U.S.P. 2,027,000, 7.1.36. Appl., 19.10.32).—Reaction is accelerated by using as solvent a Me aliphatic ether which is stable to Na and in which the O : C ratio is $1 : \not> 4$. Certain cyclic ethers are also suitable. Simultaneous passage of CO_2 gives the carboxylic acids and regenerates Na. $C_{10}H_8$ reacts the faster, the lower is the mol. wt. of the ether; reaction may be started in Me_2O and continued after addition of another ether. Suitable ethers are Me_2O, dioxan, glycerol Me_3 ether, dimethylenepentaerythritol, MeOEt, $MeOPr^{\alpha}$, $MeOPr^{\beta}$, $CH_2(OMe)_2$, $(CH_2\cdot OMe)_2$, $(\cdot CH_2\cdot O\cdot)_2CH_2$, $OH\cdot CH_2\cdot CH(OH)\cdot CH_2\cdot O\cdot CH_2\cdot OMe$. Examples are: reaction of $C_{10}H_8$ with Na, K, and Li, and of Ph_2, anthracene, and phenanthrene with Na. R. S. C.

[Manufacture of] intermediates for secondary alkylated rhodamine dyes [alkyl-*m*-aminophenols]. L. P. KYRIDES, Assr. to NAT. ANILINE & CHEM. Co., INC. (U.S.P. 1,981,516, 20.11.34. Appl., 1.12.28).—A primary arylamine of the C_6H_6 series, *e.g.*, *o*-toluidine, is monoalkylated with a *sec.*-alkyl halide $> C_3$, sulphonated, and fused with alkali. C. H.

Manufacture of 3 : 6-dihalogeno-2 : 4-dinitroanilines. CHEM. WORKS FORMERLY SANDOZ (B.P. 457,518, 12.11.35. Switz., 24.11.34 and 9.8.35).—2:5-Dihalogeno- (Cl- or Br-)4-nitroanilines and H_2SO_4–HNO_3 (*d* 1·54) at $<0°$, 2 : 5-dihalogeno(alkyl)-sulphonanilides with HNO_3 (*d* 1·4) alone, or 2 : 5-dihalogeno(aryl)sulphonanilides with HNO_3 (*d* 1·54) alone at elevated temp. give the 4 : 6-$(NO_2)_2$-derivatives. 2 : 5-Dihalogeno(aryl)sulphonanilides with HNO_3 (*d* 1·4) give the NO_2-compounds. 3 : 6-Dihalogeno-4-nitroanilines and HNO_3 (*d* 1·54) alone, preferably at $<10°$, give the nitroamines, converted by H_2SO_4 into the 2 : 4-$(NO_2)_2$-compounds. The nitrosulphonanilides are hydrolysed by H_2SO_4 (*d* 1·33; 3 pts.) at 80° to the dinitroanilines. Examples are the prep. of 3 : 6-*dichloro*-2 : 4-*dinitroaniline*, m.p. 168°, -4 : N-*dinitroaniline*, -2 : 4-*dinitromethanesulphonanilide*, m.p. 172°, and -2 : 4 : 3′-*trinitro*-4′-*methylbenzenesulphonanilide*, m.p. 208°, and 3 : 6-*dibromo*-2 : 4-*dinitroaniline*, m.p. 155°. R. S. C.

Manufacture of 3 : 4′-dinitro-4-amino-6-methyldiphenylamine. I. G. FARBENIND. A.-G. (B.P. 457,535, 4.6.35. Ger., 28.11.34).—3-Nitro-6-methyl-*p*-phenylenediamine (30) heated with 4 : 2-$NO_2\cdot C_6H_4Cl\cdot SO_3Na$ (68), $CaCO_3$ (15), and H_2O (250 pts.) at 140° gives *Ca* 3 : 4′-*dinitro*-4-*amino*-6-*methyldiphenylamine*-2-*sulphonate*, hydrolysed by 78% H_2SO_4 (10 pts.) at 60—100° to 3 : 4′-*dinitro*-4-*amino*-6-*methyldiphenylamine*, m.p. 221°. R. S. C.

Manufacture of secondary aromatic amines. W. L. SEMON, Assr. to B. F. GOODRICH Co. (U.S.P. 2,029,642, 4.2.36. Appl., 23.6.33. Cf. U.S.P. 1,942,838; B., 1934, 921).—Salts of phenols with primary arylamines, prepared by pptg. one component with the other in aq. solution, yield *sec.* amines on heating to 250—300°. The internal condensations of the salts of *p*-$C_6H_4(NH_2)_2$ with β-$C_{10}H_7\cdot OH$ (yielding dinaphthyl-*p*-phenylenediamine), and of *p*-$C_6H_4(OH)_2$ with NH_2Ph (I) (yielding *p*-phenylaminophenol or, with excess (I), diphenyl-*p*-phenylenediamine) are specifically claimed. A. H. C.

[Preparation of] cumylphenol [4-hydroxy-ββ-diphenylpropane]. E. C. BRITTON and L. F. MARTIN, Assrs. to DOW CHEM. Co. (U.S.P. 2,028,043, 14.1.36. Appl., 13.2.34).—4-*Hydroxy*-ββ-*diphenylpropane*, m.p. 73—75°, b.p. 182°/9 mm., which is claimed to be a germicide, insecticide, and intermediate for synthetic resins, is prepared by a Friedel–Crafts condensation of $CPhMe{:}CH_2$ or "cumyl chloride," $CPhMe_2Cl$ (I), with PhOH (II). *E.g.*, (I) (0·94 mol.) is heated with (II) (3 mols.) and $AlCl_3$ (0·23 mol.) at 40°. H. A. P.

Chlorination of phthalic anhydride. M. N. Dvornikoff, Assr. to Monsanto Chem. Co. (U.S.P. 2,028,383, 21.1.36. Appl., 12.6.33).—o-$C_6H_4(CO)_2O$ (I) is treated with Cl_2 in presence of Fe or a Fe^{III} salt. *E.g.*, 70 pts. of (I) with 1 pt. of $FeCl_3$ is treated with Cl_2 over 72 hr. while raising the temp. from 160° to 260°, giving, after freeing from Fe by dissolution in alkali and acidification, tetrachlorophthalic acid in almost quant. yield. Cl- (yield 75%), Cl_2-, and Cl_3-derivatives of (I) may be isolated by interrupting the chlorination and fractionally distilling. A. H. C.

Preparation of benzoyl persulphide. T. H. Rider and R. Shelton, Assrs. to W. S. Merrell Co. (U.S.P. 2,028,246, 21.1.36. Appl., 2.8.34).—A mixture of BzCl and aq. NaSH is oxidised (O_2) below 10° and crude Bz_2S_2 (I) allowed to settle at 30°, a further quantity being obtained by acidification and re-oxidation. The product is purified by dissolution in a solvent ($CHCl_3$, CCl_4) miscible with MeOH or EtOH, but not with H_2O, impurities are removed by alkali-washing, and pure (I) (yield 80%) is pptd. with MeOH or EtOH and dried at <60°. A. H. C.

Manufacture and application of substances having capillary activity. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 455,379, 15.1.35).—Aromatic compounds having a hydrocarbon side-chain terminated by CO_2H, SO_3H, substituted NH_2, or quaternary NH_4 are alkylated (in the nucleus) by interaction with $\nless 2$ mols. of an aliphatic alcohol having $\nless C_3$ or a derived olefine or halide in presence of an acid condensing agent; further, a polyalkylated aromatic carboxylic chloride (obtainable as above) may be condensed with a hydroxy- or amino-alkanesulphonic acid or the H_2SO_4 ester of a hydroxyalkylamine. *E.g.*, $CH_2Ph{\cdot}CO_2H$ (68 pts.) is condensed with $Bu^{a}OH$ (148 pts.) in H_2SO_4 (300 pts.) at 50—60° for 15 hr.; the product is a mixture of di- and tri-*iso*butylphenylacetic acids, and is claimed to have detergent properties; a fraction of this product, b.p. 184—190°/3 mm., which is stated to be mainly $C_6H_2Bu^{\beta}_3{\cdot}CH_2{\cdot}CO_2H$ (I) is converted into its chloride, and this is condensed with $OH{\cdot}C_2H_4{\cdot}SO_3Na$ and $NHMe{\cdot}C_2H_4{\cdot}SO_3Na$ to give scouring agents for textiles which are stable in hard H_2O. In other examples, (I) is converted into the nitrile, which is reduced to β-tri*iso*butylphenylethylamine; this is converted by Me_2SO_4 into quaternary NH_4 salt or is condensed with $CH_2Cl{\cdot}CO_2H$ and the product methylated (MeCl and alkali) to methyl-β-tri*iso*butylphenylethylamino-acetic acid and the derived betaine. Other aromatic starting materials exemplified are $CH_2Ph{\cdot}SO_3Na$, $CH_2Ph{\cdot}CH_2{\cdot}CO_2H$, α-$C_{10}H_7{\cdot}CH_2{\cdot}CO_2H$, δ-phenyl-*n*-valeric acid, and $CH_2Ph{\cdot}NEt_3Cl$; other alkylating agents are PrOH, *iso*hexyl alcohol, *iso*heptene, and dodecene. H. A. P.

Production of (A) esters of *N*-*p*-aminoaryl-carbamic acids, (B) [esters of] *N*-*p*-aminoaryl-carbamic acids. R. E. Etzelmiller, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,026,618–9, 7.1.36. Appl., [A, B] 18.7.34).—(A) Alkyl or aralkyl 4-amino-2-alkoxy-, -2 : 5-dialkoxy- (I), or -2-alkoxy-5-alkyl-carbamates (II) are produced by condensing the appropriate nitroarylamine with an alkyl or aralkyl chloroformate (III) and reducing the product. (B) (I) and (II) are prepared by condensing a 2 : 5-dialkoxy- or a 2-alkoxy-5-alkyl-aniline with (III), nitrating, and reducing. The following appear to be new: *Me*, m.p. 122—124°, and β-*methoxyethyl 4-amino-2 : 5-dimethoxyphenylcarbamate*; *Me 6-amino-4-methoxy-*p*-tolylcarbamate*, m.p. 97—99°; *Me*, m.p. 103°, *Et*, m.p. 101—102°, Pr^{β}, m.p. 92—96°, Bu^{a}, m.p. 75—78°, and *benzyl 4-amino-2 : 5-dimethoxyphenylcarbamate*, m.p. 103—106°; Me 4-*nitro*-, m.p. 136—137°, and 4-*amino-*o*-anisylcarbamate*.
H. A. P.

Manufacture of diamides and imides of [aromatic] dicarboxylic acids. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 456,070, 7.5.35).—Polynuclear compounds containing at least one aromatic radical are caused to interact with $\nless 2$ equivs. of a carbamyl (I) or an alkylcarbamyl chloride and $\nless 2$ equivs. of a Friedel–Crafts condensing agent ($AlCl_3$). *E.g.*, Ph_2 with the additive compound of (I) and $AlCl_3$ (cf. B.P. 449,100; B., 1936, 824) in $C_6H_4Cl_2$ at 60—140° gives $4:4'$-$({\cdot}C_6H_4{\cdot}CO{\cdot}NH_2)_2$. Other examples describe the prep. of acenaphthene-5 : 6-dicarboxylimide, fluorenedicarboxydiamide, m.p. 292°, stilbene-, m.p. 322—323°, diphenylene oxide-, m.p. 307—308°, chrysene-, carbazole-, pyrene-, and fluoranthrene-dicarboxydiamide, and *diphenyl-4 : 4'-dicarboxybismethylamide*, m.p. 321°. H. A. P.

Manufacture of sugar derivatives of 1 : 2-diamino-4 : 5-dimethylbenzene [4 : 5-diamino-*o*-xylene]. F. Hoffmann–La Roche & Co. A.-G. (B.P. 457,178, 29.7.36. Ger., 23.8.35).—3 : 4-Dimethylphenylamino-pentites or -hexites are coupled with a diazonium salt and the products are reduced. *E.g.*, 3-*o*-xylylarabinamine is coupled with p-$NO_2{\cdot}C_6H_4{\cdot}N_2Cl$, and the *product* is reduced with H_2–Ni at 100°/25 atm. to give the 4-NH_2-*derivative*; *4-amino-3-ribamino-*o*-xylene* is similarly prepared. (Cf. B.P. 445,405, B., 1936, 684.) H. A. P.

Preparation of protocatechualdehyde. M. S. Carpenter and E. C. Kunz, Assrs. to Givaudan–Delawanna, Inc. (U.S.P. 2,027,148, 7.1.36. Appl., 26.5.34).—Fission of heliotropin to protocatechualdehyde in presence of an aromatic hydrocarbon is best effected in a chlorinated aliphatic solvent. The prep. (95% yield) in $(CH_2Cl)_2$ in presence of PhMe is described. R. S. C.

Manufacture of nitrogenous aromatic aldehydes. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 456,534, 11.5.35).—(*tert.*-)Halogenoalkylarylamines or the corresponding OH-compounds are condensed with *tert.* formamides and S or P halides or oxyhalides to give the corresponding aldehydes, the halogen in which is then (optionally) replaced by OH, OAlk, NH_2, SO_3H, etc. *E.g.*, methyl-β-hydroxyethylaniline is heated with $POCl_3$ at 90° and cooled to 0°, $NPhMe{\cdot}CHO$ and further $POCl_3$ in C_6H_6 are added, and the mixture is then heated at 30—

35° to give p-*methyl*-β-*chloroethylaminobenzaldehyde* (I), m.p. 70°. p-*Butyl*-β-*chloroethyl*-, p-*di*-β-*chloroethyl*- (II), m.p. 88·5°, p-*anilino*-β-*chloroethyl*-, o-*chloro*-p-*butyl*-β-*chloroethyl*-, m.p. 51°, p-*methyl*-β-*sulphoethyl* [*Na* salt; from (I) and Na_2SO_3 in H_2O at 180—200°], p-*methyl*-β-*chloropropyl*-, p-*methyl*-β-*bromoethyl*-, m.p. 78°, p-*methyl*-β-*diethylaminoethyl*-, m.p. 198°/8 mm., and p-*methyl*-β-*methoxyethyl-aminobenzaldehyde*, b.p. 168—170°/7 mm.; p-*morpholinobenzaldehyde*, m.p. 66—67° [from (II) and Na_2CO_3 in aq. EtOH]; 5-*ethyl*-β-*chloroethyl*-o-*tolualdehyde*, m.p. 54°, and 4-*ethyl*-β-*chloroethyl*-1-*naphthaldehyde*, m.p. 176° (decomp.), are similarly prepared. H. A. P.

Manufacture of morpholine and homologues thereof. Carbide & Carbon Chemicals Corp., Assees. of A. L. Wilson (B.P. 457,481, 30.5.35. U.S., 12.7.34).—$(CH_2Cl{\cdot}CH_2)_2O$ and 1 mol. of NH_3 give only a little morpholine (I) and much di-(β-*N*-morpholinoethyl) ether and bismorpholinium chloride (decomposed by alkali into β-*N*-morpholinoethyl vinyl ether). Good yields of (I) are obtained by use of an excess (5—20 mols.) of NH_3 in H_2O or other non-reactive solvent, preferably at 60—90°/50—100 lb. per sq. in. Examples of various procedures are given, differing mainly in the method of separation of the (I) from the aq. solution; in general, salting out by NaOH is preferred. Other ββ′-dihalogeno-ethers react similarly; thus $(CHMeCl{\cdot}CH_2)_2O$ gives 2 : 6-dimethylmorpholine, b.p. 145—150°. R. S. C.

Preparation of [arylene]thiazyl monosulphides. J. Teppema, Assr. to Wingfoot Corp. (U.S.P. 2,028,082, 14.1.36. Appl., 29.7.33).—The interaction of a 1-thiol- with a 1-halogeno-arylenethiazole is claimed. *E.g.*, 1-chloro- and 1-thiol-benzthiazole (Na salt) when heated at 225—230° give 1 : 1′-dibenzthiazyl sulphide, m.p. 98—99° and 145°; the corresponding 4 : 4′-$(NO_2)_2$-compound, m.p. 276—278°, is similarly prepared. H. A. P.

Manufacture of 4-alkyl-5-hydroxyalkylthiazoles. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 456,751, 13.5.35).—An α-halogeno-α-hydroxyalkyl ketone (I) or its ester or ether is condensed with a salt of HSCN [or derivatives formed by addition of H_2O, H_2S, NH_3, or alkylthiols, *e.g.*, thiocarbamide, xanthamide (II), $HCS{\cdot}NH_2$], the resulting product is cyclised, and the 2-OH (where present) is reduced to H through the 2-Cl-compound. Instead of (I) corresponding halogenoketones in which the OH is replaced by CO_2H or NH_2 may be used, and the final products are converted into hydroxyalkyl compounds by known means, *e.g.*, Bouveault–Blanc reduction, Hofmann or Curtius reaction, action of HNO_2. *E.g.*, β-acetopropyl acetate is brominated (Br–Et_2O) and the product is heated with $Ba(SCN)_2$ (III) in EtOH; the crude product is cyclised by H_2SO_4 in AcOH at 90—100° to 2-*hydroxy*-5-*methyl*-4-*acetoxyethylthiazole*, m.p. 87°, the 2-*Cl*-compound corresponding ($POCl_3$ at the b.p.), b.p. 104°/0·2 mm., being reduced by Zn–abs. AcOH to the *Ac* compound (*picrate*, m.p. 133°) of 5-*methyl*-4-β-*hydroxyethylthiazole* (IV), b.p. 135°/7 mm. (*picrate*, m.p. 164°). Alternatively, Et γ-acetobutyrate is brominated as above and converted by (III) followed by cyclisation with 10% H_2SO_4–EtOH at the b.p. or by heating with (II) and KOAc at 60—70°, into 2-hydroxy-, which with $POCl_3$ gives *Et* 2-*chloro*-5-*methylthiazolyl*-4-*propionate*, b.p. 148—150°/7 mm.; this is reduced (Zn–AcOH) to *Et* 5-*methylthiazolyl*-4-*propionate*, b.p. 130—132°/7 mm., from which 5-*methyl*-4-β-*aminoethylthiazole* (V), b.p. 103°/7 mm. (*picrate*, m.p. 227°; *hydrochloride*, m.p. 246°), is obtained *via* the *amide*, m.p. 96°, or hydrazide. Interaction of (V) with HNO_2 gives (IV). *Et* 2-*hydroxy*-, m.p. 97°, 2-*chloro*-, b.p. 132°/8 mm., and 2-*amino*-5-*methyl*- (B,*HCl*, m.p. 153°; B,*HBr*, m.p. 170°), and 5-*methyl-thiazolyl*-4-*acetic acid*, b.p. 123°/8 mm.; 2-*hydroxy*-5-*methyl*-4-β-*bromoethylthiazole*, m.p. 170°; and 2-*hydroxy*-5-*methyl*-, m.p. 148°, 2-*chloro*-5-*methyl*-, and 5-*methyl*-4-β-*benzoyloxyethylthiazole* (*picrate*, m.p. 189°) are described. H. A. P.

[Preparation of] intermediates and dyes of the anthraquinone series. D. P. Graham, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,028,104, 14.1.36. Appl., 28.10.33).—Interaction of 6-amino-1-benzamidoanthraquinone with $CPhCl_3$ and S in $C_{10}H_8$ at 220° gives 1-*benzamidoanthraquinone*-5 : 6-(4′ : 5′)-*phenylthiazole* (4 : 5-2′-benzamidophthaloyl-1-phenylbenzthiazole), a yellow vat dye. The corresponding NH_2-compound (80—100% H_2SO_4 at 80—100°) is condensed with anthraquinone-2-, anthra*iso*thiazole-2-, and 1-nitroanthraquinone-2-carboxyl chloride, and 5-chloro-1-benzamidoanthraquinone to give yellow vat dyes. H. A. P.

Preparation of (A) benzanthronethiazoles, (B) benzanthroneselenazoles. A. J. Wuertz and M. S. Whelen, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,028,114 and 2,028,116, 14.1.36. Appl., [A, B] 29.4.33).—The benzanthrone synthesis is applied to (A) anthraquinone-1 : 2-(4′ : 5′)-thiazoles, and (B) -1 : 2-(4′ : 5′)-selenazoles. *E.g.*, 2′-phenylanthraquinone-1 : 2-thiazole or -selenazole is heated with glycerol and Fe in 82% H_2SO_4 at 112—120° to give weak yellow vat dyes. Other examples start from anthraquinone-1 : 2-thiazole or -selenazole (the conditions are identical in the two cases) and their 2′-Me, 2′-β-anthraquinonyl, 2′-bromophenyl, and 2′-chlorophenyl derivatives. H. A. P.

C_2H_2. Separating mixed [hydrocarbon] gases. Recovering phenols.—See II. **HCO_2K. Xanthates.**—See VII. **β-Chloro-$\Delta^{\alpha\gamma}$-butadiene.**—See XIV.

IV.—DYESTUFFS.

Substantive dyes and the theory of substantivity. P. Ruggli (Bull. Soc. chim., 1936, [v], 3, 2165—2171).—A lecture.

Textile dyes.—See III. **Dyes for printing ink.**—See XIII. **Colouring Dutch cheese rind.**—See XIX. **Toxic dusts and fumes.**—See XXIII.

See also A., II, 7, **Anthraquinone colouring matters.** 13, **$NaHSO_3$ compounds of azo dyes.** 37, **Synthesis of cyanine dyes of the *peri*naphtho-*m*-thiazine series.**

Patents.

Manufacture of azo dyes. I. G. Farbenind. A.-G. (B.P. 451,665, 8.2.35. Ger., 9.2.34).—An *o*-aminoazo dye, $Ar{\cdot}N_2{\cdot}Ar'{\cdot}NH_2$, in which Ar may carry a further azo group, is nitroaroylated and the NO_2 reduced to NH_2; nitroaroylation and reduction may be repeated. The products may be diazotized and coupled in substance or on the fibre; if the last coupling component is a suitable arylamine the nitroaroylation, reduction, and coupling may be repeated. Examples are: 2-aminoazobenzene-3′-sulphonic acid (I) with *p*-$NO_2{\cdot}C_6H_4{\cdot}COCl$ (II), reduced with Na_2S, with (II) [yellow; → 1-phenyl-3-methyl-5-pyrazolone (full yellow), or β-$C_{10}H_7{\cdot}OH$ (III) (orange)]; (I) with (II), reduced, → *p*-aminobenzoyl-J-acid [orange-red; → (III) (reddish-orange)]; dye from 2 : 4 : 8-$NO_2{\cdot}C_{10}H_5(SO_3H)_2$ and *o*-$C_6H_4(NH_2)_2$, with (I), reduced, → *m*-aminobenzoyl-*m*-aminobenzoyl-J-acid [yellow; → (III) (yellower)]. C. H.

Manufacture of [azo] dyes [for wool or acetate silk]. Soc. Chem. Ind. in Basle (B.P. 451,970, 25.3.35. Switz., 24.3.34 and 14.3.35).—A *p*-nitro- or *p*-acylamino-arylamine of the C_6H_6 series carrying in *o*-position SO_2R (R = alkyl or aralkyl) is diazotised and coupled with an arylamine of the C_6H_6 or $C_{10}H_8$ series. The NO_2 may be reduced to NH_2 and acylated. Examples are: 5-nitro-2-aminophenyl ethyl sulphone → $NPhEt(C_2H_4{\cdot}OH)$ (violet-red on acetate silk); 5-nitro-2-aminophenyl methyl sulphone (I) → *NN*-di-(β-methoxyethyl)cresidine (violet); (I) → 1 : 5-$NH_2{\cdot}C_{10}H_6{\cdot}OH$ in acid (greenish-blue); 5-nitro 2-aminophenyl benzyl sulphone → γ-acid (II) (blue on wool); 2-amino-5-acetamidophenyl ethyl sulphone → (II) (bluish-red on wool). C. H.

Dye mixtures [for acetate silk]. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 452,421, 15.2.35).—A 1 : 4-diaminoanthraquinone (I), $C_6H_4(CO)_2C_6H_2(NHR){\cdot}NHR'$, where R and R′ are the same or different alkyl, hydroxyalkyl, chlorohydroxyalkyl, *cyclo*alkyl, or aralkyl groups, and the C_6H_4 may carry 1 or 2 OH, NH_2, NHAlkyl, or NO_2 substituents, is mixed with another similar 1 : 4-diaminoanthraquinone in which R or R′ is not the same as in (I). Greater solubility and tinctorial power are obtained than with the single diamines. C. H.

[Manufacture of acid] anthraquinone dyes. Imperial Chem. Industries, Ltd., N. H. Haddock, F. Lodge, and C. H. Lumsden (B.P. 452,203, 14.11.34).—One halogen in a 2 : 3-dihalogeno-1 : 4-diaminoanthraquinone is replaced by $R{\cdot}C_6H_4{\cdot}O{\cdot}$, $R{\cdot}O{\cdot}C_6H_4{\cdot}O{\cdot}$, $R{\cdot}S{\cdot}C_6H_4{\cdot}O{\cdot}$, $R{\cdot}C_6H_4{\cdot}S{\cdot}$, $R{\cdot}O{\cdot}C_6H_4{\cdot}S{\cdot}$, or $R{\cdot}S{\cdot}C_6H_4{\cdot}S{\cdot}$ [R = alkyl (C_4 — C_7)], and the other halogen by such a group or by $R{\cdot}S{\cdot}$, and the product is sulphonated; the anthraquinone and/or C_6H_4 may carry Me, Cl, or Br. Examples are: Na 2-chloro-1 : 4-diamino-3-thiolanthraquinone (cf. B.P. 387,765; B., 1933, 341) with Bu^aBr (I), then with *p*-$C_6H_4Bu^a{\cdot}ONa$ (II), and sulphonated (violet); 2 : 3-dichloro-1 : 4-diaminoanthraquinone (III) with 2 mols. of *p*-*iso*-$C_5H_{11}{\cdot}O{\cdot}C_6H_4{\cdot}SH$ and the product, m.p. 154°, sulphonated (blue); (III) with 1 mol. of (II), then with Na_2S_2, alkylated with (I), and sulphonated (violet). C. H.

Manufacture of [chromable acid] dyes of the anthraquinone series. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 452,424, 16.2.35).—Anthraquinones containing in position 1 OH or NHR (R = H, alkyl, or aryl) and in position 4 $NH{\cdot}Ar(OH){\cdot}CO_2H$ (Ar = aromatic residue, CO_2H being *ortho* to OH), and carrying $\nless 1$ SO_3H external to the anthraquinone nucleus, give on chroming or after-chroming fast green to grey shades on wool. Examples are: leucoquinizarin (I) with 1 mol. of Me 5-aminosalicylate, hydrolysed to acid, m.p. 30° (decomp.), and sulphonated (bluish-violet; + Cr, greenish-grey); (I) with Me 3-aminosalicylate, hydrolysed to acid, m.p. 298° (decomp.), sulphonated (+ Cr, green); 1-chloro-4-aminoanthraquinone (II) with 5-aminosalicylic acid (III) [product, m.p. 267° (decomp.)], sulphonated (+ Cr, grey); (II) with 3-aminosalicylic acid (IV) [product, m.p. 257° (decomp.)], sulphonated (+ Cr, green); 1-bromo-4-methylaminoanthraquinone (V), with (III) [product, m.p. 242—243° (decomp.)], sulphonated (+ Cr, grey); (V) with (IV) [product, m.p. 276° (decomp.)], sulphonated (+ Cr, green); 1-bromo-4-hydroxyanthraquinone-3-sulphonic acid (VI) with (III), desulphonated [product, m.p. 307° (decomp.)], sulphonated (+ Cr, grey); (VI) with (IV), desulphonated [product, m.p. 298° (decomp.)], sulphonated (+ Cr, green); 1-bromo-4-aminoanthraquinone-3-sulphonic acid (VII) with (III), desulphonated [product, m.p. 267° (decomp.)], sulphonated (+ Cr, grey); (VII) with (IV), desulphonated [product, m.p. 257° (decomp.)], sulphonated (+ Cr, green); the use of aminosulphosalicylic acids in place of (III) or (IV) makes sulphonation of the product unnecessary; (VI) with 4-amino-4′-hydroxy-3′-carboxy-5′-methyldiphenylmethane, desulphonated [product, m.p. 248° (decomp.)], sulphonated (bluish-violet; + Cr, greyish-blue). C. H.

Production of halogenated indanthrenes. J. Ogilvie, Assr. to Nat. Aniline & Chem. Co., Inc. (U.S.P. 2,026,647, 7.1.36. Appl., 3.5.30).—Indanthrene is treated with Cl_2 (for preference) or Br in (di)chlorobenzene at $\ngtr 40°$ (15—30°) and the product is reduced to the dihydroazine ($FeSO_4$–H_2SO_4). H. A. P.

Manufacture of mordant dyes [of the azine series]. Durand & Huguenin A.-G. (B.P. 452,346, 5.9.35. Ger., 5.9.34).—A suitable *p*-nitrosoarylamine is condensed in presence of mineral acid and an org. diluent with the product obtained by removal of the aminosalicylic acid from the condensation products of B.P. 437,798 (B., 1936, 92), or with the condensation products themselves. Examples are: product from 2 : 8-$OH{\cdot}C_{10}H_6{\cdot}SO_3H$ or R-acid and 5-aminosalicylic acid, boiled with 95% EtOH, condensed with nitrosoethyl-*o*-toluidine in aq. HCl (chrome-printed, bluish-red). C. H.

Manufacture of dyes of the dioxazine series. I. G. Farbenind. A.-G. (B.P. 452,033, 15.2.35. Ger., 15.2.34).—The products obtained by condensing 2 mols. of an aminoazo compound with chloranil (I) or other suitable *p*-benzoquinone, with or without sulphonation, are heated at >150° in a solvent, preferably in presence of an oxidant, a metal chloride, and/or an acylating agent, and, if desired, sulphonated. Examples are: (I) with 4-aminoazobenzene, in $PhNO_2$ with *m*-$NO_2{\cdot}C_6H_4{\cdot}SO_2Cl$, sulphonated (violet); (I) with benzeneazo-α-naphthylamine, in $PhNO_2$ with *p*-$C_6H_4Me{\cdot}SO_2Cl$ (blue pigment; sulphonated, green). C. H.

Production of anthrimide carbazole [vat] dyes [containing a benzacridone nucleus]. E. I. Du Pont de Nemours & Co. (B.P. 451,859, 12.2.35. U.S., 12.2.34).—A chloro- or amino-phthaloylacridone is condensed with an amino- or chloro-anthraquinone in $PhNO_2$, and the anthrimide, without isolation, is carbazolated with $AlCl_3$ in the $PhNO_2$. The product from trichlorinated 3 : 4-phthaloylacridone and 1 : 5-diaminoanthraquinone is a violet-brown vat dye. C. H.

Formation of leuco-compounds [of vat dyes]. L. S. Bake, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,027,144, 7.1.36. Appl., 27.2.30).—Vat dyes (indigo) are reduced to their leuco-compounds by treatment in aq. suspension (at 60—80°) in an inert atm. (CO_2) with a slight excess of Zn and a small amount of SO_2, ZnS_2O_4 being continuously regenerated as used by gradual addition of the calc. quantity of a non-oxidising inorg. acid (H_2SO_4). H. A. P.

Manufacture of sulphur dyes. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 452,007, 16.2.35).—A *p*-hydroxyphenylarylamine is sulphurised at high temp. (130—210°) and reaction is completed at atm. or raised pressure in presence of an alcohol of b.p. $>100°$, *e.g.*, BuOH. Preferably S and I are used in the first stage, and alkaline sulphide and the alcohol are then added. Examples are: *p*-hydroxyphenyl-β-naphthylamine (black), 4-hydroxy-4′-methyldiphenylamine (red-brown), and 5-β-naphthylaminosalicylic acid (black). C. H.

Manufacture of acid triphenylmethane dyes. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 451,937, 8.2.35).—A 3-*p*-chloro- or -*p*-alkoxy-benzoyl-1 : 2-substituted indole is condensed with a *sec.* or *tert.* aromatic or heterocyclic amine, the Cl or OR is replaced by NH·Ar·OAlk by reaction with a *p*-alkoxyarylamine, and the product is sulphonated. Sulphonation may be effected before the replacement of the Cl or OR. Examples are: 3-*p*-chlorobenzoyl-2-phenyl-1-methylindole, m.p. 158·5°, with *m*-$NEt(CH_2Ph){\cdot}C_6H_4Me$ and $POCl_3$, sulphonated, with *p*-$NH_2{\cdot}C_6H_4{\cdot}OEt$ (I) (reddish-blue on wool or silk); 3-*p*-anisoyl-2-phenyl-1-methylindole, m.p. 161·5—162°, with $NPhMe_2$, then with (I) and sulphonated (reddish-blue). C. H.

Intermediates for rhodamine dyes. Anthraquinone dyes. Benzanthrone-thi- and -selenazoles.—See III.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Mongolian sheep wool. I. Macroscopical, microscopical, and chemical investigations. M. Saito (Rep. Inst. Sci. Res., Manchoukuo, 1936, **1**, 29—62, 11—14).—Wool from a Mongolian fleece consists of coarse wool (including kemps) 22·2% (average diameter 60—95 μ), semi-coarse 8·6% (40—45 μ), and fine 69·2% (23—28 μ). Only the fine wool shows crimps. The no. of serrations per unit length increases with increasing fineness. Microscopical examination of all three types shows that coarse kempy wool contains a large % of medulla, and is extremely irregular in cross-section, whilst the fine wool is free from medulla, and round or elliptical in cross-section. Chemically the coarse wool contains less fat, H_2O, N, and S than the fine, but has a higher C content. S. G. S.

Oxidation of wool: alkali-solubility test for determining the extent of oxidation. M. Harris and A. L. Smith (J. Res. Nat. Bur. Stand., 1936, **17**, 577—583; cf. B., 1936, 827, 828).—Oxidising agents attack the disulphide groups of the cystine in wool, and increase the solubility of wool in alkaline solution. The latter can be used as a measure of the extent of oxidation, especially as a control in practical processes, *e.g.*, bleaching and chlorination, and as a measure of the extent of degradation of wool by photochemical reactions. A relation exists between the chemical and physical degradation of wool fibres. J. W. S.

Structure of straw, esparto, flax, and cotton fibres. R. Michel-Jaffard (Chim. et Ind., 1936, **36**, 879—887).—The micrographical characteristics and *X*-ray diagrams largely reveal characters grouping straw with esparto, and cotton with flax; the technical properties in paper-making, however, show similarities between straw and flax, which give dense, less permeable papers, and between esparto and cotton, which give soft, absorbent papers. Limiting concns. of Schweitzer solution are found, below which the liquid produces no appreciable deformations of the fibres, which accords with Sakurada's solubility curves (B., 1932, 1116). Just above these concns., however, the deformations produced show straw behaving as flax, with a radial periodicity (separation of layers longitudinally), and esparto as cotton, with axial deformation (alternate points of shrinking and swelling) which easily transforms into helicoidal forms. Above these concns. the effects are less marked, and various characters appear individually or together in all the fibres. The action of the more dil. solutions is considered to be the same in kind as that of H_2O, and agrees with technical results. A large no. of photomicrographs are given. J. L.

Determination of chlorine in the silk-rind of cocoons. G. Cola (Boll. uff. R. Staz. sperim. Seta, 1934, **4**, 81; Chem. Zentr., 1935, ii, 2472).—Cl′ is extracted with H_2O, fixed with alkali, and titrated. (Cf. A., 1936, 1403.) H. N. R.

Comparison of raw silk with the seriplan and the serimeter. I, II. G. Colombo and G. Baroni (Boll. uff. R. Staz. sperim. Seta, 1934, **4**, 53—56, 69—72; Chem. Zentr., 1935, ii, 2473).—The resistance of a no. of silks to tearing has been determined. H. N. R.

Detection of akon (akund) fibre in kapok. N. J. M. Vorstman (Chem. Weekblad, 1936, **33**, 746—747).—Colour reaction for akon fibres with phloroglucinol–HCl (cf. B., 1936, 405), safranine, etc. are unreliable. The fibres are best identified by microscopical examination of their cross-sections, which are always perfectly circular for kapok fibres. S. C.

Advances in the chemistry of lignin. E. Hägglund (Zellstoff u. Papier, 1936, **16**, 570—574).—A crit. survey of recent investigations. D. A. C.

Composition and method of anaylsis of lignified vegetable tissues. G. Bertrand (Ann. Off. nat. Comb. liq., 1936, **11**, 191—208).—The material, previously extracted with H_2O and EtOH, is refluxed for 5 hr. with 2% aq. NaOH and the solution filtered. The washed and dried ppt. represents cellulose and vasculose. The unattacked cellulose, remaining after treating the ppt. with Br–H_2O in the dark for 24 hr., is washed with H_2O and then with dil. aq. NH_3, dried, and weighed. A fresh sample is extracted for 48 hr. with 2% aq. NaOH, and the filtrate therefrom is treated with 90% EtOH to ppt. gum (xylan), which is washed with EtOH, dried in a vac., and weighed. The neutralised filtrate from the gum determination is evaporated to dryness by vac. distillation. The residue is extracted with sufficient H_2O to remove NaCl, dissolved in EtOH, evaporated on a water-bath, and weighed as lignol. R. B. C.

Constitution of cellulose and of wood. E. Coffari (Chim. e l'Ind., 1936, **18**, 565—567).—A review of recent work, mainly that of E. Schmidt and his co-workers. O. J. W.

Structure of wood and cellulose fibres. D. Krüger (Zellstoff u. Papier, 1937, **17**, 9—13).—Recent work on fibre structure and chemical composition of wood is reviewed. D. A. C.

Wood substances. V. Yield and properties of cellulose from Manchurian conifers. K. Nishida and R. Miyama (J. Cellulose Inst. Tokyo, 1936, **12**, 326—331; cf. B., 1936, 740).—Details are given of Na_2SO_3 cooks and of the properties of the resultant cellulose. A. G.

Lyophilic properties of cellulose and its derivatives. IV. Hydrophilic properties of electropositive cellulose fibres. V. Hydrophilic properties of electroneutral cellulose. K. Kanamaru and T. Nakamura (J. Soc. Chem. Ind. Japan, 1936, **39**, 338—346B, 346—350B; cf. B., 1936, 1034).—IV. When cellulose fibres are rendered electropositive by adsorption of $Al(OH)_3$ the hygroscopicity is diminished and the breakdown voltage increased. The best result is obtained by steeping in 17—18% NaOH, pressing between filter paper, steeping in 10% $Al_2(SO_4)_3$ for 3—4 hr. at 40° at a tension of 30% of the breaking stress, washing, and drying at 100—105°.

V. When the amount of $Al(OH)_3$ absorbed from aq. $AlCl_3$ increases, the ζ-potential rises through zero to positive vals.; the zero val. corresponds with a min. hygroscopicity and a max. breakdown voltage. A. G.

Measurement of the fluidity (or viscosity) of cotton in cuprammonium solution. D. A. Clibbens and A. H. Little (J. Text. Inst., 1936, **27**, T285—304).—A precise specification is given for a special viscosimeter for the determination of the η of cotton in cuprammonium; this is conveniently calibrated with $CH_2Ph{\cdot}CH_2{\cdot}OH$. The viscosimeter is divided by a third mark into two sections such that the time of flow in each section is the same for normal liquids. For cellulose solutions the time of flow in the first section, in which the head of liquid is greater, is $<$ that in the second, and the ratio of the two times is a measure of the deviation from Poiseuille's law. This ratio increases towards unity with decreasing concn. and with increasing modification of the cellulose in solutions of equal η. The presence of injurious chemicals in cotton goods is detected by measuring η before and after a standard heating treatment. This treatment results in definite changes of η when the cotton contains mineral or org. acids, the sulphates of Mg, NH_4, or Al, or the chlorides of Zn, Mg, or Ca. When only a min. wt. of cotton is available a rolling-sphere viscosimeter is used. This requires 0·01 g. of cotton dissolved in 2 c.c. of cuprammonium, and the η is measured by the time taken by a steel ball to roll between two marks when the viscosimeter is held at an angle of 20° to the horizontal. A. G.

Viscose. LXVII. Influence of temperature and duration of soaking on viscosity of viscose. G. Kita, S. Monden, and H. Ishikawa. **LXVIII. Influence of temperature on ripening of viscose. Experiments with viscose prepared from alkali-cellulose aged at room temperature or above.** G. Kita, S. Suehiro, S. Imamura, and M. Yamaguchi (J. Soc. Chem. Ind. Japan, 1936, **39**, 374—377B, 377—378B).—LXVII. When cotton was steeped in 18% NaOH for 1—6 hr. at 23° or 33° the η of the viscose prepared from it was a min. after 4 hr. steeping, at 45° the η was a max. after 2 hr., and at 55° it fell continuously with increasing duration of steeping. When the temp. was varied the η was a max. at 33° after 2 hr., but after 4 hr. the results were less simple.

LXVIII. The degree of ripening (Hottenroth no.) and the η are recorded for viscose prepared from alkali-cellulose aged at room temp. or at 55° and ripened at 18—24°. A. G.

Relation between the viscosity of cellulose acetates and the mechanical properties of dopes prepared from them. R. Shinoda and E. Inagaki (J. Cellulose Inst. Tokyo, 1936, **12**, 358—366).—The η of a 6% solution in $COMe_2$ of a mixture of cellulose acetates (I) is given by $\log\eta = ax + b$, where x is the fraction of the (I) of higher η and a and b are consts. No definite relations were found between the η of (I) and the strength of films prepared from them, or the tautness, strength, or resistance to beating of doped linen. High η imparted better resistance of the film to weathering. A. G.

Progress in artificial silk production. O. Faust (Z. Ver. deut. Ing., 1936, **80**, 981—988).—A comprehensive review. R. B. C.

Matt rayon. Titanium dioxide as a delustrant. C. L. Moore (Rayon Text. Month., 1936, **17**, 737—738, 791—792).—When delustrants are added to viscose before spinning, undue wear of the apparatus is avoided if the material is finely dispersed, is free from large particles, and is not hard. It is desirable to give TiO_2 an extra grinding with a part of the viscose before use. The calcining of the hydroxide must be so conducted that the structure of the TiO_2 becomes cryst. but its form remains amorphous; high n is thus obtained without hardness.

Other advantages of TiO_2 are that its colour is unaffected by S gases, it is opaque and non-poisonous, and has a low *d*, a fine texture, and great chemical stability. When TiO_2 or ZnO is used as an external delustrant in presence of glycerin, the latter becomes oxidised in light, and this leads to the fading of some dyes. A. G.

Bagasse. X. Phenol derivatives isolated from the waste acid of the nitric acid pulping process. Y. Hachihama and M. Ônishi (J. Soc. Chem. Ind. Japan, 1936, **39**, 362—363B).—The waste nitric acid (cf. B., 1936, 979) from rice and wheat straw, bamboo, and wood pulp contains 3-nitro- and 3 : 5-dinitro-4-hydroxybenzaldehyde, and 3-nitro-4-hydroxybenzoic acid, probably formed from lignin. J. L. D.

Effect of screening on the cleanliness of pulps. H. Alfthan (Zellstoff u. Papier, 1936, **16**, 497—502, 575—576).—The effectiveness in the elimination of dirt specks of Spangenberg, three-stage Biffar, and flat screens, with comparable slit or hole dimensions, are investigated under commercial conditions. The Biffar, in general, tend to give a cleaner stock than Spangenberg screens, although there is some variation in the amount of dirt passing through the various stages of Biffar screens. Flat screens give slightly better results than Biffar screens, although their effectiveness depends to some extent on the head of stock in the screen. Increasing the pressure in pressing both the test sheets used for the dirt counts and the pulp on the wet machine tended to increase the apparent dirt content by exposing particles lying near the surface. D. A. C.

Effect of wood density during sulphite digestion on yield and strength of the pulp. R. Sieber (Papier-Fabr., 1936, **34**, 478—483).—Investigation of the relation of wood-*d* and pulp yield for a variety of woods of different origin and varying *d* showed that in 54% of the determinations the heavier wood produced the greater yield (by an average of about 3%). The rate of fibre liberation, however, remains practically unaffected. Wood-*d* has practically no effect on the unbeaten strength of the pulp, except in the case of the tear, which is considerably higher initially with the denser wood, but finally approaches that of the lighter wood on prolonged beating. The burst and breaking length of unbeaten pulp, however, are similar with woods of all densities, but in the region of max. beaten strength, especially with the breaking length, the dense wood tends to give a higher strength. Wood-*d* has no effect on the wetness development during beating. D. A. C.

Bleaching of pulp during the year 1936. L. Rys and A. Bönisch (Zellstoff u. Papier, 1936, **16**, 577—581).—A review of the year's developments with references to the patent literature. D. A. C.

Control of pulp viscosity during bleaching. S. N. Pravdin (Zellstoff u. Papier, 1936, **16**, 581—583).—A rapid method of determining the cuprammonium-η of pulp is described. The η obtained by this method is compared with that obtained by the xanthate method, and conversion factors to compensate both for the differences between them and also for the differences between the η of the slush pulp and that of the dried pulp are deduced. They are considered to be sufficiently accurate for the rapid method to be used as a control of the bleaching operation. D. A. C.

Sodium hypochlorite bleaching of pulps for artificial silk. F. Komarov and I. Nagrodski (Zellstoff u. Papier, 1936, **16**, 502—504).—The effect on the chemical consts. of viscose pulp of $Ca(OCl)_2$ (I) and NaOCl (II) bleaching both in one and two stages are compared. Single-stage (I) and (II) give similar results, which are slightly improved on by two-stage (I). The best results are given by two-stage (II) bleaching, but in order to obtain a sufficiently high η of the pulp, the bleach liquor in the second stage must have an alkalinity of 0·056—0·080 g. of NaOH per litre. D. A. C.

Bleaching of rag half-stock by calcium hypochlorite. R. C. Crain (Paper Trade J., 1936, **103**, TAPPI Sect., 343—352).—A no. of operating variables have been studied. These include [OCl′], ratio of available Cl to cellulose, time of treatment, temp. over the range 15—45°, and p_H of the bleach liquor. The resulting effects were followed by determinations of η, α-, β-, and γ-cellulose, Cu no., and methylene-blue absorption. Under ordinary mill-operating conditions there is only a very slight loss of fibre, since about 99·7% is recovered over a wide range of concns. of available Cl. The rate of degradation of stock, however, $\propto$ the concn. of the hypochlorite solution and with time of treatment. There is roughly a linear relation between the loss of η and temp. up to 35°, but between 35° and 45° η decreases much more rapidly. The most rapid degradation of stock due to p_H within the range of 4·5—10 occurs at about 6·8. Strength tests, in general, support the chemical data. H. A. H.

Fungal damage in wood pulp. E. Rennerfelt (Svensk Träv.-Tidn., 1935, **51**, 680—687; Chem. Zentr., 1935, ii, 2472).—Methods of preventing such damage are described. H. N. R.

Rapid determination of cuprammonium viscosity of pulp. E. Ennevaara (Pacific Pulp and Paper Ind., 1936, **10**, No. 11, 20—21).—A rapid method, based on the standard TAPPI method and suitable for control purposes, is described. The test takes only ½ hr., and results can be duplicated to within 4%. H. A. H.

Manufacture of paper and the theory of beating. R. Kerslake (J. Proc. Austral. Chem. Inst., 1936, **3**, 344—347).—A description of paper-making processes from the half-stuff stage onwards, with special reference to the theories of beating and sizing and to H_2O supply. J. G.

Progres in paper filling. A. E. H. Fair (Paper Trade J., 1936, **103**, TAPPI Sect., 311—312).—Ti, Zn, and CO_3'' loading materials are briefly discussed. Ash content throughout a run of paper is more uniform when a well dispersed suspension of filler is allowed to flow on to the wire during sheet formation. H. A. H.

Relation between the filler content of papers and their technological properties. W. Brecht and H. Pfretzschner (Papier-Fabr., 1936, **34**, 417—

419, 429—433, 439—447, 449—452).—Factors affecting the retention of a variety of different fillers in use in Germany are investigated, using laboratory sheets of a strong sulphite pulp beaten to 50° S.R. The considerable variation in retention obtained with different fillers is independent of the *d* of the filler; to a small extent it is dependent on particle size in that the finer qualities of the same filler give a slightly higher retention, but it is suggested that the main governing property of the filler is particle shape. Retention is considered to take place through a combination of the filtering qualities of the sheet and the adsorption of the finer particles on the fibres, aided by diffusion of the particles into the sheet structure. Attempts are made to correlate the results with theoretical curves which differentiate the effect of the filtration and adsorption factors. Beating the pulp to a high wetness and, to a less extent, reducing the fibre length by beating without increasing the wetness, increase retention and the differences between the different fillers are partly removed. The increase in retention follows to some extent the reduction in air-permeability of the sheets. Addition of alum alone, alum and resin size, or alum with Na_2SiO_3 all increase retention, the extent of the increase depending mainly on the amount of excess alum present. Optimum retention is obtained with alum and size at p_H 4·9. The action of the alum is considered to be one of occlusion of the finer particles by the $Al(OH)_3$ ppt. and fixation thereby on the fibres. Of the different pulps, groundwood shows the greatest retention with all the fillers, linen half-stuff slightly less, whereas cotton half-stuff shows comparatively a greatly reduced retention. D. A. C.

Substitution of German for foreign clays [in papermaking]. von Possanner, A. Laubenheimer, R. Wagner, and R. Jenke (Papier-Fabr., 1936, **34**, 459—477).—A large no. of clays from different parts of Germany, as well as some English clays, were analysed with a view of comparing their suitability for papermaking. Methods of analysis are described; these include fractionation by sedimentation in presence of water-glass; screening through 170- and 270-mesh sieves; and examination of the mineralogical composition of the residues, photo-cell whiteness determination, and retention in and effect on the properties of laboratory sheets of beaten bleached sulphite pulp. The residues on the 270-mesh screen give a good indication of the final abrasive properties (Bekk method) of the sheets, whereas retention in the paper is governed mainly by the quantity of the clay fraction of >5 μ particle size. Clays with very large fine fractions (<2 μ) will reduce retention. The finish of the sheets (Bekk method) is mainly governed by the quantities of particles >20 μ present, increase in which tends to reduce the finish. The loss of finish due to these fractions, however, may be offset to a certain extent by the presence of large 2 μ fractions. Transparency of the sheets is practically unaffected by the different clay qualities, and whiteness only to a small extent. 20% of ash in the sheets greatly reduces their folding-resistance; the effect, however, is least with clays having large medium fractions. D. A. C.

Recent progress on colour problems in the paper industry. L. C. Lewis (Paper Trade J., 1936, **103**, TAPPI Sect., 323—330).—A survey of recent investigations, mostly by spectrophotometric methods, concerning such optical properties of near-white papers as optimum chromaticity, transparency, and opacity. The measurement of coloured and coated papers is also briefly discussed. H. A. H.

Opacity measurements [on paper]. O. Maass (Pulp and Paper Mag. Canada, 1936, **37**, 689—694).—The dynamic photoelectric opacimeter (B., 1933, 835), evolved for the measurement of transmittancy (*T*), may be used for the measurement of reflectance (*R*) of paper, and for the calculation therefrom of both contrast ratio and printing opacity. The variation of *T* with sheet-basis wt. has been investigated, and it is shown that corrections can be applied over the range 25—150 g./sq. m. The optical characteristics of groundwood–sulphite mixtures, examined in the form of laboratory sheets, indicate that the effect of a small % of groundwood on the *T* of sulphite pulp is much more pronounced than that of the same % of sulphite on groundwood. The *T* of sheets made on the British pulp-evaluation apparatus is the same on both sides, but this is not so in the case of machine-made paper, owing to the preponderance of fine fibres on the top side. *T* decreases and *R* increases with decrease in fibre length, except when fibre length is reduced by beating, in which case the fibrillation so brought about has the opposite optical effect. Increase of pressure during the wet-pressing of laboratory-made sheets increases *T* and decreases *R*, the effect being greater with sulphite than with groundwood. A converse effect is obtained by adding loading, sulphite again being more affected than groundwood. H. A. H.

Impregnation [of paper] and associated processes. E. E. Halls (Ind. Chem., 1936, **12**, 526—531, 567—571).—Methods of impregnating, various impregnating agents, and their recovery are discussed. The moisture reabsorption and moisture-permeability of papers before and after impregnation with different agents are compared; impregnation with bitumen is considered superior to that with wax. L. A. O'N.

Effect of titanium dioxide on sizing of paper. J. A. Bicknell (Pulp and Paper Mag. Canada, 1936, **37**, 688—689).—From laboratory-made sheets it is concluded that, regardless of the amounts of size and alum used, TiO_2 does not reduce the resistance to H_2O-penetration of bleached beaten hemlock paper so much as does Georgia clay. With $CaCO_3$ no sizing degree is obtained. A flotation test involving the use of powdered $KMnO_4$ was employed, as being preferable to the ink and dry-indicator flotation methods. H. A. H.

News[-print] penetration tester. J. Hammond (Paper Trade J., 1936, **103**, TAPPI Sect., 313—315).—The instrument (described) indicates the ink-resistance of paper by measuring photoelectrically the change in reflectance of the surface as penetration proceeds from the underside. Both writing and printing inks can be used, and calibration against an optical black enables sizing comparisons to be made between papers of different opacity. Evidence of both initial and internal sizing degree is given (cf. B., 1936, 981). H. A. H.

Theory of paper drying. E. Cowan and B. Cowan (Trans. Amer. Soc. Mech. Eng., 1936, 58, 711—718).—Theoretical formulæ are developed for predicting the performance of paper-drying machines. R. B. C.

Steam storage.—See I. **Briquettes from sulphite-cellulose waste.**—See II. **Pulp wood.**—See IX. **Ti pigments for paper.**—See XIII. **Hydrolysis of sawdust.**—See XVII. **Soya-bean proteins.**—See XIX. **Sulphite waste liquor.**—See XXIII.

See also A., II, 7, **Polymerisation of celluloses.** 27, **Pine-wood lignin. Relationships between lignin and hemicelluloses.**

Patents.

Treatment [degumming] of silk and silk products. L. Wallerstein, T. Hawley, and R. A. Gale, Assrs. to Wallerstein Co., Inc. (U.S.P. 2,029,350, 4.2.36. Appl., 19.4.32).—Raw silk is impregnated with a solution containing a protease prep. of bacterial origin (pancreatin, papain), Na_2SO_3, and a wetting-out agent, and dried without removal of any substantial amount of silk gum. After subjecting the silk to textile processes (weaving, knitting, etc.), the modified silk gum may be removed with hot H_2O. F. R. E.

[Production of] artificial horse hair. C. T. Pastor (B.P. 457,140, 23.5.35. Ger., 23.5.34).—Textile fibrous material (waste yarn, jute, hemp, or artificial silk) is drawn through a calibrated nozzle fed with a liquid coating prep. of rubber, synthetic resin, or lacquer, the excess of which is stripped off. The coated material is then dried, and the coating vulcanised or hardened. By treatment of the product with a liquid capable of diffusing through the resilient coating and causing elongation or swelling of the textile material relative to the coating, *e.g.*, CH_2Cl_2 for cellulose acetate, a curled effect may be produced. F. R. E.

Preservative means for [vegetable] ropes and the like. A. W. Koon, Assr. to Columbian Rope Co. (U.S.P. 2,031,267, 18.2.36. Appl., 13.9.34).—A Cu or other toxic metallic compound is impregnated into a paper tape (*e.g.*) and incorporated in the rope along a line well below the surface. B. M. V.

Processing of cellulose pulp for esterification purposes. G. A. Richter, Assr. to Brown Co. (U.S.P. 2,028,846, 28.1.36. Appl., 22.6.31).—Preliberated hardwood pulp is suspended in a mercerising liquor (≮15% NaOH) containing an oxidant (Cl_2, OCl') for ≮2—8 hr., washed, treated with NaOH to form soda-cellulose (I), and the (I) converted into viscose by means of CS_2, without ageing. F. R. E.

Fibrous esterification of cellulose. R. H. van Dyke, C. J. Staud, and H. Le B. Gray, Assrs. to Eastman Kodak Co. (U.S.P. 2,029,900, 4.2.36. Appl., 29.7.32).—After pretreatment with a fatty acid, cellulose is washed with a non-solvent (CCl_4) for the subsequently produced fibrous ester in order to reduce the acid content to the predetermined amount required, together with the fatty acid anhydride, for esterification, and to provide the predetermined amount of non-solvent diluent. F. R. E.

Esterification of cellulosic materials. J. F. Haskins and W. F. Underwood, Assrs. to Du Pont Cellophane Co., Inc. (U.S.P. 2,029,481, 4.2.36. Appl., 29.3.33).—Regenerated cellulose, cellulose, slightly esterified or etherified cellulose, or an article cast and regenerated from viscose is esterified at about 35° in a bath containing an alkyl- or arylmonocarboxylic acid anhydride, together with C_5H_5N,HCl and either uncombined C_5H_5N or HCl. F. R. E.

Preparation of viscose. Algem. Kunstzijde Unie N.V. (B. P. 457,596, 22.5.36. Holl., 11.6.35).—Viscose is mixed with 0·1% of $(NaPO_3)_6$ in aq. solution to assist filtration by preventing the formation of insol. silicates therein. F. R. E.

Production of cellulose xanthate solutions. J. W. Brown (B.P. 456,841, 14.3.35. Austral., 14.3.34).—In a rapid continuous process for production of viscose without intermediate ageing, raw cellulose is crumbled, alkalised with 19% NaOH (approx. 13 pts. by wt. per 4 pts. of α-cellulose) for 20—40 min., treated with 12—15% CS_2 for 30 min., diluted with aq. NaOH containing Na_2SO_3 for 40—75 min. to produce a solution containing 8% of cellulose, and then this solution filtered after adding a small proportion of alkaline oleate or stearate. F. R. E.

Production of nitrocellulose [of low solution-viscosity]. M. O. Schur, Assr. to Brown Co. (U.S.P. 2,029,547, 4.2.36. Appl., 17.6.30. Renewed 8.7.35).—Cellulose fibres, after mercerising, are treated in interfelted sheet form with a dil. mineral acid (≯1%) to reduce the solution-η while preserving the interfelted cohesion, so that fine fibres and fibre fragments are retained within the sheets. The treated sheets are finally nitrated. F. R. E.

Treatment [hydrolysis] of cellulose acetate and other organic esters of cellulose. Brit. Celanese, Ltd., H. Dreyfus, and R. W. Moncrieff (B.P. 457,134, 23.5.35).—Filaments, fabrics, films, etc. of org. derivatives of cellulose are impregnated with an aq. solution of a hydrolysable halide of an amphoteric element and an acid other than that produced by hydrolysis (26—40% $TiCl_4$ and 5—20% AcOH), batched at 10—50° for several hr., washed, and dried. The resultant loss of wt. is only 0·5—3% and the product has affinity for cotton dyes. F. R. E.

Preparation of alkoxy-fatty acid esters of cellulose. C. J. Malm and J. D. Coleman, Assrs. to Eastman Kodak Co. (U.S.P. 2,028,792, 28.1.36. Appl., 29.2.32).—Cellulose or a derivative thereof having free and available OH groups is esterified with an alkoxy-fatty acid anhydride, *e.g.*, $(EtO{\cdot}CH_2{\cdot}CO)_2O$, in presence of a *tert.* org. base (C_5H_5N). F. R. E.

(A) Production of disilane-rayon. (B, C) Cellulosic spinning solution containing (B) aromatic silicon derivatives, (C) aliphatic silicon compounds. (D) Production of silicon-rayon. (E) Soft-lustre rayon. R. S. Bley, Assr. to North

Amer. Rayon Corp. (U.S.P. 2,030,736–40, 11.2.36. Appl., [a—d] 22. and [e] 25.10.34).—(a—d) Non-inflammable, non-irritant viscose or cuprammonium cellulose fibres, having reduced lustre, are obtained by dispersing in the bath, prior to spinning, 1—20% (calc. on the amount of cellulose) of (a) a di-, tetra-, or hexa-alkyldisilane, (b) certain aromatic Si compounds, *e.g.*, $SiPh_4$, $Si(CH_2Ph)_4$, trisilicobenzoylsilicic acid ($C_{18}H_{18}Si_4O_7$), etc., (c) aliphatic acids, $RSiO_2H$, or their alkyl esters, or (d) substances, SiH_3R, $SiH_2R{\cdot}OH$, $RSiO_2R'$ ($R' = H$ or alkyl), SiH_2RHal, etc. (e) Similar fibres, impermeable to ultra-violet light, are obtained by addition of 0·5—10% of $SbPh_3$, $BiPh_3$, phthalimide, or *p*-$NH_2{\cdot}C_6H_4{\cdot}CO_2H$. R. S. C.

Apparatus for the manufacture of artificial silk. R. Etzkorn, Assr. to North American Rayon Corp. (U.S.P. 2,029,226, 28.1.36. Appl., 15.3.32. Ger., 27.3.31).—Apparatus for rewinding thread from spools of large diameter on to a suitable take-up means is claimed. F. R. E.

Device for use in artificial-silk spinning machines for warding off acid splash and spray and for simultaneously preventing crystallisation of spinning-bath solutions on rapidly running filament guiding rollers. Verein. Glanzstoff-Fabriken A.-G. (B.P. 455,764, 8.4.36. Ger., 8.4.35).—Acid spray flung off the rollers is caught by an impact sheet, from which it is drained through slit-like apertures back to the roller. B. M. V.

Conditioning of artificial thread. H. Hofmann, Assr. to Amer. Bemberg Corp. (U.S.P. 2,027,911, 14.1.36. Appl., 2.4.30).—The pptd. thread (from cuprammonium cellulose) is stretched and the tension then removed before fixing with an acid solution. The product shows improved breaking strength and elasticity. F. R. E.

Production of staple fibre. C. Hamel A.-G. (B.P. 457,328, 23.5.35. Ger., 17.1.35).—The fibre bundles issuing from the individual nozzles of the spinning machine are introduced into a wash trough through which H_2O flows and along which they are conveyed to the after-treatment plant, in which the combined bundles or fibre rope from one spinning machine are further treated before cutting. Apparatus is claimed. F. R. E.

Production of artificial crêpe threads and fabrics made thereof. H. Dreyfus (B.P. 457,538, 31.5.35).—Threads of regenerated cellulose (hydrolysed cellulose esters) are crêpe-twisted, and, during at least the last part of the twisting, are treated with moist steam or H_2O at 100°. F. R. E.

Manufacture of shaped structures from cellulose derivatives. L. Lilienfeld (B.P. 457,031, 14.2.35).—A solution of an alkali-sol. simple, mixed, alkyl, hydroxyalkyl, or alkyl hydroxyalkyl ether of cellulose is shaped and coagulated by H_2O. The coagulating H_2O may contain one or more acids or salts capable of coagulating viscose, but in insufficient quantity to coagulate a normal solution of viscose, or the shaped structure may, after leaving the bath, be treated with a viscose coagulant. F. R. E.

Manufacture of [shrinkable] bottle caps from cellulose esters. Distillers Co., Ltd., H. A. Auden, and H. P. Staudinger (B.P. 456,973, 18.4.35).—A fully esterified cellulose ester is dissolved in an org. compound which is a solvent therefor at elevated but not at room temp. (diacetone alcohol, $CH_2Ph{\cdot}OH$, Et lactate, etc.), and the solution is solidified on a former by cooling or immersion in a liquid (EtOH), the bulk of the solvent being finally removed by another liquid (H_2O). F. R. E.

Casting of transparent films. E. M. Kratz, Assr. to Marbo Products Corp. (U.S.P. 2,027,829, 14.1.36. Appl., 8.11.33).—The surface of the carrier web is protected by coating it with a thin, uniform film of petroleum jelly applied as a solution in a volatile solvent (naphtha). F. R. E.

Removal of water of gelation [from films]. M. J. Shoemaker, Assr. to Carbide & Carbon Chemicals Corp. (U.S.P. 2,028,296, 21.1.36. Appl., 24.11.31).—A cellulose film, which has been coagulated from aq. solution and contains non-re-entrant H_2O of gelation (I), is immersed in an aq. refrigerating salt solution (II) at $<0°$ until the (I) freezes and diffuses into the (II). The film, after removal and drying as usual, exhibits uniform shrinkage and tensile strength in directions at right-angles. F. R. E.

Paper pulp-making process. S. D. Wells, Assr. to G. D. Muggleton (U.S.P. 2,029,973, 4.2.36. Appl., 22.8.34).—The raw material (grasses, bamboo, or printed waste paper) is washed in H_2O, the excess of which is then removed, and the material continuously disintegrated in a rod mill in presence of hot waste NaOH liquor from a subsequent digesting operation. The pulp next passes through a screw press, and after screening is digested, with agitation, with excess of NaOH at approx. 175°. The pulp then enters a cyclone separator and is washed in counter-current to a stream of H_2O. D. A. C.

Digestion of fibrous or cellular material. De La Roza Corp. (B.P. 457,524, 27.5.35. U.S., 28.5.34).—Cellulosic material is compacted so as to remove the contained air, the removal being assisted by pre-impregnation with a liquid, *e.g.*, $Ca(OH)_2$ solution, or by forcing a liquid therethrough while compacting. It is then digested in absence of O_2 with hot liquor under pressure and the volatile products are continuously removed. Apparatus is claimed. F. R. E.

Treatment of vegetable fibrous material for production of cellulose fibre or pulp. F. R. Chesley, jun. (B.P. 457,171, 3.6.36. U.S., 13.6.35).—In the production of α-pulp, coniferous woods or grasses, after reducing in size by chipping etc., are boiled in aq. solution containing about 719 lb. of Na_3PO_4, 62·5 lb. of Na_2CO_3, and either 7·8 lb. of $Al_2(SO_4)_3$ or 23·3 oz. of finely-divided metallic Al per 10,000 lb. of H_2O. The pulp is washed and the process may be repeated for a shorter time, followed, if necessary, by treatment with a wax solvent and/or a bleaching agent. D. A. C.

Wood pulp adapted for chemical use. R. L. Stern, Assr. to Hercules Powder Co. (U.S.P. 2,028,080, 14.1.36. Appl., 28.12.34).—Sheeted pulp, to be used for esterification purposes, is disintegrated into pieces about 0·75 in. long and 0·015 in. wide by means of a revolving cylinder fitted around its periphery with a series of knives. The knives, the length of which determines the length of pulp fragments cut, effect a shearing action against a stationary horizontal edge. D. A. C.

(A, B) Treatment, (C) bleaching, of pulp. A. T. Luth, R. A. Nugent, and N. H. Christian, Assrs. to Nekoosa–Edwards Paper Co. (U.S.P. 2,030,382—4, 11.2.36. Appl., 18.10.34).—(A, B) Sulphate pulp, immediately after blowing from the digester, is treated with 2·5—15% of conc. aq. NaOH (*e.g.*, 50% solution) which is allowed to flow slowly through the pulp, *e.g.*, in a porous-bottomed blow pit. A H_2O-wash follows immediately and the pulp after screening is bleached by a multi-stage process, a NaOH treatment followed by washing being interposed between each stage. The final stage is carried out in alkaline solution. (C) The aq. NaOH used in the pretreatment and in the treatments between the bleaching steps contains small quantities of Na_2O_2 (*e.g.*, 0·5 wt.-% of the pulp). D. A. C.

Manufacture of fibrous product. G. H. Ellis, Assr. to Insulite Co. (U.S.P. 2,027,581, 14.1.36. Appl., 5.2.34).—In the manufacture of boards a germicide is incorporated in them by mixing it with melted resin or an oil. The mixture is finely divided and subsequently dispersed in the pulp stock by means of a centrifugal pump before feeding to the head box. D. A. C.

Manufacture of fibre products. D. M. Sutherland, jun. (U.S.P. 2,030,946, 18.2.36. Appl., 31.10.30. Renewed 11.8.34).—In the manufacture of fibre board or paper, waste of white-H_2O is prevented by reducing the amount of H_2O in the feed stock to equal that in the manufactured product, white-H_2O being continually re-used and a toxic agent being present to prevent formation of org. slime. This agent is continually added in quantity = that removed in the final product. B. M. V.

(A) Manufacture of synthetic [board-like] products, (B) manufacture of fibrous product. G. H. Ellis, Assr. to Insulite Co. (U.S.P. 2,030,625—6, 11.2.36. Appl., [A] 13.1.34, [B] 27.4.34).—(A) Boards are continuously formed from pulp into which has been mixed 0·5—10% of a vegetable oil (*e.g.*, tung or soya-bean); they are then pressed, dried in a heated chamber, sprayed with H_2O, and pressed between heated cylinders. The board is then coated with gloss oil, again heat-pressed, cut into sheets, humidified to contain 5—9% of H_2O, and finally cooled. (B) Forest or saw-mill waste is pulped by digesting at 125—175 lb. per sq. in. with 2—6% of Na_2CO_3 and subsequent disintegration. It is then continuously formed into board between two vac. rolls rotating in the same vat, pressed, and dried under pressure by passing between a no. of rolls in a hot chamber. D. A. C.

Manufacture of pressed fibre board. R. T. Pollock, Assr. to Respats, Inc. (U.S.P. 2,029,034, 28.1.36. Appl., 31.7.33).—Wood pulp, prepared without digesting, *e.g.*, from saw-mill waste (cf. U.S.P. 1,897,620; B., 1933, 1006), is mixed with pulp prepared from saw grass or palmetto by mild alkali digestion and subsequent refining treatment, and formed into pressed boards. The proportions of wood to grass pulp may be 70 : 30. D. A. C.

Fireproofing [of boards]. R. G. Quinn, Assr. to Internat. Paper Co. (U.S.P. 2,030,653, 11.2.36. Appl., 18.12.31).—Coarse and fine groundwood to be made up into boards is fireproofed by mixing with a dil. aq. mixture of crude $(NH_4)_3PO_4$ and H_3BO_3, the mixture being added, *e.g.*, as a spray at the grinder-stone face or fine screens. The pulp is then treated with a waterproofing agent consisting of an aq. emulsion of a chlorinated $C_{10}H_8$–paraffin mixture, with soap or resin size as emulsifier. After forming and drying, the board is finally sprayed with aq. NH_3. A closed system is preserved throughout. D. A. C.

Stabilisation of sheet vulcanised fibre. H. R. Stratford, Assr. to H. B. Fay (U.S.P. 2,028,932, 28.1.36. Appl., 28.8.31).—To prevent distortion or warping, the sheets are dried at $>100°$ to expel moisture and their surfaces sealed by treatment with a setting liquid composed of a urea–rosin condensation product, a wax (Japan), and another synthetic resin (PhOH–CH_2O). F. R. E.

Manufacture of paper. P. J. Reimer (U.S.P. 2,028,952, 28.1.36. Appl., 14.2.34).—An open-top box containing several vertical partitions and inlet and drain valves is fitted under the wire of a Fourdrinier machine, so that the sides of the box form a substantially watertight joint with the underside of the wire. The box is placed as near to the slice as possible and is kept filled with H_2O so that the rate of drainage at that end of the wire may be controlled by adjustment of the drain valve. Alternatively, a filler suspension may be applied through the box, to the underside of the sheet. Control of sheet-formation and elimination of two-sidedness are claimed. D. A. C.

Prevention or elimination of froth in the manufacture of paper. H. Voss, R. Fromm, and J. Mau (B.P. 456,572, 12.6.36. Ger., 26.6.35).—Small quantities of an aq. sol of vegetable phosphatides are added to the stock, at the outset or only on the occurrence of the froth. D. A. C.

Manufacture of transparent tissue. C. Ellis, Assr. to Ellis–Foster Co. (U.S.P. 2,029,525, 4.2.36. Appl., 14.11.29. Renewed 31.5.34).—Glassine, tissue paper, etc. is impregnated either with conc. aq. urea–CH_2O resin syrup (*A*) or EtOH solutions of $COMe_2$–CH_2O (*B*) or PhOH–CH_2O resins (*C*), or mixtures of *A* and *B* or *A* and *C*. The solvents are removed and the paper is hot-pressed in a mould of any desired shape. The paper may be laminated after the impregnating step. D. A. C.

Card or paper stock for use in duplicating processes [hectography]. R. S. Jones (U.S.P. 2,021,938, 26.11.35. Appl., 16.9.33).—In hectographic duplicating, more copies are obtained by employing stock coated with a mixture of glue 8, $NaHCO_3$ 15, starch 30, aq. Na silicate (1 : 14) 1·75, and aq. alum (1 : 6) 10 pts. L. C. M.

Production of safety paper. A. H. Stevens. From Todd Co., Inc. (B.P. 457,081, 21.12.35).—A H_2O-sol. substance (*e.g.*, diphenylguanidine) which develops a colour in presence of ink eradicators is printed on the paper after moistening, and the paper subsequently dried and calendered. D. A. C.

Manufacture of parchment papers. G. A. Richter, Assr. to Brown Co. (U.S.P. 2,030,469, 11.2.36. Appl., 2.9.32).—$CaCO_3$ filler is incorporated in the paper before parchmentising. Also the $CaCO_3$ may be deposited on the paper in local concns. so as to form a variegated effect. D. A. C.

Production of waterproofed plastic paper. E. V. Rodgers (U.S.P. 2,029,390, 4.2.36. Appl., 8.6.33).—The paper is coated with a composition containing a solution of nitrocellulose in $Pr^{\beta}OAc$ and of elemi gum in toluol, together with a stearate or plasticiser (blown castor oil) and a pigment (*e.g.*, metal salt). D. A. C.

Coating of paper. Container Corp. of America, Assees. of C. E. Fawkes and C. M. Mackenzie (B.P. 456,938, 1.11.35. U.S., 30.11.34).—Paper is coated with a nitrocellulose lacquer of high η by means of a roll which rotates in the same direction of travel as the paper, but at a speed of 25—90% of that of the paper, so that the lacquer is transferred mainly by a shearing action. A lacquer film of const. thickness is similarly fed to the applying roll by means of a secondary feeding roll. Uniformity of the film on the paper, with absence of streakiness, is maintained by regulating the η of the lacquer and the speed ratio of paper to applying roll. D. A. C.

Manufacture of coated paper. D. D. Uong, Assr. to Fitchburg Paper Co. (U.S.P. 2,030,483, 11.2.36. Appl., 1.4.33).—A powdered coating agent (I) is applied, on a Fourdrinier machine, to the web while it is still moist, *e.g.*, after the first battery of suction boxes or after or within the press section. (I) is fed through a triangular-sectioned hopper, having at its apex a slit-opening with reciprocating sides, into a bell in which it settles on to the web moving across the opening at the bottom of the bell. D. A. C.

Pulp purification.—See I. **Oxidation of turpentine oils. Assistants in paper industry.**—See III. **Sandpaper.**—See VIII. **Wax emulsions for paper.**—See XII. **Cellulose ester compositions. Casein dispersion. Condensation products [for paper etc.]. Artificial filaments etc. Undercoat for lacquers.**—See XIII.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Progress in the production of fast colours in the textile industry. A. Beil (Angew. Chem., 1936, **49**, 905—906).—A review mainly of Krais' work.

Adsorption and desorption of dyes by straw. A. Lottermoser and P. Neubert (Kolloid-Beih., 1936, **45**, 149—209).—The adsorption of acid, substantive, and basic dyes by raw and bleached straw has been determined. With acid and substantive dyes adsorption proceeds in accordance with the theories of dissolution and adsorption; with basic dyes the process is different, and electrical and chemical changes occur. The influence of acid substances in the straw has been investigated. Adsorption of acid dyes is reversible; that of basic dyes irreversible. E. S. H.

Applications of metal spraying in the dyeing and textile industries. N. H. Kitchen (J. Soc. Dyers & Col., 1936, **52**, 449—455).—Spraying of metals (*e.g.*, Al, Zn, Pb, Sn, Ni, Cd, Cu, Ag, Au) on to metal, wood, and fabric surfaces is effected with a pistol, the method of using which is described. No oxidation of the metal occurs during spraying and the sprayed film appears as a closely compressed powder, the particles being saucer-shaped; the film porosity is approx. = that of cast metal of similar thickness. The packing of the particles in the film is closer as the m.p. of the metal is lower. The adhesion of a film is usually 5—7 tons per sq. in. A. J. H.

Dry cleaning: methods of increasing the detergent effect. C. L. Bird (J. Soc. Dyers & Col., 1936, **52**, 456—458).—Removal of ingrained dirt and stains (milk, tea, etc.) in dry cleaning is assisted by adding to the white spirit a limited amount ($\ngtr$1 gal. per 100—150 lb. of garments) of H_2O dispersed with mahogany sulphonates (I) (cf. B.P. 392,931; B., 1933, 622) or excess of a dry-cleaning soap. When (I) is used, all the H_2O, but not (I), is preferentially absorbed by the garments. Hot drying of dyed (especially red) acetate-rayon goods cleaned with C_2HCl_3 (II) causes bleeding of the dye. The detergent val. of (II) is improved by adding to it a dry-cleaning soap (1/800), but its solvent action on acetate dyes is increased correspondingly. A. J. H.

Survey of the progress in mothproofing during 1928—1936. C. O. Clark (J. Text. Inst., 1936, **27**, P389—394). A. G.

Textile auxiliaries and dyes.—See III. **Oxidation of wool. Bleaching rag half-stock. Bleaching pulps.**—See V.

See also A., I, 43, "**Spot**" **test [for Cl′ contamination of fabric].**

Patents.

Apparatus for fluid treatment of yarns and other fibrous materials. D'A. M. Clark. From Abbott Machine Co. (B.P. 456,099, 17.2.36).—Spools of the yarn are placed over perforated stand-pipes in a vat; the latter communicate with a space between a real and false bottom, and that space is supplied with heated liquid by means of a central stand-pipe containing a steam injector or the like. B. M. V.

Valves for bleaching kiers and the like. Hunt & Moscrop, Ltd., and G. Calvert (B.P. 455,939, 29.6.35).—Closing the valve also breaks the supply pipe for any fluid dangerous to man. B. M. V.

Printing and other textile treatments. Brit. Celanese, Ltd., and G. Rivat (B.P. 456,451, 4.4.35).—Coloured ciré effects, fast to washing, are produced on cellulosic fabrics by printing with the components of a nitrogenous resin (CH_2O–urea) and a non-substantive acid dye, bringing about resin formation (*e.g.*, by hot-calendering), and removing the unfixed dye (if any) from the untreated portions by washing. H. A. P.

Coating of flexible sheet materials. [Production of patent leather.] E. I. Du Pont de Nemours & Co. (B.P. 454,590, 4.4.35. U.S., 12.5.34).—A product not liable to "piping" (crinkling as produced by bending) is obtained by applying a coating composition comprising a cellulose derivative (I) (cellulose nitrate, 12·1 pts.), a softener other than a blown vegetable oil (raw castor oil, 27·5), a pigment (18·6), and a solvent [EtOAc (38%) + EtOH (60) + $COMe_2$ (2), 41·8], then a further coating of a composition comprising (I) (12·1 pts.), a blown vegetable oil softener (blown cottonseed oil, 27·5), pigment (18·6), and solvent (41·8), followed by a coat of clear-drying oil varnish. A. J. H.

Improving [the creasing tendency] of fibres, yarns, fabrics, felt, paper, and the like. E. Pollak (B.P. 454,424, 26.3.35. Ger., 27.3.34).—The textile material is treated with an aq. solution of a synthetic resin in presence of a hydrotropic wetting agent, *e.g.*, Leonil S and Nekal (I.G.), so that the individual fibres are partly coated and partly impregnated with the resin, which is afterwards hardened by heating at about 130° for ½ hr. A. J. H.

Production of crease-resisting textiles made of cellulose-containing fibres. Heberlein & Co. A.-G. (B.P. 455, 472, 17.2.36. Ger., 13.6.35).—Cotton or viscose-rayon fabric is impregnated with aq. CH_2O (or substances which split off CH_2O) and a catalyst (*e.g.*, sol. salts of Fe, Hg, and especially Al), dried, and then heated to 150°. Examples of suitable salts are $Al_2(SO_4)_3$, $Al(CNS)_3$, and Al alum. A. J. H.

Assistants in textile industry. Washing etc. agents. Phosphoric esters of glycerides. Solvent-recovery device. Substances having capillary activity.—See III. **Bleaching pulp.**—See V. **Bleaching compositions.**—See VII.

VII.—ACIDS; ALKALIS; SALTS; NON-METALLIC ELEMENTS.

Preparation of sulphuric acid without intermediate production of nitrosylsulphuric acid. Z. K. Zeiberlich (J. Chem. Ind. Russ., 1936, **13**, 1164—1169).—Dry SO_2 and NO_2 react at 255° to yield $(SO_3)_2,N_2O_3$, which is decomposed by H_2SO_4 to yield H_2SO_4,SO_3 and NO, from which NO_2 is regenerated by admixture with O_2. The plant serves for the daily production of 21 tons of H_2SO_4 per cu.m. of reaction space. R. T.

Crystallisation of phosphoric acid obtained by the thermoelectric process. L. V. Vladimirov, M. O. Brun, and Z. F. Schaterkina (Min. Udobr. Insektofung., 1935, **1**, No. 3, 74—78).—Cryst. H_3PO_4 free from As and Pb was obtained from acid of d^{10-12} 1·72—1·87 with energetic stirring and rapid removal of the mother-liquor. Ch. Abs. (*e*)

Influence of temperature of firing and of different admixtures on velocity of slaking of lime. P. P. Budnikov and L. G. Gulinova (Ukrain. Chem. J., 1936, **11**, 275—282).—The rate of slaking is at a max. for CaO prepared at 1100°; addition of 1% of different salts to the H_2O accelerates slaking, in the order $Ca(NO_3)_2 < Na_2S_2O_3 < Ca(OAc)_2 < NH_4Cl < MgCl_2 < NaCl < CaCl_2 < NaOH$. $Mg(OH)_2$, $Ca(OH)_2$, $AlCl_3$, and $BaCl_2$ slightly retard reaction. R. T.

Crystal ice. N. Clarke-Jones (Chem. and Ind., 1937, 11—12).—Crystal ice is manufactured by spraying H_2O upon a cooled surface from which the ice film is removed by revolving cutters. The crystals are swept out by the H_2O, separated, and the latter is returned. It is more economical in use than crushed ice. C. I.

Preparation of ammonium nitrate, with utilisation of the heat of reaction. L. M. Laschnik (J. Chem. Ind. Russ., 1936, **13**, 1154—1159).—Apparatus is described, consisting of a neutralising chamber and two evaporators, in which the heat of neutralisation of HNO_3 by NH_3 is utilised for evaporation of aq. NH_4NO_3, thereby effecting a 33% economy in fuel. R. T.

Elimination of undesirable physical properties of ammonium nitrate connected with its hygroscopicity. M. I. Kantor, E. I. Dundur, and R. M. Bass (Chem. Social. Agr., 1934, No. 3, 78—82).—Equal amounts of finely-ground solid NH_4NO_3 (I) and $CaCO_3$ were mixed. The product could be scattered as dust. Mixing (I) with peat gave the best results, but the (I) was rendered more explosive. Ch. Abs. (*e*)

Granulation of ammonium nitrate. A. Dubovitzki, A. Filinov, P. Verishnikov, F. Margolis, and Z. Lunskaja (Min. Udobr. Insektofung., 1935, **1**, No. 2, 24—40).—NH_4NO_3 alone and in admixture with $(NH_4)_2SO_4$, KCl, CaO, and phosphorite meal is granulated by centrifugal spraying of the fused material. Properties of products obtained under various working conditions are examined. Ch. Abs. (*p*)

Distillation of the melt obtained in urea synthesis. P. I. Levi, V. I. Orlov, and M. N. Krilova (J. Chem. Ind. Russ., 1936, **13**, 1109—1114, 1170—1173).—The H_2O content of the gaseous phase over $NH_2{\cdot}CO_2NH_4$ is respectively 2, 4, and 5% at 135°, 155°, and 165°. The $NH_3 : CO_2$ ratio varies from 2 initially to 5 finally, owing to the solubility of NH_3 in the urea formed, for which reason const. addition of NH_3 to the circulating gases is essential. The walls of the distilling column should be at 200°, and the upper part of the melt at $\nless$135°, in order as far as possible to eliminate dissolved NH_3. R. T.

Reduction of sodium sulphate to sulphide by natural gas. D. E. Dionisiev (J. Appl. Chem. Russ., 1936, **9**, 1378—1386).—Max. (95%) yields of Na_2S are obtained by passing natural gas (82% CH_4) over Na_2SO_4 (3 hr. at 850°); at 800° the max. yield is $\ngtr$88%. The issuing gases are passed through a second oven, in which 90% reduction is attained. Na_2SO_3 is not formed at >850°, and the product contains $\ngtr$2% of NaOH and 0·6% of C. The best results are obtained with granules of Na_2SO_4 0·3 mm. in diameter. R. T.

New borax products. W. R. Lester (Glass Ind., 1935, **16**, 216—217).—Anhyd. cryst. $Na_2B_4O_7$ is prepared by partial dehydration at low temp., fusion, and cooling in moulds. It eliminates puffing, fluxes more quickly, produces less scum, has increased " fining " action, and is denser than borax.

Ch. Abs. (*e*)

Stability of [sodium] perborate in washing powders. B. Tiutiunnikov and N. Kasjanova (Ukrain. Chem. J., 1936, **11**, 253—259).—Silicates, laurin, and colophony soaps, β-$C_{10}H_7$·OH, NH_4Cl, NH_2Ph, and NHPhAc stabilise $NaBO_3$, whilst oleates, linoleates, and alkalis accelerate decomp. The most stable powders are those containing least H_2O.

R. T.

First industrial plant in East Africa for recovering potassium salts from sea-water by the Niccoli process. E. Niccoli (Chim. e l'Ind., 1936, **18**, 557—563).—A plant for the production of K salts from sea-H_2O for use as fertilisers is described in detail. The product has the composition: K_2SO_4 51·0, $MgSO_4$ 37·9, NaCl 3·1, H_2O 4·6, insol. 3·0%. O. J. W.

Action of methane gas from Sărmâşel (Rumania) on lithium and potassium chlorides. C. Cândea and I. G. Murgulescu (Chim. et Ind., 1936, **36**, 896—897).—The reaction of pure H_2 and of CH_4 (natural gas from Sărmâsel: 98·6% CH_4) on LiCl and on KCl, at 800—1000°, has been studied. As the reactions, being markedly endothermic, are difficult to effect directly, admixtures were made of the chlorides with SiO_2 and Fe_2O_3, which facilitate the formation of HCl. The results agree with the theoretical heats of reaction, and, on comparison with previous results with NaCl, it is found that the yields of HCl from the reaction with CH_4 decrease in the order LiCl, NaCl, KCl. The yield increases from 800° to 900°, but is about the same at 1000°. J. L.

(A) Use of magnesium chloride. Physicochemical principles of extraction and reworking of magnesium chloride. A. G. Bergman and A. P. Obukov. **(B, C) Hydrolysis of magnesium chloride.** A. G. Bergman, V. A. Klementiev, and E. B. Pevzner; A. G. Bergman, A. I. Liashenko, and A. P. Obukov. **(D) Properties of magnesium oxide obtained by hydrolysis of magnesium chloride.** A. P. Obukov, M. N. Michailova, and V. I. Koposova. **(E) Hydration of magnesium oxide.** V. A. Klementiev. **(F) Ternary system: magnesium chloride–water–hydrogen chloride.** A. P. Obukov and V. P. Lavrov. **(G) Hydrolytic study of the system $MgCl_2 + H_2O = 2HCl + MgO$.** A. P. Obukov, M. N. Michailova, V. I. Koposova, and A. A. Bukvin. **(H) Production of aluminium oxide by the magnesium chloride method.** A. P. Obukov and M. N. Michailova. **(I) Carbonisation of dolomites. Production of magnesia alba from dolomites.** N. A. Osokoreva (Trans. State Inst. Appl. Chem. U.S.S.R., 1934, No. 25, 9—19, 20—39, 39—69, 69—78, 78—81, 81—84, 84—90, 91—93, 94—101).—(B, C) $MgCl_2$ is completely decomposed to MgO and HCl by heating a solid cement containing $MgCl_2$ with a little MgO for 1 hr. at 500—600° in a rotary furnace in a CO_2–H_2O vapour mixture.

(D) MgO formed from $MgCl_2$ at 650° meets the requirements for material formed by calcining magnesite (I). With rising temp. of hydrolysis the reactivity of the resulting MgO is decreased. The product at 1000° is suitable for refractory materials.

(E) Hydration of MgO formed by hydrolysis of $MgCl_2$ is slower than for that from (I).

(F) $MgCl_2,6H_2O$ may be salted out by saturating the solution with HCl.

(G) At 250—400° with low [HCl] the solid phase Mg(OH)Cl is formed; this decomposes at >400° into MgO and HCl. With higher [HCl] solid solutions of variable composition are formed.

(H) A 92% yield of Al_2O_3 free from Si and Fe was obtained by mixing clay with 33% aq. $MgCl_2$, and evaporating to a solid mass. The latter is heated in a crucible at 800°, or in a tube in a steam current at 800—1000°, and the product leached with 10% NaOH. Na_3AlO_3 is decomposed with CO_2 and the $Al(OH)_3$ ignited.

(I) The dolomite is calcined to 21% loss in wt. Addition of Na_2CO_3 and aq. NH_3 in the process of carbonisation gave no increased yields.

Ch. Abs. (*e*)

Treatment of waste from magnesite industry. A. K. Raspopina and A. I. Krjagova (Kali, 1935, No. 3, 18—26).—Waste from carnallite and $MgCl_2$ extraction, after heating at a high temp., contains 20—50% MgO. The powdered waste is dissolved in hot HCl, and sufficient KCl added to form carnallite, which crystallises on cooling. Ch. Abs. (*e*)

Flotation of phosphorites from the Sosh deposits in the Baschkir Republic. F. N. Belash (Gorn. Shur., 1934, **110**, No. 5, 58—59).—Flotation of phosphorites with 16·8% P_2O_5 by means of tar acids, acidol, and water-glass yielded 58·6% of concentrate (27·0% P_2O_5) and 41·4% of end fraction (2·4% P_2O_5).

Ch. Abs. (*e*)

Reworking of phosphates with nitric acid. V. B. Rozler (Min. Udobr. Insektofung., 1935, **1**, No. 1, 28—42).—Processes for manufacture of P fertilisers from rock phosphates are discussed.

Ch. Abs. (*p*)

Carboxylic acids as reagents in flotation of apatite. F. N. Belash (Min. Udobr. Insektofung., 1935, **1**, No. 2, 56—63).—Mixed carboxylic acids, obtained by oxidising petrolatum jelly, may be successfully and economically substituted for oleic acid in the flotation of apatites. Ch. Abs. (*e*)

Apatite concentrate. I. Mozel (Min. Udobr. Insektofung., 1935, **1**, No. 3, 72—74).—Proposed methods for concentrating apatite for superphosphate manufacture are reviewed. Ch. Abs. (*p*)

Decomposition of apatites and phosphorites by nitric acid. M. I. Krantz (J. Chem. Ind. Russ., 1936, **13**, 1137—1141).—Considerable economies are effected by extraction with HNO_3 instead of H_2SO_4.

R. T.

Manufacture of superphosphate. B. A. Sokolovski (Min. Udobr. Insektofung., 1935, **1**, No. 2, 11—23).—Methods reviewed are suited to production of superphosphate from flotation phosphorites, but not from flotation apatites. The latter contain excessive H_2O and are not readily decomposed. Ch. Abs. (*p*)

Obtaining potassium superphosphate. L. Berlin and I. L. Goritzkaja (Kali, 1935, No. 2, 18—23). —K superphosphate was prepared by heating for 3 hr. at 95—105° a mixture of 200 g. of phosphorite (I) (25·51% P_2O_5), 10—100 g. of crude KCl, and the theoretical amount of H_2SO_4 (d 1·56), calc. on the basis of P_2O_5, CO_2, Fe_2O_3, and Al_2O_3 in (I). Increase in the KCl aided decomp. of (I). With excess of H_2SO_4 the product became hygroscopic. Ch. Abs. (e)

Separation of nephelite from iolite–urtite ores by centrifugal method. A. G. Filippova (Min. Udobr. Insektofung., 1935, **1**, No. 3, 78—84).—A modified procedure of the Zilbermintz method of centrifugal phase separation is described. Ch. Abs. (e)

Determination of small quantities of iron oxide in raw materials and glass. A. Dietzel (J. Soc. Glass. Tech., 1936, **20**, 315—318T).—It is recommended that Fe^{II} be determined by titration with 0·001N-$CeSO_4$ or $KMnO_4$ [tri-o-phenanthroline–$FeSO_4$ as indicator; cf. A., 1931, 1385)] and Fe^{III} by titration with 0·001N-$TiCl_3$ (H_2O_2 as indicator). The application of spectral-analytical methods is briefly described. J. A. S.

Colorimetric determination of small quantities (maximum 0·1%) of iron oxide in raw materials and glass. L. Springer (J. Soc. Glass Tech., 1936, **20**, 319—323T).—Sources of inaccuracies in the KCNS method are discussed in detail. A standard method is proposed. J. A. S.

Technical basis of bleaching-clay industry. P. G. Nutting (Bull. Amer. Assoc. Petrol. Geol., 1935, **19**, 1043—1052).—A review and discussion. Ch. Abs. (e)

Properties of molybdenum–sulphur catalysts. E. I. Prokopetz and I. I. Eru (Chim. Tverd. Topl., 1935, **6**, 67—73).—MoS_3 is easily decomposed at elevated temp. in contact with metallic walls of the reaction vessel. Addition of NiO to MoS_2 catalyst retards the poisoning of the mixture. Ch. Abs. (e)

Vanadium-bearing magnetite deposits of Dhalbum and Mayurbhanj, Bihar, India. G. H. Tipper (Bull. Imp. Inst., 1936, **34**, 449—452).—Samples of magnetite boulders and débris found on the surface contain 0·6—5·0% V_2O_3 and 10·0—22·0% TiO_2. Whilst large quantities of ore are in sight, exploration and careful sampling are necessary before the val. of these deposits as a source of V can be estimated. The mineral is found in altered gabbros and is in part converted into hæmatite, such samples being of low V content. C. I.

Carbon monoxide as a chemical raw material. N. W. Krase (Chem. Met. Eng., 1936, **43**, 590—595). —A review. H. C. M.

Carbon monoxide analyser. E. A. Means and E. L. Newman (Refiner, 1936, **15**, 191—192).—The gas is burned in a combustion chamber and the vol. contraction noted. In experiments on air samples containing 0·01—0·1% CO the average deviation was 0·003%. R. B. C.

Recent developments in carbon monoxide indicators. H. Pohl (Schlägel u. Eisen, 1936, **34**, 243—245).—An apparatus designed by Malecki consists of a U-shaped glass tube on to each end of which a bulb is fused. In the lower part of the tube, which is partly filled with Hg, there are two Pt electrodes. A liquid of low b.p. above the Hg half fills the bulbs. A catalyst covering one of the bulbs promotes combustion of CO in the gas sample, causing expansion of the liquid in the bulb and upward movement of Hg towards one of the electrodes, both of which are connected to an alarm device. By suitable adjustment of the position of the electrodes it is possible to set the alarm for CO contents ranging from 0·01 to 0·02%. R. B. C.

Determination of atmospheric carbon dioxide by condensation. Y. Kauko and T. Yli-Uotila (Z. anorg. Chem., 1936, **229**, 352—356; cf. B., 1935, 671).—Accurate results in the determination of CO_2 by condensation in liquid air are obtainable only after removal of CO_2 from the walls of the apparatus by prolonged passage of air or H_2. J. S. A.

Apparatus for determining carbon dioxide in stone dust. L. Altbürger (Glückauf, 1936, **72**, 986—987).—A modification of the Scheibler and Dietrich apparatus is described. 1 g. of dust is decomposed with HCl, and the vol. of CO_2 evolved, measured by displacement of H_2O from a burette, is corrected to n.t.p. R. B. C.

(A) **Steam–kerosene treatment of sulphur ores.** (B) **Increasing percentage extraction of sulphur by the autoclave method.** N. F. Ljamin (J. Appl. Chem. Russ., 1936, **9**, 1400—1401, 1402—1404).— (A) 0·7 kg. of kerosene (I) is added per 100 kg. of ore, and steam introduced at a pressure of 5 atm. The extraction of S is thereby raised from 40% without (I) to 60—65%.

(B) The optimum diameter of the grains of ore is 10 cm. R. T.

Calculation of mechanism of the process of oxidation of sulphur dioxide in the chamber process. N. Kiritschenko and S. Benkovski (Ukrain. Chem. J., 1936, **11**, 260—263).—Polemical, against Tichonov (B., 1936, 638). R. T.

Contact activity of chromium oxide in the oxidation of sulphur dioxide to sulphur trioxide. V. F. Postnikov, T. I. Kunin, and A. A. Astascheva (J. Appl. Chem. Russ., 1936, **9**, 1373—1377).— $Cr(OH)_3$ (I) pptd. by aq. NH_3 is more active than (I) pptd. by KOH or NaOH. The activity is unaffected by addition of K, Zn, Al, or Ni acetate in the former case, but is enhanced in the latter cases. Presence of H_2O in the gas increases the activity of (I), but max. conversion is obtained at higher temp. R. T.

Extraction of bromine from sylvinite. J. Vilnjanski and V. Zeljanski (Kali, 1935, No. 2, 12—17).—Solikamsk sylvinite (0·05% Br) can be used economically. The mother-liquor is conc. to 0·08% Br before extraction with Cl_2. Ch. Abs. (e)

Recovery by activated carbon of iodine from waters containing it. F. Krczil (Chem.-Ztg., 1936, **60**, 983—985).—Recovery of I from well-H_2O by activated C consists in (a) pretreatment of the H_2O, (b) adsorption of the I, (c) recovery of I. In (a), if the H_2O is associated with petroleum, removal of oil, naphthenic acids, etc. is necessary, and also filtration. Amongst reagents proposed for acidification and oxidation are $AlCl_3$, $Cl_2 + NaNO_2$, etc. I in the free state may be removed from H_2O by air-blowing, or extracted with petroleum, but it is more usual to filter the H_2O through C direct. Direct heating of the saturated C does not recover I quantitatively, but it may be treated with superheated steam at 200—300°. Another method is to treat with an alkaline solution with production of iodide. C. I.

Production of phosphorus pentasulphide. M. P. Golovkov, V. A. Klementiev, M. N. Michailova, and A. P. Obukov (Trans. State Inst. Appl. Chem. U.S.S.R., 1935, No. 23, 17—30).—P_2S_5 is obtained in 90% yield by pouring dry, powdered red P into melted S in a CO_2 steam, with stirring, at an initial temp. of 125° and a final temp. of 400°. By thermostatic heating of powdered P_2S_5 at 350° (6 hr.) unchanged P and S yield P_2S_5 and excess of S is either expelled or dissolved as a solid solution.

Ch. Abs. (*e*)

Stability of SO_2–lubricating oil solutions.—See I. **Crystallisation of conc. NH_3 liquor.**—See II. **Cast Fe for $NaHSO_4$ boilers. Corrosion by $NaNO_3$–KCl. Corrosion-resistant Pb and Al equipment.**—See X. **Fused-SiO_2 vessels [for acid concn.].**—See XI. **ZnO. TiO_2.**—See XIII. **Fertilisers.**—See XVI. **Ca silicates in medicine. Ca gluconate. Determining I in NaI and KI.**—See XX. **Determining CO_2 in air.**—See XXIII.

See also A., I, 37, **Activity of Cr catalysts [in SO_2 oxidation]. Prep. of D_2O, and persulphate, by electrolysis.** 38, **Action of electric discharge on N_2–O_2 mixture.** 41, **Ra. Eu compounds from monazite residues.** 45, **Analysis of A–N_2 mixtures.**

Patents.

Absorption in highly concentrated nitric acid of nitrous gases formed by the combustion of ammonia. Bamag–Meguin A.-G. (B.P. 455,734, 10.10.35. Ger., 19.1.35).—The hot gases are cooled rapidly to condense the H_2O, then mixed with sufficient air for oxidation to N_2O_4, and again cooled to separate the remainder of the H_2O as dil. HNO_3. To complete the oxidation to N_2O_4 the gases are passed up a tower packed with Raschig rings over which conc. HNO_3 is flowed, and the N_2O_4 is then condensed in conc. HNO_3 at −10° to −30°, the gases from the condensing chamber being finally scrubbed with the dil. HNO_3 previously produced. A. R. P.

Manufacture of alkaline liquors or salt solutions. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 452,302, 2.3.35).—Na–Hg from a Kestner cell is passed through a series of shallow vessels in countercurrent to a stream of H_2O so that the effluent contains 50% NaOH.

A. R. P.

Purification of caustic soda solutions. Pennsylvania Salt Manufg. Co. (B.P. 452,218, 18.2.35. U.S., 17.2.34).—Conc. aq. NaOH (700—800 g. per litre) is stirred at 70—80° with sufficient anhyd. Na_2SO_4 to cause all the contained NaCl to separate on cooling to 30° as a triple compound (I) of NaCl, Na_2SO_4, and NaOH. After removal of the purified lye, the residual (I) is heated at $>34°$ to produce a solution containing 16—26 (21)% NaOH which dissolves the NaCl, leaving the Na_2SO_4 for re-use.

A. R. P.

Production of magnesium hydroxide. H. H. Chesny, and Marine Chemicals Co., Ltd. (B.P. 455,335, 7.2.36).—$MgCl_2$ brines are heated with $Ca(OH)_2$ to ppt. $Mg(OH)_2$, the washed ppt. is suspended in H_2O, and the suspension boiled and dewatered to a thick paste which is dried with steam until the H_2O content is reduced to about 23%. The product is a light, white powder of the composition $Mg(OH)_2,H_2O$.

A. R. P.

Production of potassium formate. Chem. Fabr. Buckau (B.P. 452,471, 3.1.36. Ger., 31.1.35).—Milk-of-CaO is treated with CO at 180—200°/20—30 atm., and aq. K_2SO_4 is added at the same rate as it is used up in converting the $(HCO_2)_2Ca$ into $CaSO_4$ and HCO_2K. A. R. P.

Production of xanthates. E. D. Wilson, Assr. to W.-B. Chem. Co. (U.S.P. 2,021,930, 26.11.35. Appl., 3.11.33).—CS_2 vapour, produced by heating C with S in an electric furnace, is passed up a packed tower down which trickles alcoholic KOH or NaOH. The sludge from the foot of the tower is collected on an enclosed filter, the K or Na xanthate dried in vac., and EtOH, recovered by fractional distillation of the mother-liquors, is returned to the process.

L. C. M.

Manufacture of alums. S. S. Svendsen, Assr. to Clay Reduction Co. (U.S.P. 2,022,012, 26.11.35. Appl., 3.2.30).—In the prep. of Al salts from clays, *e.g.*, kaolin or orthoclase, the clay is calcined at 650—850°, then mixed with $(NH_4)_2SO_4$, and treated with NH_4F at 350°; the product is leached, the solution filtered, and $(NH_4)_2SiF_6 + NH_3$ distilled off. NH_4 alum is recovered from the solution and NH_4F from the gases. L. C. M.

Manufacture of [alkali] phosphates. L. Preisman, Assr. to Gen. Chem. Co. (U.S.P. 2,021,699, 19.11.35. Appl., 26.10.31).—Phosphate rock is treated with a mixture of H_3PO_4 and H_2SO_4; the $CaSO_4$ is removed, and the liquor treated with aq. Na_3PO_4 containing Na_2SO_4, obtained by the process of, *e.g.*, U.S.P. 1,037,837 (B., 1912, 922). $CaSO_4$ is again removed, the filtrate neutralised with Na_2CO_3, clarified, and aq. Na_2HPO_4 is produced. L. C. M.

Manufacture of superphosphates. L. B. Skinner (U.S.P. 2,021,671, 19.11.35. Appl., 19.1.31).—Limestone or phosphate rock, containing $\ngtr 30\%$ of H_2O, is ground to ¾-in. mesh, and treated with 85% H_3PO_4 at 100—210° in a rotating drum containing pebbles; H_2O is removed as it is formed and dry, powdered $CaHPO_4$ is produced. L. C. M.

Bleaching and germicidal compositions and their utilisation. Albright & Wilson, Ltd. (B.P. 455,611, 18.4.35. U.S., 19.4.34).—A dry mixture of $Na_6P_6O_{18}$ (I) with $Ca(OCl)_2$, BaO_2, Ca, Mg, Zn, or Cd perborate, or $Ca(HSO_3)_2$ is claimed. Na_3PO_4, Na_2CO_3, Na_4SiO_4, $NaAlO_2$, $NaBO_2$, or borax may be added to make the $p_H > 7$. The amount of (I) in the mixture is sufficient to prevent pptn. of alkaline-earth compound when the product is dissolved in H_2O.

A. R. P.

Production of persilicates of increased stability with high content of hydrogen peroxide or active oxygen. F. Krauss (B.P. 452,144, 14.12.34. Ger., 15.12.33).—SiO_2 gel or conc. aq. alkali metasilicate (I) is mixed with 30% H_2O_2 and the mixture dried in vac. at a low temp. Alternatively, (I) may be anodically oxidised at high c.d. Insol. products, *e.g.*, $BaSi_2O_5,2H_2O_2,3H_2O$, are prepared by adding sol. chlorides to a mixture of (I) and H_2O_2. A. R. P.

Manufacture of alkali selenides and tellurides. F. B. Downing and C. J. Pedersen, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,008,753, 23.7.35. Appl., 14.12.32).—Se or Te is heated with aq. NaOH or KOH and Al powder, or with MeOH or EtOH and metallic Na; 15—20% aq. Na_2Se or Na_2Te is obtained by the first method, and the corresponding solid salts by the second. Na_2Se may also be produced by heating a mixture of NaOH, HCO_2Na, and Se to fusion in a current of N_2. A. R. P.

(A) Production of pure lithium compounds from impure solutions. (B) Recovery of values from lithium-bearing ores. (C) Production of lithium compounds. (D) Recovery of lithium values from ores. (A, B) H. S. Colton, (C) H. P. Corson and R. Pfanstiel, (D) R. J. Kepfer and R. Pfanstiel, Assrs. to Grasselli Chem. Co. (U.S.P. 2,021,986—8 and 2,022,003, 26.11.35. Appl., [A—D] 20.1.34).—(A) Solutions containing NaOH, KOH, and LiOH are treated with aq. Na silicate; the ppt. of Li silicate is collected, washed, and treated with HCl or other acid, yielding SiO_2 and sol. Li salt. (B) Lepidolite is calcined with $CaCO_3$, and the mass leached with aq. $Na_2CO_3 + K_2CO_3 + Li_2CO_3$ (I); the clear solution is decanted and treated with aq. Na_2CO_3. The ppt. of Li_2CO_3 is filtered off, and the filtrate, carbonated with CO_2 from the calcination stage, yields (I). (C) Impure aq. Li_2SO_4 is treated with aq. Na_2CO_3 and the Li_2CO_3 filtered off and treated with HCl or other acid; the solution is filtered, and the Li salt isolated by concn. The mother-liquors are treated with Na_3PO_4 and the ppt. of Li_3PO_4 is returned to the ore-treatment stage. (D) Lepidolite is ground to 80-mesh, calcined with $CaCl_2$ 33—100 (67) wt.-% at 780—920 (840°), and the product leached with H_2O. L. C. M.

Dehydration of magnesium chloride. Magall A.-G., Zürich (B.P. 457,588, 1.5.36. Austr., 23.11.35). —In a graphite-lined electric furnace containing a central graphite cathode and filled with lumps of charcoal, an alkali chloride is melted by passing a d.c. between the lining and the graphite rod, and $MgCl_2,2H_2O$ is added slowly to the fused mass so that the H_2O is instantaneously evolved and the Cl_2 produced at the anode prevents hydrolysis of the fused $MgCl_2$. The charcoal serves not only as a deoxidiser, but also as a filter for the melt, which is drawn off from a taphole in the bottom directly to the Mg-electrolysis cells. A. R. P.

Production of hydrated magnesium silicate decolorising materials. L. Caldwell (B.P. 452,247, 2.12.35. U.S., 1.12.34, 26.4.35, and 10.5.35). —Aq. $MgCl_2$ is autoclaved at $>250°$ with finely-ground wollastonite, synthetic $CaSiO_3$, or a mixture of Portland cement and SiO_2. After washing out the $CaCl_2$ formed the residue forms a useful decoloriser and adsorbent for purifying sugar syrup etc. A. R. P.

Production of a calcium aluminate suitable for manufacture of sodium aluminate by treatment with soda lye. A./S. Norsk Aluminium Co. (B.P. 457,676, 20.8.35. Norw., 30.8.34).—Finely-ground bauxite is mixed with C and sufficient $CaCO_3$ to form $CaAl_2O_4$, Ca_2SiO_4, $Ca_2Fe_2O_4$, and $CaTiO_3$, and the mixture is briquetted and heated to redness. Extraction of the crushed briquettes with aq. NaOH affords aq. $NaAlO_2$. A. R. P.

Production of thixotropic preparations containing copper oxychloride. P. Kubelka (B.P. 452,950, 12.7.35).—$CuCl_2,3CuO,4H_2O$ (I), produced by passing aq. $CuCl_2$ over Cu and aërating the solution, is dewatered by centrifuging and then kneaded in a Werner–Pfleiderer machine with waste sulphite-cellulose liquor or molasses to produce a thixotropic gel with 600 g. of (I) per litre. A. R. P.

Production of antimony oxide [from antimonial lead]. E. L. W. Byrne. From Amer. Smelting & Refining Co. (B.P. 455,181, 13.12.35).—Antimonial dross (from the softening of hard Pb) containing $>40\%$ Pb is heated at 775—785° until covered with a thin oily film of slag, and air is blown over the charge, whereby pure Sb_2O_3 volatilises. Any crusts which form are broken up and removed from time to time by an Fe baler. A. R. P.

Differentially leaching ores to separate lead and other metals from zinc sulphide. M. G. Platten (U.S.P. 2,021,896, 26.11.35. Appl., 9.1.32). —Pb is removed from the crushed ore by leaching at 85° with saturated aq. KCl, NaCl, $CaCl_2$, or $MgCl_2$ containing $FeCl_2$ 4·5 and H_2SO_4 0·25%. L. C. M.

Production of hydrated ferric chloride. E. T. Ladd, Assr. to Isco Chem. Co. (U.S.P. 2,021,791, 19.11.35. Appl., 14.5.32).—H_2O is allowed to trickle down a tower, packed with scrap Fe, up which steam and Cl_2 are passed. Traces of $FeCl_2$ are removed from the resulting 60% aq. $FeCl_3$ by a second chlorination. L. C. M.

Separation of carbon dioxide and/or hydrogen sulphide from ammonia. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 455,865, 1.5.35).—The gas mixture is scrubbed (under pressure) with a monoalkylolamine at 105—120°, whereby only the H_2S and CO_2 are removed. The solvent is regenerated by slowly heating to 140—160°/1 atm. A. R. P.

Separation and purification of hydrogen. L. S. Twomey (U.S.P. 2,022,165, 26.11.35. Appl., 9.5.34). —Water-gas is cooled to −183° to remove $H_2O + CO_2$, scrubbed with aq. NaOH, cooled to condense $N_2 + CO$, then liquefied and decanted from the remaining solidified impurities. L. C. M.

Obtaining hydrogen sulphide. J. A. Shaw, Assr. to Koppers Co. of Delaware (U.S.P. 2,028,125, 14.1.36. Appl., 8.1.32).—H_2S is recovered from gas mixtures containing CO_2 by passing the gases through milk-of-CaO to absorb most of the CO_2, then through 10—15% aq. NaOPh which absorbs

H_2S in preference to CO_2. The H_2S is recovered by boiling the solution under reflux, and burned to SO_2 for making H_2SO_4. A. R. P.

Conversion of hydrogen sulphide into sulphur. B. H. Lincoln, Assr. to Continental Oil Co. (U.S.P. 2,021,865, 19.11.35. Appl., 26.5.33).—A gas mixture containing H_2S (*e.g.*, cracked petroleum gas) is freed from H_2S by scrubbing with hot aq. SO_2 in towers packed with activated C. S is recovered from the liquor and SO_2 removed from the purified gas by scrubbing with aq. NaOH. L. C. M.

Recovery of sulphur from sulphurous gases. Nat. Smelting Co., Ltd., S. Robson, and M. W. Travers (B.P. 458,073, 11.3 and 6.7.35).—The gasses are oxidised to SO_3 or H_2SO_4, which may be preheated, if desired, and are then introduced as vapour or spray into a reaction chamber, where they are reduced by carbonaceous material at 500—800°. Formation of by-products (CS_2) is avoided by controlling the proportions of the reactants and passing the hot gases through catalytic material (oxides of Fe and Al). W. J. W.

Manufacture of sulphur dioxide gas. I. Hechenbleikner, Assr. to Chem. Construction Corp. (U.S.P. 2,021,725, 19.11.35. Appl., 17.11.31).—Gases containing a small proportion of SO_2, at $>1150°$, are enriched by passage through a rotating cylinder containing sludge H_2SO_4 obtained from the refining of petroleum. L. C. M.

NH_4 compounds from [gas] liquors.—See II. **Corrosion-resistant Ni alloys.**—See X. **Electrolysis of Na_2SO_4.**—See XI. **Treating Zn pigments.**—See XIII. **Substances for use in rubber.**—See XIV. **Insecticide.**—See XVI. **Bi salts. Metallic keratinates.**—See XX.

VIII.—GLASS; CERAMICS.

Application of fused silica in heating processes. III. Heaters and radiants. B. Moore and R. Brown (Ind. Chem., 1936, **12**, 561—564; cf. B., 1936, 369).—The advantage of fused SiO_2 in electric and gas heaters are discussed. D. K. M.

Sapphire and other new combustion-chamber window materials. G. Calingaert, S. D. Horton, and R. Stair (J. Soc. Auto. Eng., 1936, **39**, 448—450).—A study was made of the properties, *e.g.*, mechanical strength, limits of transparency, and resistance to attack by PbO or CO, of quartz, spinel, sapphire, periclase, fluorite, and rock salt. Sapphire was not attacked by combustion products from petrol containing Pb. R. B. C.

Determination of iron in sands and glasses. A. R. Wood (J. Soc. Glass Tech., 1936, **20**, 324—325T).—Dissolution in HF + H_2SO_4 is followed by oxidation with Br and titration with $TiCl_3$ (NH_4CNS as indicator). J. A. S.

Determination of iron in sands by the spectrographic method. P. Gilard, L. Dubrul, and F. Jamar (J. Soc. Glass Tech., 1936, **20**, 326—332T).—The use of the Hilger E.2 apparatus is described in some detail. For Fe contents $>0{\cdot}1\%$ an accuracy of 5% is claimed. J. A. S.

Reactions in the solid state in the silicate industry. W. Eitel (Angew. Chem., 1936, **49**, 895—901).—The significance of solid reactions in silicate systems during the stages preceding sintering or fusion is reviewed with particular reference to the following topics: (*a*) ceramics: the formation of the metakaolin phase and of mullite, and the polymorphous transformation of SiO_2 etc., especially in presence of other oxides promoting sintering; (*b*) cement: the $CaO–Al_2O_3–SiO_2$ reactions, and the operation of small amounts of foreign oxides in forming polyeutectic melts; and (*c*) glass and enamel: the formation of $Na_2O–CaO–2CO_2$ and its function in the preliminary stages of the melt. J. S. A.

Decolorising of glass. F. C. Flint (J. Soc. Glass Tech., 1936, **20**, 358—374T).—A comprehensive review of present knowledge of the subject. J. A. S.

Decolorising of glass—a review. E. J. Gooding (J. Soc. Glass Tech., 1936, **20**, 375—383T).—Special reference is made to the use of Se and the effects of auxiliary agents such as As_2O_3, nitrates, and Na_2SO_4. An extensive bibliography is included. J. A. S.

Crushing and sieving of glass to ensure control of the surface of the grains. E. Berger (J. Soc. Glass Tech., 1936, **20**, 384—404T).—The dimensions of the particles of powdered glass were investigated statistically. The average grain vol. was independent of the composition of the glass or its thermal history. An optical shadow method of determining the average surface per unit vol. of glass powder is described. The average grain vol. and surface are determined by the mesh size and shape of grain or "form factor." The latter depends on (*a*) the shape of the glass before crushing (the use of well-annealed cullet is recommended), (*b*) the crushing process (*e.g.*, with or without the removal of fines), (*c*) the sieving process (type and duration), (*d*) errors in the sieve mesh, (*e*) the mesh size, and (*f*) the roughening of the grain surfaces, *e.g.*, by excessive inter-grain friction. Full instructions for the attainment of a const. average grain surface are given. J. A. S.

Thermal endurance of glass. W. M. Hampton (J. Soc. Glass Tech., 1936, **20**, 461—474T).—The present state of knowledge of the subject and standard test methods are reviewed. J. A. S.

General methods of determining the thermal endurance of glass. H. Schönborn (J. Soc. Glass Tech., 1936, **20**, 475—497T).—Previous investigations are reviewed and an account is given of quenching experiments on rods 120 mm. long × 2—20 mm. in diameter. The temp. differences at which first cracks (longitudinal) and first transverse cracks appeared are called the "technical" and "true" thermal endurance, respectively. It is considered that the longitudinal cracks are caused by surface flaws. The "true" is somewhat > the "technical" endurance and its "spread" is narrower. Annealing the rods decreases the effect of fire-polishing the (notched) cut ends. A thermal-endurance test is described in which quenching is repeated at the same temp. until cracking occurs. The thermal expansion of ordinary glasses is a reliable indication of their endurance. J. A. S.

Proposed standard thermal-endurance test based on the use of glass rods. Report of the Glass Standards Committee of the Society of Glass Technology (J. Soc. Glass Tech., 1936, 20, 498—510T).—Extensive data for H_2O-quenching tests on rods 5 cm. long × 2—6 mm. in diameter are presented, together with a statistical study. The results show promise of the possibility of formulating a general test. J. A. S.

Thermal-endurance tests for glassware. J. B. Murgatroyd (J. Soc. Glass Tech., 1936, 20, 511—516T).—A method employing a uniform temp. gradient (as distinct from "shock" tests) is described. A hollow vessel stands in cold, running H_2O while the temp. of the H_2O inside is slowly raised until fracture occurs. This test is more accurate and requires fewer test-pieces than do the shock tests. A shock test suitable for routine control of hollow ware is described. J. A. S.

Thermal endurance of glass articles. R. W. Douglas (J. Soc. Glass Tech., 1936, 20, 517—523T).—Cold-H_2O, external-quenching tests on two glasses in narrow-bore tube form did not forecast the facts that one of the glasses readily cracked during sudden heating in the blow-pipe flame whereas the other glass did not. The internal quenching of the tubes by suddenly filling with cold Hg did indicate that one glass would crack more readily than the other. This showed that the unsuitability of the one glass was due to the ultimate strength of its internal surface being adversely affected by flaws. When such flaws were diminished by treatment of the surface with HF, the behaviour of this glass both in the internal-quenching test and in the blow-pipe was improved almost to the standard of the more satisfactory glass. J. A. S.

Thermal endurance of glass. K. Tabata and T. Moriya (J. Soc. Glass Tech., 1936, 20, 524—529T).—Data for the relationship between the composition of a K_2O–Na_2O–B_2O_3–SiO_2 glass and its thermal endurance are recorded in tabular and graphical solid-model forms. The relationship is parabolic. J. A. S.

Report of progress on glass-durability [test] methods. W. C. Taylor (J. Soc. Glass Tech., 1936, 20, 405—415T).—Results of tests by several laboratories, on sheet and bottle glasses, using the A.C.S. No. 1 and Sheffield methods, are recorded. Data on the effects of different extraction liquids and of time and temp. factors are presented, together with a description of a "fogging test." The A.C.S. method is simple and more consistent than the Sheffield method, but will not give a true comparison of different types of glasses. Extraction with dil. alkali instead of acid might give a better indication of "general durability," but certain glasses may need specially modified tests. Emphasis is laid on the difference between the durability of a glass and a glass container. J. A. S.

Critical examination of the standard test for the chemical durability of glass bottles. A. Cousen (J. Soc. Glass Tech., 1936, 20, 418—427T).—An "alkali extraction" method for 4-oz. medicine bottles is discussed in the light of extended experience with it. The effects of glass composition, size, shape, and methods of manufacture, annealing, and storage are examined. The rate of boiling of the H_2O during the test and the annealing of the container are the most influential factors. The reproducibility of the results is given as 0·2 mg./sq. dm. J. A. S.

Mechanical strength of glass. A. J. Holland and W. E. S. Turner (J. Soc. Glass Tech., 1936, 20, 428T; cf. B., 1936, 1152). J. A. S.

Factors which influence the results in tests of the mechanical strength of glass. E. Albrecht (J. Soc. Glass Tech., 1936, 20, 429—431T).—The effects of size of test-piece, time of loading, temp., and type of fracture are discussed. J. A. S.

Nature of the mechanical strength of glass. A. Smekal (J. Soc. Glass Tech., 1936, 20, 432—448T).—Knowledge of the mechanism of rupture of glass is comprehensively reviewed. It is pointed out that methods of improving the mechanical properties of glass by the removal of flaws have, up to the present, been applied only to external flaws. Internal flaws are considered to be equally important. J. A. S.

Influence of specimen width on breaking strength of sheet glass. A. Smekal (J. Soc. Glass Tech., 1936, 20, 449—453T).—A logarithmic relationship is suggested for the results obtained by Turner and Holland (B., 1936, 1152). The rate of loading per unit cross-section is an influential factor in mechanical tests. J. A. S.

Powder method of comparing the solubilities of glasses. A. R. Wood (J. Soc. Glass Tech., 1936, 20, 416—417T).—The glass is mixed with a solution of indicators and the degree to which alkali is extracted is measured by the colour change. The result is recorded as the p_H of the solution when it has reached equilibrium. Care is taken to remove dust from the glass powder by washing with CCl_4. The method is not applicable to B_2O_3–SiO_2 glasses. J. A. S.

Suggested standards for the testing of safety glass. F. Versen (J. Soc. Glass Tech., 1936, 20, 454—460T).—The suggestions include impact, steam-chest, boiling, thermostat, and quartz-lamp tests for laminated glass, and sieve-testing of shattered "toughened" glass. J. A. S.

Comparison between the standard method and certain more rapid methods for the analysis of simple glasses. J. D. Cauwood and V. Dimbleby (J. Soc. Glass Tech., 1936, 20, 338—344T).—A no. of Na_2O–CaO–SiO_2 glasses were analysed by (*a*) fusion with Na_2CO_3 and (*b*) treatment with HF, in both cases Al + Fe being pptd. with aq. NH_3 and Ca with $(NH_4)_2C_2O_4$, followed by ignition. The rapid HF method gives very close agreement with the standard method if (1) the dissolution with HF is carried out slowly and to completion, (2) all the HF is driven off before taking up with HCl, and (3) the residual H_2SO_4 in solution is inappreciable. Two separate 15 ml. of HF and 1 ml. of conc. H_2SO_4 are sufficient for decomp. 1 g. of glass, the residue being ignited at 550—600°. J. A. S.

Application of 8-hydroxyquinoline to the Berzelius method of alkali determination in soda–lime–silica glasses. R. F. R. Sykes (J. Soc. Glass Tech., 1936, **20**, 345—350T).—Al and Mg were removed satisfactorily from the alkali-containing solution (after HF + H_2SO_4) if the hydroxyquinoline pptn. was carried out at p_H 9·5—10. Full analytical details are given. J. A. S.

Determination of alkali [in glass] by the autoclave method. A. R. Wood (J. Soc. Glass Tech., 1936, **20**, 351T).—The method described previously (B., 1935, 496) has given very satisfactory results during the last 2 years. It is not applicable to glasses containing heavy metals (Ba, Pb, Zn, etc.) or $>$0·2% of Fe_2O_3. Small amounts of B_2O_3 do not interfere. J. A. S.

Determination of carbon in glasses coloured by carbonaceous matter. K. Fuwa (J. Soc. Glass Tech., 1936, **20**, 333—337T).—The glass is powdered (in a CO_2 atm.) and dissolved in dil. H_2SO_4 + HF; the solution containing the pptd. C is oxidised with Ag_2CrO_4 in a special vac. apparatus, where the CO_2 is adsorbed by KOH, pptd. as $BaCO_3$, and this is titrated with 0·05N-HCl. Data are recorded for a glass (SiO_2 72, CaO 12, Na_2O 16) coloured with volatilised C black, graphite, and cane sugar. J. A. S.

Determination of iron in glass. N. E. Densem (J. Soc. Glass Tech., 1936, **20**, 303—314T).—Colorimetric, gravimetric, electrometric and volumetric oxidation–reduction methods for the determination of total Fe are described. Pratt's HF method for the determination of Fe^{II} was modified as follows. 1—2 g. of glass are quickly ground in air to normal analytical-method fineness and boiled (20 min.) in a 100-ml. Pt crucible (in CO_2 chamber) with 10 ml. of conc. HF + 25 ml. of air-free H_2O + 5 drops of conc. H_2SO_4, which solution has been previously boiled for 15 min. in an atm. of CO_2. The contents of the crucible are dissolved in 200 ml. of saturated H_3BO_3 + 100 ml. of H_2O + 10 ml. of conc. H_2SO_4 and titrated with 0·01N-$KMnO_4$ in an atm. of CO_2. J. A. S.

Application of spectrographic methods to glass analysis. B. S. Cooper (J. Soc. Glass Tech., 1936, **20**, 352—357T).—Applications to (1) preliminary qual. analysis, (2) testing the effectiveness of chemical separation, *i.e.*, purity of the ppt. or solution, (3) testing the purity of raw materials, (4) determining the minor constituents, and (5) identifying the inclusions in glass are described. J. A. S.

Action of hydrogen on alkaline glasses at high temperature. M. A. Foex (Compt. rend., 1936, **203**, 875—877).—Alkaline glasses heated at 850—1150° in H_2 lose considerable wt., the loss being the greater the higher is the ratio $[Na_2O]/[SiO_2]$. This loss is due to vaporisation of alkali, and increases the tendency to devitrify. The losses of Na_2O and K_2O, respectively, from Na and K glasses of similar mol. composition are in the ratio of their mol. wts. J. W. S.

Glasses coloured by carbonaceous matter. III. Chemical composition and physical properties. K. Fuwa (J. Soc. Chem. Ind. Japan, 1936, **39**, 373B; cf. B., 1936, 1207).—The carbonaceous content of the glasses had no influence on the chemical or physical properties. The limit of the light transmission depended only on the Fe_2O_3 content and not on the intensity of the apparent colour. A distinction was observed only in the region below λ 550 mμ. T. W. P.

Chemistry of the copper-red glazes. II. J. W. Mellor (Trans. Ceram. Soc., 1936, **35**, 487—491).—A discussion of the "peach-bloom" effect is continued (cf. B., 1936, 1040). J. A. S.

Precious metals as materials for decorating pottery and glass. W. P. Harmsworth (Sands, Clays, and Minerals, 1936, **3**, 49).—The uses of these metals in the form of liquid preps. in the ceramic industry are noted. C. I.

Accelerated drying of products from plastic clay without addition of non-plastic material. A. Selivanov (Stroit. Mat., 1935, No. 3, 6—9).—By controlling the process in the hot- and moist-process chambers with the aid of a blast and an exhaust fan, the flawed output was considerably decreased, cracks in the brick disappeared completely, drying was homogeneous (3—4 instead of 8—10 days), and less fuel was needed. Ch. Abs. (*e*)

Unusual type of scumming on buff brick. M. Barrett (Brit. Clayworker, 1935, **44**, 175).—Sol. alkali and alkaline-earth salts are primarily responsible for the defect. Addition of $\ngtr$1% of $BaCO_3$ was the most satisfactory method of correction. Ch. Abs. (*e*)

Copperheads or iron oxide defects in porcelain enamel. J. J. Canfield (Iron Age, 1935, **136**, No. 7, 30—34).—Small amounts of Fe_2O_3 lower the softening point of the enamel. Further amounts, up to 12%, have little effect; 30—50% of Fe_2O_3 raises this point greatly. Increase in the B_2O_3 increases the solubility of Fe_2O_3 in the enamel. Fe_2O_3 is formed during firing of the ground-coat. It is preferably all in solution in a layer ½ the thickness of the ground-coat. Excessive formation of Fe_2O_3 causes pock marks and copperheads. Ch. Abs. (*e*)

27th Rept. of the Refractory Materials Joint Sub-Committee. (A) **Effect of hydrocarbon gases on refractory materials. II. Effect of methane on refractory materials. III. Effect of coal gas on refractory materials.** E. Rowden and A. T. Green. (B) **Jointing cements. V. Behaviour of joints under tension and compression.** F. H. Clews, H. Booth, H. M. Richardson, and A. T. Green. **VI. Permeability of some fired cement joints.** F. H. Clews, H. M. Richardson, and A. T. Green. (C) **Action of alkalis on refractory materials. V. Action of potassium chloride vapour on refractory materials at 1000°.** F. H. Clews and A. T. Green. **VI. Action of the vapour from a potash–silica glass on refractory materials at 1200°.** F. H. Clews, H. M. Richardson, A. Chadeyron, and A. T. Green. (D) **Refractoriness-under-load test. IV. Further experiments on the maintained-temperature test.** F. H. Clews and A. T. Green. (E) **Further experiments on the behaviour of**

silica mixes on being pressed. F. H. Clews and A. T. Green. (f) **Heat balance and performance of a muffle tunnel kiln fired by town gas.** E. Rowden (Inst. Gas Eng., 1936, Comm. 143, 88 pp.; cf. B., 1936, 60).—(a) Firebrick specimens subjected to the action of CH_4 at 880° were heavily coated with C and were readily disintegrated, but SiO_2 specimens were not adversely affected. Similar effects were noticed with coal gas at 900°, but no reaction occurred at lower temp.

(b) Extensive load-deformation data are recorded for test-joints heated in a laboratory Hirsch furnace. A slightly expansile cement is desirable, but a ball-clay bond without other flux (such as Na silicate) gave poor strength. Ganister–CaO mixes were found to heal fractures if maintained at 1300° under load. It was found impossible to indicate by gas-permeability tests whether a joint was technically sound or not.

(c) Lightly fired fireclay and SiO_2 materials were more readily attacked by KCl vapour, and the Fe_2O_3 content was found not to have any (catalytic) effect. The porosity of a test-piece did not account for the degree of adsorption of vapour. Test-pieces attacked by KCl vapour were found to undergo a linear expansion as high as 3% and their mechanical strengths were lowered. No full explanation of this reaction has yet been found. Similar results were obtained with the vapour from a K_2O–SiO_2 glass.

(d) Minor sources of inaccuracy in the measurement of the subsidence were examined.

(e) The results obtained with ganister were similar to those reported previously for sillimanite.

(f) Comprehensive test-data are recorded.
J. A. S.

Dry pressing in the refractory-grog industry. P. P. Kuzmenko (Trans. VI Mendeleev Congr., 1935, 1932, 2, No. 1, 466—472).—Results are given on the production of grog ware by the dry-pressing method with Boyd presses, using Tshassov-Jar clays.
Ch. Abs. (*e*)

Effect of alkalis on refractories, with particular reference to the gas and coking industries. H. T. S. Swallow (Gas J., 1936, **216**, 422—424).—Experiments showed that the vesicular structure and "flaking" of brickwork exposed to alkali salts, which Cobb attributed to the action of the alkali oxides derived from the chlorides and sulphates, is due, not to the basic, but to the acid, radical. Na_2CO_3 does not cause the bloating and flaking of furnace refractories. The use of Na_2CO_3, CaO, or "activated" coke is not likely to cause undue wear of refractories. J. A. S.

Determination of grinding power of various abrasives in comparison with diamond. W. Dawihl, K. Schröter, and M. Stockmayer (Z. Ver. deut. Ing., 1936, **80**, 1001—1003).—Investigations of the abrasive properties of B_4C, B (obtained from BF_3), cryst. B, and SiC showed them to be greatly inferior to diamond dust. R. B. C.

Spun glass etc. insulation.—See I. **MgO. Determining traces of Fe oxide in glass.**—See VII. **Fire cements.**—See IX. **Heating of fused SiO_2 vessels. Materials for electrical heating.**—See XI. **Sulphite waste liquor [in clay-working].**—See XXIII.

See also A., I, 11, **Phosphorescent glass.** 30, **System CaO–MgO–SiO_2 in the temp. range 600—1200°.**

Patents.

[Electrically heated] tunnel kilns. Siemens-Schuckertwerke A.-G. (B.P. 457,024, 17.7.36. Ger., 22.7.35).—Transverse, blade-like baffles depending from the ceiling and upstanding from the floor are shaped so as to convert any gaseous currents developing in the kiln into local eddies. B. M. V.

Drying plant such as potter's mangles. J. Wedgwood & Sons, Ltd., and C. T. Wedgwood (B.P. 456,509, 15.7.36).—A potter's mangle, comprising a vertical shaft containing an elevator both runs of which are utilised to dry the goods, is provided with a single aperture (*A*) for charging and discharging; both the middle separating wall and the outer walls are of zigzag shape, and the goods pass upwards from *A*, then downwards the full distance, and upwards a short distance back to *A*, the heating means being at the bottom. B. M. V.

Guide or support for molten glass. C. A. Weller, Assr. to Baker & Co., Inc., and to Westinghouse Electric & Manufg. Co. (U.S.P. 2,031,083, 18.2.36. Appl., 21.1.33).—Alloys suitable for contact with glass at temp. at which wetting will take place comprise Pt 80—99 (90) and Rh 20—1 (10)%.
B. M. V.

Manufacture of glasses resistant to alkali-metal vapours. Corning Glass Works (B.P. [a] 455,460, [b] 455,945, and [c] 456,551, [a—c] 25.10.35. U.S., [a—c] 6.11.34. [b, c] Addns. to [a]).—(a) The surface of ordinary glass is covered with a very thin film ($\ngtr$0·01 mm.) of B_2O_3 or alkali borate by coating the surface with a suitable mixture, which is then fired at about 600°. The mixture may be applied to the surface as an aq. solution or as B_2O_3 vapour which may be derived from a Me_3BO_3 flame or the oxidation of B. A suitable solution consists of a 10—20% solution of salts composed of B_2O_3 (90—95) + alkali oxides (10—5%). (b) The fired-on surface film consists wholly or mainly of alkali oxide. (c) The film consists of B_2O_3 + alkali fluoride.
J. A. S.

[Opal glass envelopes for] luminous discharge lamps. Corning Glass Works, Assees. of H. P. Hood (B.P. 456,325, 30.6.36. U.S., 8.1.36).—Glasses of which the opacities are not affected by reheating to the softening point are formed by melting a batch containing CaF_2 and one of the components $AlF_3,3NaF$ Na_2SiF_6, KF, or AlF_3, in the ratios between 1 : 1 and 3 : 1. J. A. S.

Strengthening of glass. Corning Glass Works, Assees. of C. J. Phillips (B.P. 455,751, 17.1.36. U.S., 11.2.35).—The glass is "fortified" by dipping in a bath of NaOH + KOH at 750°, and then suddenly chilling (*e.g.*, to 20°). The fortification may also be brought about by etching with HF, and the process may be carried out independently of and prior to the chilling process. J. A. S.

L (B.)

Tempering of glass. F. A. Clemo. From Amer. Securit Co. (B.P. 457,488, 30.5.35).—The heating furnace and blowing frames are arranged to move so that the apparatus occupies little head room and the glass sheet has not to be moved. J. A. S.

Glass pipe-lines. Neue Glasind. Ges., G.m.b.H. (B.P. 457,143, 21.5.35. Ger., 6.6.34).—The tubes are manufactured of glass of high chemical and physical resistance, which properties are enhanced by surface-hardening by known methods. [Stat. ref.] B. M. V.

Safety glass. J. W. Kamerer and Le R. S. Whitmire, Assrs. to Duplate Corp. (U.S.P. 2,030,878, 18.2.36. Appl., 21.10.33).—The safety layer is combustible, soft when heated, and of such size as to project beyond the glass to which it is cemented. The projecting edges are burned off and while the edges are soft, dry pressure being applied locally; finally the whole plate is subjected to fluid pressure. B. M. V.

Manufacture of enamels, glazes, and the like. Sioto Ges.m.b.H. (B.P. 456,714, 22.5.36. Ger., 22.5.35 and 6.1.36).—Mg borosilicate or fluoroborosilicate (*e.g.*, SiO_2 30—50, B_2O_3 10—30, MgO 15—35, alkali compound 10—20%; or SiO_2 30—50, B_2O_3 10—30, MgO 4—35, alkali compound 10—20, CaO 0—10, F 1—7%) prepared by sintering or wet pptn. is used as a batch constituent. This constituent, which may replace B_2O_3 and Pb_3O_4, avoids discoloration of the product, does not affect the power of the opacifying agents, and makes possible low-softening point products, with a low coeff. of expansion. J. A. S.

Manufacture of white clouded enamel. I. Kreidl (B.P. 455,771, 7.5.36. Austr., 25.9.35).—The whiteness of a "gas cloud" opacifier is improved by the introduction of $<1\%$ of the oxide or a compound of Sb, U, Ce, Fe, or As. J. A. S.

Zinc sulphide as an opacifier for enamels glasses, or the like. R. W. Hannagen (B.P. 455,980, 1.5.35).—The whiteness and finish of a ZnS-opacified product are improved by the introduction of ZnO as the oxide or as a compound [$ZnCO_3$, $Zn(OAc)_2$] which will form the oxide during the subsequent heat-treatment. J. A. S.

Refractory brick for lining rotary furnaces. Oesterr. Amerikan. Magnesit A.-G. (B.P. 455,809, 5.7.35. Austr., 14.8.34).—The arch-bricks are formed with the face constituting the outside circumference not square with the radial face; thus the bricks touch the steel shell only over a small area and partial heat insulation is effected by the air pockets. B. M. V.

Refractory building materials. V. M. Goldschmidt (B.P. 456,207, 3.6.36. U.S., 4.6. and 16.7.35).—A highly refractory mixture consists substantially of chromite (I) or a (I)–magnesite mixture, the olivine content of which is $\nless 50$ (10—40) wt.-%. J. A. S.

Manufacture of silicon carbide resisters. A. J. Thompson, Assr. to Globar Corp. (U.S.P. 2,032,077, 25.2.36. Appl., 17.11.31. Renewed 6.7.35).—Many different sp. resistances are obtained from only a few main mixtures for preparing recryst. SiC by varying the composition of a coat of slurry containing SiO_2, C, and Si, which is applied before curing. B. M. V.

Heat-conducting walls. Carborundum Co. (B.P. 456,825, 16.5.35. U.S., 31.5.34).—Aluminous material ($\nless 85\%$ of Al_2O_3, the remainder being substantially alkaline-earth oxide) is fused and cast. The thermal conductivity is $>0·015$ g.-cal./cm. cube/sec. B. M. V.

Manufacture of grinding wheels. Norton Grinding Wheel Co., Ltd. (B.P. 456,097, 14.2.36. U.S., 14.2.35).—An outer annulus is composed of diamond and resin bond (I), and the inner disc of granular material and resin bond (II). The proportion of grains and the coeffs. of contraction of (I) and (II) during maturing are equal in each zone. B. M. V.

Abrasive articles. W. J. Tennant. From Carborundum Co. (B.P. 456,985, 18.5.35).—Individual elements of bonded abrasive are attached to yieldable material which is thin compared with the elements and is backed by a flexible support. It comprises soft rubber, resinous material, and alkyd and modified vinyl resin cements; the support may comprise an endless band of metal, and to form a wheel it may be filled with a circular core. B. M. V.

Adhesive or binder [for sandpaper]. R. P. Carlton, Assr. to Minnesota Mining & Manufg. Co. (U.S.P. 2,030,743, 11.2.36. Appl., 23.5.25).—A nitrocellulose, or other cellulose derivative, solution containing a resin, gum camphor, and castor oil is used as binder. S. M.

Manufacture of water-resistant sandpaper and other abrasive papers. C. Ellis, Assr. to Ellis–Foster Co. (U.S.P. 2,031,362, 18.2.36. Appl., 18.2.27. Renewed 9.9.33).—Paper is rendered H_2O-resistant by incorporation of wax and coated with an abrasive which is bound by a composition containing nitrocellulose and an oil-modified alkyd resin. S. M.

Manufacture of granule-coated webs. W. J. Tennant. From Carborundum Co. (B.P. 456,532, 10.5.35).—The fabric is coated with adhesive, then with elongated granules oriented to stand up and finally, after allowing to set, with a sizing coat. B. M. V.

Centrifugal separation of solids [clay].—See I.

IX.—BUILDING MATERIALS.

Various admixtures of Portland cement. I. Absorptive power of lime by the dried admixtures at 105°. M. Ôno (J. Soc. Chem. Ind. Japan, 1936, **39**, 365—366B).—A quant. relation exists between the residue on drying and the decolorising effect on Rhodamine-B. There is also a relation between the latter effect and the degree of absorption of CaO. Such absorption takes place in two stages, viz., an early physical adsorption and later a chemical combination. T. W. P.

Influence of addenda on the setting of Portland cement. I. Formation of calcium sulphoaluminosilicate on addition of calcium sulphate. S. Yamane (J. Soc. Chem. Ind. Japan, 1936, **39**, 379—380B).—Portland cement (total CaO 66·96, free CaO 0·17, SiO_2 21·96, Al_2O_3 6·28, Fe_2O_3 3·31, MgO 1·10%) is shaken with twice its wt. of H_2O free from CO_2. After 1 min. the mixture is filtered and to the clear solution $CaSO_4,\frac{1}{2}H_2O$ (I) is added in amount = twice the wt. of $CaSO_4,2H_2O$ sol. in the above solution. After 25 min. crystals of $5CaO,Al_2O_3,SiO_2,4CaSO_4,44H_2O$ appear; this compound was also prepared by addition of Na silicate and (I) to a solution of $CaO–Al_2O_3$. On shaking $CaSO_4$ containing Portland cement with H_2O (1 : 1), Ca sulphoaluminosilicate is formed in the filtrate instead of Ca aluminosilicate. E. P.

Corrosion of Volsk Portland cement. M. N. Ambrojii (Abh. Staatsuniv. Saratov, 1936, **1**, 47—48).—$MgSO_4$ solutions deteriorate Portland cement faster than do $MgCl_2$ solutions. J. J. B.

Quick-setting and heat-evolving cements. I. Cements with unit activity index. K. Akiyama (J. Soc. Chem. Ind. Japan, 1936, **39**, 357—358B).—Various types of quick-setting cements are classified. Preliminary data on mixes of aluminous and Portland cements, and on mixes of the former with CaO, showed that cements containing both CaO,Al_2O_3 and $2CaO,SiO_2$ are probably quick-setting. The experimental methods used in making up synthetic cements to test this are described. T. W. P.

Use of fire cements in industry. W. O. Lake (Sands, Clays, and Minerals, 1936, **3**, 51—52).—For temp. of 1400—1600° $Al_2O_3–SiO_2$ refractories with 30—35% Al_2O_3 are generally used, but material with >60% Al_2O_3 would last longer. High-temp. jointing cements cannot be used at 800—1400° as vitrification does not occur, and it is for this range that fire cements are designed. C. I.

Zinc phosphate cement. R. H. Volland, G. W. Paffenbarger, and W. T. Sweeney (J. Amer. Dental Assoc., 1935, **22**, 1281—1306).—The cement powder is essentially calcined ZnO with MgO and other oxides. The liquid is an aq. solution of H_3PO_4 buffered by addition of ZnO, $Al(OH)_3$, or of both. Factors affecting the setting time are examined. Ch. Abs. (*p*)

"Tegul": sulphur jointing compound for bell and spigot pipe. C. R. Payne (Water Works and Sewerage, 1935, **82**, 317—318).—The cement contains S 40 and sand 60%, and has 32·5% of voids. Ch. Abs. (*p*)

Cements for concrete road construction. H. E. Schwiete (Zement, 1936, **25**, 791—798).—The effects on cement quality of increasing the content of Fe_2O_3, CaO, SiO_2, or Al_2O_3 ran parallel with the resultant content of $3CaO,SiO_2$, which should therefore be kept as high as possible. Quality also improved with fineness of grinding, but mechanical loss in transit and working properties place an upper limit to this factor. Several cements supposedly specially made for road work were found to give tests inferior to those given by standard Portland cement. G. H. C.

Determination of resin in bituminous road materials. (Mlle.) M. Barraud (Bull. Inst. Pin, 1936, **3**, 193—195).—The product is saponified and the resin obtained after separation in the form of its soap. Corrections may be applied for the saponifiable content of the bitumen or the unsaponifiable matter of the resin. If oil acids are suspected they must be separated for the resin acids by esterification. L. A. O'N.

Ring width and summer wood content of pulp wood. R. Trendelenburg (Papier-Fabr., 1936, **34**, 484—490).—A large no. of woods from different European countries were examined (cf. Sieber, B., 1937, 125), and their annual ring widths, *d*, and summer wood content are tabulated. There is no definite relation between these properties of wood of the same origin; different conditions of growth, however, produced distinctive changes in their relation. The advisability of considering ring width in conjunction with summer wood content in assessing the val. of wood for pulp-making is suggested. D. A. C.

Progressive effects of *Polyporus versicolor* on physical and chemical properties of redgum sapwood. T. C. Scheffer (U.S. Dept. Agric. Tech. Bull., 1936, No. 527, 45 pp.).—In affected wood enzymes attacking the pit membranes were produced in advance of the hyphæ. The bleaching effect of *P. versicolor* is due to destruction of semi-sol. pigments and does not depend on consumption of lignin. During decay the relative proportions of the principal wood components were not greatly altered. Lignin, pentosans not in cellulose, H_2O- and 1% alkali-sol. constituents were first attacked. Cellulose (Cross and Bevan), pentosans in cellulose, and hot H_2O-sol. matter were not attacked until part of the wood substance had been consumed. Effects on strength of timber are recorded. Initial loss of strength was due to removal or modification of small amounts of cell-wall lignin and sol. carbohydrates which cement together the fundamental units of cellulose. A. G. P.

Butter boxes and mould growth. W. Riddet and J. C. Neill (New Zealand J. Agric., 1936, **53**, 129—139).—Moulds originating from box timber can infect the surface layer of butter and is not prevented by two layers of parchment. The penetration is prevented by using Al-foil parchment. Defrosting butter at high room temp. and R.H., allowing air to penetrate to the inner surface of the box, and the use of sap- instead of heart-timber, stimulate mould growth. Various types of New Zealand white pine are susceptible to moulds if rotary cut, but less susceptible when sawn. Waxed Swedish pine boxes prevent moulds, but impart an undesirable timber taint to the butter surface. W. L. D.

Nature and action of fireproofing agents [for wood], with special reference to mining. E. Kirst (Braunkohle, 1936, **35**, 777—783, 798—803).—Results of laboratory tests with various proprietary fireproofing agents, *e.g.*, Totix, Minolith, Paratect, and Cellon, are reported. In general, spraying or painting the surface of the wood is less efficacious than impregnation with salts. No method is of val. if the wood has been splintered by rock movements. R. B. C.

Tests of inflammability of mine timbers. H. Schultze-Rhonhof (Glückauf, 1936, **72**, 649—655, 682—686).—Factors influencing inflammability are

discussed. Tests with timbers untreated, and treated with Minolith, showed that fireproofing lessened, but did not prevent, the danger of inflammability.
R. B. C.

Dedusters [for cement-kiln gases].—See I. **Asphaltic road materials.**—See II. **Wood-*d* and pulp strength. Newsprint penetration tester. Opacity measurements on paper.**—See V. **Determining CO_2 in stone dust.**—See VII. **Reactions in silicate industry. Refractory materials.**—See VIII. **Synthetic resins in wood protection. Al paint for wood. Paints for army stores.**—See XIII. **Sulphite waste liquor [for cement].**—See XXIII.

See also A., I, 43, **Ag_2CrO_4 in gelatin sol as "spot" test [for Cl′ on wood].** A., III, 33, **Physiology of dry rot.**

PATENTS.

Cement. L. McCulloch, Assr. to Westinghouse Electric & Manufg. Co. (U.S.P. 2,032,142, 25.2.36. Appl., 11.10.34).—Na silicate cement resistant to H_2O comprises powdered flint 62, Na silicate 14, H_2O 14, AlF_3 10%. It is mixed to produce reaction products and dried at 100—300° (125°).
B. M. V.

Apparatus for (A) manufacturing, treating, and cooling, (B) manufacturing and treating, cement clinkers. H. S. Lee (U.S.P. 2,031,047 and 2,031,049, 18.2.36. Appl., [A] 13.2.32, [B] 13.9.33).—In a cooling device (A) or clinker-treatment chamber (B) at the lower end of a rotary cylindrical kiln, the air for combustion is caused to pass through the clinker on a conveyor the speed of which is accelerated if the temp. of the air becomes too high.
B. M. V.

Production of light-weight plasters. J. C. Best and F. L. Marsh, Assrs. to Best Bros. Keene's Cement Co. (U.S.P. 2,031,585, 25.2.36. Appl., 18.9.33).—Gypsum is calcined to $\frac{1}{2}H_2O$ and agitated in H_2O to re-form $CaSO_4,2H_2O$, the much smaller crystals of which are recalcined to $\frac{1}{2}H_2O$.
B. M. V.

Moulding or like mixtures [for wall plugs]. N. Phillips (B.P. 457,523, 27.5. and 2.11.35).—Holes for the insertion of screws in masonry, plaster, etc. are plugged with a paste containing a fibrous substance and a binder which sets hard within a few hr. The paste may be prepared, *e.g.*, by wetting with H_2O a mixture of asbestos, cement or plaster of Paris, flour (as temporary binder), and a powder, *e.g.*, bath-brick.
S. M.

Mastic floor topping. H. K. Linzell, Assr. to United States Gypsum Co. (U.S.P. 2,031,171, 18.2.36. Appl., 5.5.32).—7—2·5 pts. of $CaSO_4$ are mixed with 1 pt. of an aq. emulsion of an org. waterproofing material (*e.g.*, asphalt, synthetic resin, or linseed oil) stabilised to $Ca^{\cdot\cdot}$ or tervalent ions by means of plastic clay.
B. M. V.

Insulating materials.—See I. **Fibre products. Synthetic boards.**—See V. **Heat-conducting walls.**—See VIII. **Cementitious paint.**—See XIII. **Adhesives.**—See XV. **Impermeabilising stony masses etc.**—See XVI.

X.—METALS; METALLURGY, INCLUDING ELECTRO-METALLURGY.

[Metal-]melting processes in high vacuum. W. Kroll (Z. Elektrochem., 1936, **42**, 873—876).—A discussion.
E. S. H.

Cupola hot-metal duplexing for the electric steel foundry. H. B. Kinnear and H. W. Gillett (Met. & Alloys, 1936, **7**, 301—308).—Methods of producing small heats of alloy and plain steels are reviewed. Trials made in a 4-ton direct-arc basic furnace with metal melted in a cupola, though inconclusive, suggest that, using the Na_2CO_3 method to reduce the S content and a cupola with heated forehearth, duplexing would give a satisfactory product with a power consumption $\not>$350 kw.-hr./ton. The chief advantages are a reduction in max. power demand and a probable saving in the total cost.
S. J. K.

Cast iron for sodium bisulphate boilers. V. I. Naumov (Chim. Mashinostr., 1935, No. 4, 27—28).—The following composition is recommended: C 3·0—3·5, Si 1·3—1·5, Mn 0·7, P 0·2—0·3, S $\not>$0·05%.
Ch. Abs. (*e*)

Automobile foundry work. E. Player (Proc. Inst. Auto. Eng., 1935—36, **30**, 528—546).—Problems arising in the production of automobile cylinders are discussed. Notes are given on core and moulding sands, and on cylinder-Fe structure and composition in relation to casting properties, wear-resistance, and machinability.
R. B. C.

Moulding sand tests in Great Britain. N. D. Ridsdale (Sands, Clays, and Minerals, 1936, **3**, 65—66).—Tests for H_2O content and physical properties recommended by a Committee of the Institute of British Foundrymen are described.
C. I.

Consequences of graphitic corrosion of cast iron. W. A. Wesley, H. R. Copson, and F. L. Laque (Met. & Alloys, 1936, **7**, 325—329).—Formation of a graphitised layer on cast Fe can influence subsequent corrosion processes by decreasing or preventing further corrosion of the cast-Fe base, accelerating it, or accelerating the corrosion of uncoated Fe in galvanic contact with the graphitised part. Experimental results are given and illustrations drawn from commercial practice.
A. J. K.

Determination of chromium and sulphur. Combined method for cast iron and steel. H. T. Brown (Ind. Chem., 1936, **12**, 549).—The metal is dissolved in dil. H_2SO_4 and the H_2S evolved is absorbed in aq. $CdCl_2$. The liquid containing CdS is gradually added to dil. HCl, the H_2S being titrated, as liberated, with I solution. The Fe solution is oxidised with HNO_3, boiled, and filtered. $Cr_2(SO_4)_3$ in solution is oxidised to $K_2Cr_2O_7$ (I) by adding $KMnO_4$ (II) to the boiling solution, excess of (II) being reduced by adding $MnSO_4$. After filtration the (I) is determined by adding excess of aq. $FeSO_4,(NH_4)_2SO_4$ and back-titrating with standard (II).
D. K. M.

Preparation of iron by reduction with hydrogen. V. F. Opotzki, A. F. Tiulpina, and C. A. Leiderman (Ukrain. Chem. J., 1936, **11**, 231—236).—Impure Fe is dissolved in HCl, Fe carbonate pptd. by

$NaHCO_3$, and the ppt. collected, calcined, and reduced with H_2 at 750°. The reagents should be free from SO_4''. R. T.

Preservation of iron and steel by means of paint. L. A. Jordan and L. Whitby (Res. Assoc. Brit. Paint, Colour, and Varnish Manufrs., Bull. 16, 1936, 68 pp.).—The modern theory of corrosion is applied to the study of the protective action of paint towards Fe and steel. The influence of the different pigments and media, of the pigment/medium ratio, of the type and proportion of driers, of the method of application, including pretreatment of the metal surface, of the condition of the surface and of the atm. at the time of application, and of the composition of the metal on the resistance of the system to corrosion are dealt with both from the theoretical viewpoint and from a detailed consideration of published results. The main conclusions are summarised in tabular form. D. R. D.

Constitution and structural hardening of austenites containing beryllium and carbon. M. Ballay (Compt. rend., 1936, **203**, 724—726; cf. A., 1936, 151).—The effect of added Be on the hardness of austenites has been investigated. Hardening is due to pptn. of a Be compound sol. in austenite. A. J. E. W.

Quench-ageing of commercial mild steel. J. A. Jones (Metallurgist, 1936, **10**, 171—174).—Age-hardening occurs after quenching from temp. just $<$ the beginning of the Ac1 change. Small inherent grain size does not affect the hardening, but prevents simultaneous embrittlement. Both hardening and embrittlement are reduced by Ti additions, and are completely suppressed when Ti : C is 3 : 1. C. E. H.

Influence of high temperatures on stud-bolt steel. D. Wilson (Steam Eng., 1936, **5**, 430—431, 477—478).—The development and properties of a creep-resistant, Cr–Mo steel, known as Durehete, which is suitable for the manufacture of stud bolts, are discussed. R. B. C.

Influence of heat-treatment on working properties of steels. W. Leyensetter (Z. Ver. deut. Ing., 1936, **80**, 1299—1300).—The influence of heat-treatment on the cutting properties of steels of different compositions is discussed. R. B. C.

Corrosion-resistance of steels low in copper. U. Gordenne (Rev. univ. Mines, 1936, [viii], **12**, 365—368).—The resistance of C steel (0·008—2·44% Cu) to attack by 30% H_2SO_4, 0·5% HCl, and 0·3% citric acid was investigated. Steel containing 0·4% Cu was the most resistant. R. B. C.

Corrosion-resistant stainless steels and irons. J. H. Critchett (Mech. Eng., 1936, **58**, 823—826).—A comprehensive review of the properties of the various types available. R. B. C.

Corrosion-fatigue in wire ropes. H. Altpeter (Glückauf, 1936, **72**, 1009—1010).—Existing knowledge is reviewed. Galvanising is the most effective method of preventing corrosion. R. B. C.

Heat flow as cause of corrosion. H. Krenn (Arch. Wärmewirts., 1936, **17**, 115—118).—Experiments in support of the view that corrosion in boilers, superheaters, and turbines is due to the action of electric currents passing between unevenly heated metallic parts in contact with a dil. electrolyte are discussed. R. B. C.

Resistance to damage by overstress of precipitation-hardened copper steel and copper-malleable [iron]. H. W. Russell (Met. & Alloys, 1936, **7**, 321—324).—Resistance to damage by overstress is measured by determining the no. of cycles at loads $>$ the endurance limit that fatigue specimens (knotched or regular) will withstand without damage, damage being determined by re-running the overstressed specimens at the endurance limit, when failure before 10^7 cycles denotes damage. A Cu steel containing 1·2% Cu showed rather poor resistance to overstress, but after pptn.-hardening very good resistance, especially on the knotched specimens. Similarly for a Cu malleable Fe with 1·12% Cu, and the Ford crank-shaft alloy (1·78% Cu, 1·66% C), even though in this latter alloy pptn.-hardening treatment did not increase the strength. A. J. K.

Corrosion of metals in the reaction between sodium nitrate and potassium chloride. M. A. Miniovitsch and M. S. Komarovski (Chim. Mashinostr., 1935, No. 3, 11—13).—The corrosion of Fe, Cu, Al, and Cr–Ni steel in the course of the reaction $NaNO_3 + KCl = KNO_3 + NaCl$ at 90—120° was studied. Air used for mixing promotes corrosion. Live steam should be used. Fe was the most resistant. Red Cu is less so. Al can be used only with $<3\%$ of NaCl present. Yellow Cu is unsuitable. In using an Fe boiler it is recommended to have in solution 30—35 g. of Na_2CO_3 per litre to passivate the Fe. Ch. Abs. (e)

Refining of molten simple copper alloys in the foundry. W. Claus (Metallwirts., 1936, **15**, 862—865).—The principles of the various methods adopted are reviewed and discussed. C. E. H.

Copper and copper-base alloys in the construction of corrosion-resistant equipment and structures. R. A. Wilkins (Mech. Eng., 1936, **58**, 809—822).—The compositions, chemical and physical properties, and uses of Cu, various brasses and bronzes, and other Cu alloys are summarised. Corrosion data are tabulated. R. B. C.

White metals and bronze bearings from the manufacturers' point of view. M. Melhuish (Proc. Inst. Auto. Eng., 1936, **30**, 431—443).—The manufacture of Sn- and Pb-base white metals, and the influence of impurities, *e.g.*, Fe, Zn, and Bi, and of methods of alloying on their properties are discussed. The various methods of lining with white metals are compared. R. B. C.

Copper–beryllium alloys with high conductivity and hardness. W. Hessenbruch (Z. Metallk., 1936, **28**, 320—323).—The tensile strength and κ of numerous alloys of Cu with 0·15—2% Be and small amounts of Zr, Cr, Si, Co, Fe, Mn, Sn, Cd, Ni, or Al have been determined. κ varied from about 20% of that of Cu with a strength of 140—150 kg./sq. mm. (Be 2, Co, Fe, Mn, or Si 0·5%) to 85% of that of Cu

with a strength of about 40 kg./sq. mm. (Be 0·3, Zr 0·5%). Numerous uses of the alloys are indicated.
A. R. P.

Determination of corrosion-resisting properties of metals and alloys against flue-gas condensate. F. P. Mueller (Amer. Gas Assoc. Month., 1936, **18**, 35—37).—The effects of the prolonged action of aq. condensate, obtained during the combustion of town's or natural gas, on various metals, *e.g.*, sheet Al, Cu, and Pb, and on Cr–Ni–Fe alloys, are shown in tables. Corrosion is probably due to H_2SO_4 originating from S in the gas. R. B. C.

Quantitative spectral analysis of zinc. R. Breckpot and W. Körber (Ann. Soc. Sci. Bruxelles, 1936, **56**, **B**, 384—403; cf. A., 1935, 719).—Data are tabulated and discussed for the spectral determination of Ag, As, Bi, Cd, Cu, Fe, Ge, In, Mg, Ni, Pb, Sb, Sn, and Tl, using a ZnO base. N. M. B.

Zinc alloys as substitutes [for other alloys]. A. Burkhardt (Z. Metallk., 1936, **28**, 299—308).—The solid solubility of Al in Zn rises from 0·05% at 20° to 0·8% at 380°, and that of Cu in Zn from 0·3% at 20° to 2·7% at the peritectic temp. (424°); in the ternary system the max. solubility is Cu 3·4, Al 1·6%, that at 300° Cu 2·6, Al 1·2%, and that at 20° Cu 0·6—0·8, Al 0·1—0·2%. The ternary eutectic point is 370°, Al 7, Cu 4%, and the 4-phase reaction $\beta \rightleftharpoons \alpha + \beta' + \varepsilon$ occurs at 270°. From a study of the dimensional changes which occur on ageing alloys with 4% Al and up to 2·7% Cu with 0 or 0·04% Mg three commercial alloys have been developed which can be used as substitutes for screw brass and lautal; these are (*a*) the 4% Al–2·7% Cu alloy having a high tensile stength and impact-resistance, (*b*) die-casting alloys of the " Zamak " type, and (*c*) alloys with Cu 0·4—0·7, Al 4, and Mg 0·04%, having a yield point of 35—38 kg./sq. mm., a tensile strength of 41—43 kg./sq. mm., an elongation of 10—15%, a reduction in area of 45—55%, a Brinell hardness of 95—105, and a vol. change of only 0·01—0·05% on ageing. A. R. P.

Zinc die-castings. H. Chase (Auto. Eng., 1936, **26**, 496—500).—The constitution, chemical and physical properties, and automotive applications of Zn-base alloys of the " Zamak " and " Mazak " types are discussed. R. B. C.

Zinc in the chemical industries. E. A. Anderson (Mech. Eng., 1936, **58**, 799—802).—Data on the resistance of Zn-coated sheet Fe to corrosion by industrial atm. and by H_2O, and on the relation between coating thickness and service life, are given.
R. B. C.

Corrosion of metals by non-electrolytes. II. L. G. Gindin, I. I. Torsuev, and R. S. Ambarzumian (Bull. Acad. Sci. U.R.S.S., 1936, 75—89; cf. B., 1936, 698).—Corrosion of Zn by cracking benzine is due to production of acids by autoxidation of hydrocarbons, as well as to other acids from the asphaltogenic constituents of the benzine. In certain cases a protective film forms on the Zn surface.
R. T.

Corrosion of the tinplate container by food products. II. T. N. Morris and J. M. Bryan (Dept. Sci. Ind. Res., Food Invest., Spec. Rept., 1936, No. 44, 54 pp.; cf. B., 1931, 591).—The corrosion of Sn by dil. citric acid (I) is accelerated by $Fe^{\cdot\cdot}$ or $Cu^{\cdot\cdot}$, unaffected by $Sn^{\cdot\cdot\cdot\cdot}$, and retarded by sucrose or NaCl (within a certain p_H range). In presence of air at 25°, lactic, tartaric, and malic acids have approx. the same corrosive effect as has (I), but Sn is not attacked by AcOH or succinic acids. $H_2C_2O_4$ is particularly corrosive. The corrosion of Sn is reduced by alloying with $\not>$0·5% of Sb or Bi. The corrosion of mild steel by the same reagents has been studied with particular regard to the influence of p_H. The influence of rate of diffusion of H_2 through steel, with or without a Sn coating, on canning practice is discussed. Factors affecting the polarity of the Fe–Sn couple are reviewed in the light of canning practice, with special reference to the composition of the basis steel for tinplate. E. S. H.

Nickel in Canada. A. H. A. Robinson (Sands, Clays, and Minerals, 1936, **3**, 11—20).—A historical survey of the Ni industry. Present procedure in the treatment of the ores is reviewed. C. I.

Nickel and nickel-base alloys. Their use in the design of corrosion-resistant machinery and equipment. F. L. Laque (Mech. Eng., 1936, **58**, 827—843).—The compositions, chemical and physical properties, and applications of Ni, Ni-clad steel, various types of monel, inconel, the Hastelloys, and illium are summarised. Data on the resistance of these materials to corrosion by acids, alkalis, fruit juices, etc. are tabulated. R. B. C.

Influence of certain ions on acid corrosion of nickel and iron. L. E. Sabinina and L. A. Polonskaja (J. Appl. Chem. Russ., 1936, **9**, 1405—1415).—Corrosion of Fe or Ni in 0·1N- and N-H_2SO_4, and in 0·1N-AcOH, is enhanced by Cd and inhibited by Hg and Pb salts. In particular, corrosion of Ni is completely inhibited by 0·00004M-$HgSO_4$. R. T.

[Ageing of silver-rich] silver–copper–silicon alloys. T. C. Jarrett (Met. & Alloys, 1936, **7**, 309—313).—Four alloys were examined, containing, respectively, Cu 6·99, Si 0·87%; Cu 3·16, Si 0·32%; Cu 1·86, Si 0·14%; and a coinage alloy with 10% Cu and no Si, for reference. Alloys were quenched from 700° and measurements of Brinell hardness, tensile properties, and conductivity made during ageing at 100°, 200°, 300°, and 400°. In the ternary alloys the initial hardness after quenching decreases as the amount of intermetallic compound (Cu_3Si) decreases. The actual final hardness obtained is about the same in all cases. The tensile strength increases with the amount of compound, whilst elongation and reduction of area decrease. In all cases the conductivity increases as time and temp. of ageing increase. No changes in microstructure are detected in slowly-cooled or aged, as compared with as-quenched, specimens. A. J. K.

Influence of impurities on the properties of lead. IV. Effects of antimony on rate of recrystallisation of distorted lead. V. Creep tests on electrolytic lead and some of its alloys. R. S. Russell. **VI. Influence of tellurium on the creep rate of commercial lead.** J. N. Greenwood and H. K. Worner (Proc. Austral. Inst. Min.

Met., 1936, No. 101, 23—32, 33—36, 57—87).—IV. Pure Pb (99·9995%) recrystallises completely within 5 min. of rolling, but after addition of 0·05% Sb recrystallisation may take up to 14 days and occasionally some areas recrystallise independently of others. This behaviour is due to coring and may be completely prevented by annealing for 10 days at 300° in vac. after cold-rolling to 66% reduction; subsequent cold-rolling produces recrystallisation in 2 hr. at 20°. Grain size is completely unaffected by alloying pure Pb with Sb.

V. Under an applied stress of 500 lb./sq. in. the life of pure Pb is 25 days and the elongation at failure is 34%; addition of even minute amounts of impurities considerably prolongs the life under this creep stress, but their effect is much less marked under stresses of 350 lb./sq. in. except in the case of Bi. Pure Pb with the addition of 0·04% Te shows a gradually increasing rate of creep and cracks severely after 12% elongation. Exposure to air during the application of stress reduces the elongation at fracture, which suggests that oxide diffuses into Pb at room temp.

VI. The hardness of cold-rolled Pb containing 0·01—0·1% Te begins to decrease 2—3 days after rolling, reaching a const. val. after 100 days. Recrystallisation takes several weeks at 20°, but is complete in <30 min. at 60°. Under a load of 500 lb./sq. in. the rate of creep continuously increases during the test and is greater the higher is the Te content, which indicates that Te actually softens Pb despite its beneficial effect on the tensile strength and Brinell hardness. Tests made 10 weeks after rolling show that ageing increases the rate of creep of Te–Pb to an extent which is greater the higher is the Te content. After 26 weeks' storage, Pb with 0·05% Te fractures in 79 days with 72% elongation, whereas commercial Pb remains unfractured after 250 days and the elongation is only 4·5%. The effect of Te on Pb may be summarised thus: it refines the grain size after cold-work, prevents the development of work-hardening under applied stresses of 500 lb./sq. in., produces an increased general elongation under creep conditions, and decreases the reduction in area at the point of fracture. A. R. P.

Corrosion-resistant lead equipment. G. O. Hiers (Mech. Eng., 1936, **58**, 793—798).—Tables show the physical and chemical properties of standard grades of Pb, and their resistance to corrosion by various concns. of aq. NH_3, NaOH, H_3PO_4, H_2SO_4 Na_2CO_3, and other acids and salts. The uses of Pb in the chemical industry are summarised.

R. B. C.

Corrosion of lead–sodium alloys. A. B. Schachkeldian and M. N. Ambroji (Abh. Staats-univ. Saratov, 1936, **1**, 73—82).—The loss of wt. of anodes from two Pb–Na alloys during electrolysis of aq. H_2SO_4, NaOAc, NaCl, Na_2SO_4, $NaNO_3$, $(NH_4)_2SO_4$, and their mixtures was measured. It is in some solutions $<$ the loss of wt. of a Pb–Sb anode as used in accumulators. J. J. B.

Bearing metal in the transport industry. H. N. Bassett (Chem. and Ind., 1937, 9—11).—In linings $>\frac{1}{16}$ in. thick, bearing metals having hard grains and a soft matrix act best, whilst in thin linings pure Sn or Pb is preferable. In transport conditions alloys are always used, either white metals or, for heavy loads, Cu alloys. Suitable alloys for various purposes are described. Cracking of white-metal linings, particularly in Diesel engines, is mainly due to bad adhesion. In such bearings Cu–Pb alloys are now often used. C. I.

Alloys of deformable chromium. W. Kroll (Z. Metallk., 1936, **28**, 317—319).—Alloys of Cr with 3—9% of Fe, Ni, Co, Al, Si, Mo, W, V, Ti, Zr, and Ta have been prepared by sintering mixtures of the powders first at 1200° in vac., then at 1500—1700° in A. All the alloys except the high-Ni alloy can be hot-rolled to thin sheet, but are brittle at room temp. Even a high oxide content has no deleterious effect on the hot-rolling properties, and it is therefore suggested that the brittleness of aluminothermically-produced Cr alloys is due to the presence of small amounts of S, P, C, or As. Ni has the greatest and Ta the least hardening effect on Cr. A. R. P.

Boron: the metal and its uses. L. Sanderson (Sands, Clays, and Minerals, 1936, **3**, 33—35).—The effect of adding metallic borides to steel, Cu, and Ni and the properties of the alloys produced are discussed; methods for determining B in steel are given.

C. I.

Aluminium and its alloys in the design of corrosion-resistant machinery and equipment. E. H. Dix and R. B. Mears (Mech. Eng., 1936, **58**, 784—792).—Typical compositions and properties of the various types of alloys are tabulated, and resistance to corrosion by sea-H_2O, acids and alkalis, etc. is discussed. R. B. C.

Resistance of aluminium–manganese alloys to chemical and atmospheric attack. W. Helling (Aluminium, 1936, **18**, 473—477).—Alloys containing 0—3% Mn were tested in H_2O vapour and in aq. solutions of $HNO_3 + HCl$, AcOH, NaOH, H_2SO_4, H_2SO_3, $NaCl + H_2O_2$, HCl, and "MBV" salts. The Mn additions reduced attack in some cases, but increased it in others. C. E. H.

Corrosion-resistance of cast hydronalium. G. Siebel (Aluminium, 1936, **18**, 511—518).—The various hydronalium (Al–Mg) alloys are very resistant in the cast condition to corrosion by sea-H_2O spray, and their resistance is unaffected by a homogenising heat-treatment. Localised corrosion is stimulated by the presence of microscopic cavities, but these are avoided if 1% of Si is added to the alloys. 0·3% of Mn has a beneficial effect. C. E. H.

Causes of electrochemical corrosion of iron and its alloys in moist aërated media. E. Herzog (Arh. Hemiju, 1936, **10**, 54).—A correction (cf. B., 1936, 994). F. R.

Corrosion of metals. P. Ronceray (Bull. Soc. chim., 1936, [v], **3**, 2154—2155).—A claim for priority over Herzog (B., 1936, 994). F. L. U.

Grinding and polishing for metallography. W. H. Dearden (Metallurgist, 1936, **10**, 157—159, 162—164).—Recent developments in technique are reviewed. C. E. H.

Extraction of metals from their sulphur-bearing ores. I. Ciochina (Chim. et Ind., 1936, 36, 898—900).—Laboratory experiments with an electric furnace show that the extraction of metals from various minerals is easily performed by heating in a current of H_2. Various Cu sulphide and sulphate ores, Ag sulphide ores, and Ni sulphide ores have been successfully treated. Some carbonate and arsenide ores are also suitable. Libethenite (Cu phosphate-hydroxide) also gives a good yield. In mixed ores the more volatile metals are carried away in the gas current, and almost pure Cu, Ag, etc. can be obtained. The reactions generally start at about 380—420°, the optimum temp. being about 950—1200° for most ores. Certain other ores, *e.g.*, molybdenite, siderite, etc., have also been successfully reduced. Sn, Sb, Pb, and Al are too volatile for satisfactory yields to be obtained. Cr sulphide ore does not react. Yields are lower if water-gas is used in place of H_2, and with Ni and Fe ores smaller yields are given owing to carbonyl formation. The possibilities of technical application are considered. J. L.

Growth of the electroplating industry. D. J. Macnaughtan (J. Electrodep. Tech. Soc., 1936, 11, 155—181).—A historical review. C. E. H.

Power supply for electroplating, with particular reference to rectification. A. Smart (J. Electrodep. Tech. Soc., 1936, 11, 109—116). C. E. H.

Plating by the ampère-hour-meter method. R. W. Wilson (Metal Ind., N.Y., 1936, 34, 387—388).—Descriptive of the method which provides controlled thickness. L. S. T.

Production of nickel sheets by [electro-]deposition. A. I. Wynne-Williams (J. Electrodep. Tech. Soc., 1936, 11, 143—153).—A normal electrolyte is used, with a rapidly rotating cathode and high c.d. The product is sufficiently ductile without annealing. C. E. H.

(A) Deposition of bright nickel coatings on unpolished surfaces. (B) Formation of striated nickel coatings. G. S. Vozdvishenski (J. Appl. Chem. Russ., 1936, 9, 1416—1422, 1423—1426).—(A) [with R. Z. Suleimanova]. Bright Ni coatings are obtained on unpolished Fe surfaces by electrolysis at 20—25°, with a c.d. of 8—10 amp./sq. dm., and with an electrolyte containing $NiSO_4$ 245, H_3BO_3 16, and $CdCl_2$ 0·3 g. per litre, at p_H 4·5—5·5. Under these conditions the coating has a high H_2 content, leading to high internal tensions, as a result of which the Ni is deposited in very small crystallites.

(B) [with I. A. Makolkin]. Striated Ni deposits are obtained when the $[Zn^{\cdot\cdot}]$ of the electrolyte is $>0·47\%$ at 20°, or $>0·65\%$ at 60°. The effect is ascribed to deposition of Zn–Ni alloy at the cathode, as a result of the depolarising effect of Ni on the process of deposition of Zn. At the same time the p_H of the solution around the cathode rises, leading to formation of positively-charged particles of $Ni(OH)_2$, which are also deposited on the cathode. R. T.

Control of silver-plating solutions. E. J. Dobbs (J. Electrodep. Tech. Soc., 1936, 11, 104—108). Methods are described for the determination of Ag, free cyanide, and carbonate, and suitable limits are suggested. C. E. H.

Electrodeposition of sheet chromium. R. H. Roberts (Trans. Faraday Soc., 1936, 32, 1722—1723).—Conditions for the deposition of sheets about 1 mm. thick are described. F. L. U.

Electrodeposition of manganese using insoluble anodes. C. G. Fink and M. Kolodney (Trans. Electrochem. Soc., 1937, 71, Preprint 3, 21—32).—Chloride and sulphate baths are discussed. The best deposits are obtained from a solution containing $MnSO_4$ 100—200 g., $(NH_4)_2SO_4$ 50 g., glycerol 50 c.c. per litre operated at 25° in the p_H range 2·5—3·0, the c.d. being 10—12 amp. per sq. dm. Graphite anodes are used and a diaphragm is necessary. Hard, silvery-white plate of considerable thickness can be deposited. The plate oxidises rapidly, but after rendering passive by immersion in aq. 5% $Na_2Cr_2O_7$ the initial brilliancy is preserved indefinitely. Mn can be co-deposited with either Fe or Zn. J. W. C.

Chemical colouring of metals. J. W. Perring (J. Electrodep. Tech. Soc., 1936, 11, 75—86).—Details are given of processes employed for Cu, brass, bronze, Ag, and Ni. C. E. H.

Electrolytic oxidation of aluminium in the patent literature. K. Nischk and F. Markhoff (Metallwirts., 1936, 15, 1170—1172, 1196—1199).—The principal patents, with notes on the characteristics of the processes covered, are given in tabular form. C. E. H.

Construction and use of welding machines. A. Matting (Wärme, 1936, 59, 595—600).—Physical processes involved in the production of metallic and C arcs are discussed and descriptions given of welding machines, including automatic welders, in common use. R. B. C.

Electro-analysis of silver–copper alloys. W. L. Miller (Ind. Eng. Chem. [Anal.], 1936, 8, 431—432).—The sample is dissolved in dil. HNO_3, and the solution made alkaline with aq. NH_3. Ag is deposited cathodically by electrolysis of this solution. The residue is acidified with HNO_3, and Cu determined electrolytically by the usual method. E. S. H.

Analysis by "internal" electrolysis. I. Determination of bismuth and copper in lead alloys containing antimony and tin. B. L. Clarke, L. A. Wooten, and C. L. Luke (Ind. Eng. Chem. [Anal.], 1936, 8, 411—414).—Modified apparatus and technique (cf. B., 1930, 773) enable the procedure to be used in HNO_3–HF mixtures, thus extending its applicability to Pb–Sn alloys. E. S. H.

Crushers. Recording dilatometer. Hardness testing.—See I. **Metal spraying in the dyeing etc. industry.**—See VI. **Precious metals for pottery etc.**—See VIII. **Materials for electrical heating. Al electrodes.**—See XI. **Painting steel. Paints for army stores.**—See XIII. **Milk-pasteurising plant.**—See XIX.

See also A., I, 16, **Crystallisation of Cu.** 17, **Cu_2Sb and Fe_2As.** 23, ***X*-Ray spectrum analysis of Cu–Zn alloys. System Mo–C. Crystal structure of ternary Mg alloys.** 30, **System Pb–Bi.**

33, X-Ray study of surface Al–Cu alloys. 37, Black Ag. Electrolysis of aq. solutions of Na_2SO_4 and $ZrOSO_4$. 41, Ra. Reduction of B_2O_3 by Mn. Eu from monazite residues. 42, Action of N_2 on steels. 48, Separation of Bi from Cd.

Patents.

Smelter. G. A. La Voie (U.S.P. 2,032,706, 3.3.36. Appl., 19.2.34).—A reverberatory furnace fired by oil and suitable for moist ore is provided with a feeding device which depends through the roof and constricts the passage of the hot gases and deflects them on to the bed. B. M. V.

Apparatus for fusing metals. J. A. Zublin (U.S.P. 2,022,171, 26.11.35. Appl., 22.12.34).—A construction of arc furnaces adapted for the production of alloys which segregate readily from mixtures of the powdered metals is described. L. C. M.

Handling of slag. R. N. Wilson (U.S.P. 2,031,352, 18.2.36. Appl., 11.6.32).—Molten slag from the furnace is solidified in the buckets of an inclined conveyor and disrupted by falling upon a grating. B. M. V.

Heat-treatment of metal bars. A. P. Newall (B.P. 453,005, 28.5.35).—A combination of a heating furnace with inclined hearth and quenching chamber is claimed. [Stat. ref.] A. R. P.

Heat-treating apparatus [for metal articles]. H. W. McQuaid, Assr. to Timken–Detroit Axle Co. (U.S.P. 2,021,666, 19.11.35. Appl., 5.10.33).—A case-hardening apparatus consists of sheet-steel boxes, shaped to conform with their contents, resting upon a corrugated and perforated sheet-steel base which allows free circulation of furnace gases. L. C. M.

Electrical furnaces for heat-treatment of metals. Birmingham Electric Furnaces, Ltd., A. G. Lobley, and T. G. Tanner (B.P. 457,093, 15.5.35).—In automatically temp.-controlled furnaces the resisters in the door (where the heat losses are largest) are not cut out altogether when the resisters in the body are switched off, but are connected to an auxiliary supply (transformer) at a reduced voltage. B. M. V.

Apparatus for production and supply of gaseous atmospheres for use in heat-treatment of metals. S. N. Brayshaw and F. Rushton (B.P. 452,489, 27.2.35).—A combination of combustion furnace for producing a controlled gas composition, compressors, purifiers, control valves, etc. is claimed for use in bright-annealing, case-hardening, etc. A. R. P.

Production of rustless iron. W. B. Arness, Assr. to Rustless Iron Corp. of America (U.S.P. 2,021,979, 26.11.35. Appl., 20.7.33).—A charge consisting of stainless-steel (Cr 17, C 0·1%) scrap 12,600, steel scrap 3250, chrome ore (48% Cr_2O_3) 2850, and mill scale 1000 lb. is melted in an arc furnace (1630—1720°); when the C content falls to 0·05%, 75% Fe–Si 1400 and CaO 4500 lb. are added, and N_2 is introduced into the slag. The Si and Mn content is adjusted by addition of Fe–Si and Fe–Mn, alloying metals are added if required, and the steel, containing N approx. 0·06%, is tapped off. L. C. M.

Protection of iron and steel surfaces from corrosion. S. O. Cowper-Coles (B.P. 453,157, 7.3.35).—The surfaces are sprayed with a primary coat containing Pb_3O_4 and a filler, *e.g.*, china clay, SiO_2, Al_2O_3, $BaSO_4$, or slate dust, and, when this is tacky, with a suspension of Zn, Al, or Mg dust in a volatile vehicle. A. R. P.

Manufacture of [steel] blanks. B. H. Payne, Assr. to Stulz–Sickles Co. (U.S.P. 2,021,945, 26.11.35. Appl., 18.6.32).—In the manufacture of hollow drill-steel (C 0·7, V 0·2%) billets, the drilled billet is fitted with a core of welding steel (C 0·6—0·9, Mn 11—13·5, Ni 2·5—3·5, Si 0·6—0·95%); it is then hot-rolled to the required dimensions and the core (of lower coeff. of expansion) removed on cooling. L. C. M.

Production of forged steel roll. C. B. Ferree (U.S.P. 2,022,192, 26.11.35. Appl., 30.1.35).—Rolls of steel containing C 0·75—0·95 and Co 1·3—1·8% are cast, forged, heated at 810°, cooled slowly, machined, chilled from 810°, and tempered by quenching from 220°. L. C. M.

Iron or steel alloy. Alloy Res. Corp. (B.P. 452,416, 18.1.35. U.S., 20.1.34).—The alloy contains Cr 10—25, Ni 7—15, Mo + Cu 5—7, C $<$ 0·15, W 2—3, and Mn 2—5%. Mo should be $\nless$2 and Cu $\nless$2%. A. R. P.

Alloy steels and articles made therefrom. W. G. Hildorf, A. E. White, and C. L. Clark, Assrs. to Timken Roller Bearing Co. (U.S.P. 2,021,781—3, 19.11.35. Appl., 20.11.31).—Claim is made for steels suitable for: (a) boiler tubes, heat exchangers, etc., containing C 0·01—0·2 (0·025), Mn 0·2—1 (0·23), Si 0·5—1 (0·5), Cr 0·75—1·5 (1·2), W 0·5—1·5 (1·13), and V 0—0·5 (0)%; (b) valve parts, stay rods, etc., for use at $>$400°, containing C 0·2—0·6 (0·46), Mn 0·2—1 (0·47), Si 0·5—1 (0·72), Cr 0·75—1·5 (1·35), W 0·75—1·5 (0·9), and V 0·01—0·5 (0·3)%; and (c) use at $>$540°, *e.g.*, for grate bars or carburising boxes, containing C 0·01—0·6 (0·5), Mn 0·2—1 (0·75), Si 1—3 (2·41), Cr 1·5—3 (2·78), W 0·25—1 (0·55), and V 0—0·5 (0)%. L. C. M.

Chromium-steel seamless tubes. Electro Metallurg. Co., Assees. of R. Franks (B.P. 453,056, 5.3.35. U.S., 13.4.34. Addn. to B.P. 397,646; B., 1933, 972).—The steel contains Cr 15—35 (28), C 0·05—0·5 (0·3), N 0·15—0·62 (0·25), and C + N $\nless$0·3%. No grain-growth occurs at 900°, even after 6 months' heating, and the steel resists destruction by carburising gases. A. R. P.

Production of metal [bronze] powders. E. Kramer (B.P. 453,142, 5.3.35. Ger., 5.3.34).—An arrangement of a ball mill, air or inert gas blowers, and collecting chambers for the powder blown out of the mill is claimed. The mill is attached to a weighing machine which weighs it at intervals to ascertain the amount of new material to be charged. A. R. P.

Alloy for dental plates. A. R. Powell, and Johnson, Matthey & Co., Ltd. (B.P. 425,401, 28.2.36).—An alloy for casting dental plates consists of

Pd 20—40 ($\not<$30), Ag 65—35, Cu 15—30 (15), and P (added as Cu_3P) 0·05—0·25 (0·15)%. A. R. P.

Welding pen tips to pen nibs. Pfanstiehl Chem. Co., Assees. of C. Pfanstiehl (B.P. 452,861, 29.12.34. U.S., 13.1.34).—The hard alloy tip is "tacked on" to the completed pen nib before splitting and then fused in a small H_2 arc. A. R. P.

Chemical process and [metallic] product [from titanium]. S. M. Burton (B.P. 457,923, 5.3.35).—Dry Cl_2 is passed over KI at 300—450°, and the gaseous products are bubbled through acidulated H_2O in which is a pair of electrodes to cause electrolysis. The resultant gases are passed over a mixture of Te 10, MnO_2 10, and Mo 1—2 pts. at 300—450°, again through acidulated H_2O, and then to a vessel containing Ti and heated to 300—400°. A cyclic exothermic reaction begins and proceeds for some hr., after which the heat is discontinued, the vessel exhausted, and the metallic product separated. W. J. W.

Preparation of colloidal dispersions of metals in oils. J. C. Bird, Assr. to Standard Oil Development Co. (U.S.P. 2,021,885, 26.11.35. Appl., 6.1.32).—Oily solutions of Na + heavy-metal sulphonates are heated at 85—220°, whereby the metal is liberated in a colloidal form. The use of dispersions of Cu as fungicides, of Pb and Se as antiknock compounds, of Bi and Hg in radiotherapy, and of Ag, Bi, and Hg in medicine is suggested. L. C. M.

Treatment of discrete [metal] particles and vapours. F. R. Kemmer, Assr. to Magnesium Products, Inc. (U.S.P. 2,032,215, 25.2.36. Appl., 14.2.34).—For the liquefaction of metal powders in presence of CO, *e.g.*, Mg dust from the reduction furnace, the gas-borne powder is injected tangentially into a cyclone apparatus maintained at a temp. between the b.p. and m.p. of the metal, the rate of formation of liquid being such that the wall is maintained wet. B. M. V.

Metallic coating recovering device. M. J. Brizard (U.S.P. 2,031,030, 18.2.36. Appl., 22.4.35).—A bag filter for recovery of (metallic) dust is described. B. M. V.

Etching of metals [aluminium]. Mallory Patents Holding Co., Ltd. (B.P. 453,042, 31.12.35. U.S., 31.12.34).—The surface to be etched is treated with dil. HCl while in contact with Cu gauze. A. R. P.

[Corrosion-resistant] aluminium alloys. Deuts. Gold- u. Silber-Scheideanst. vorm. Roessler (B.P. 452,952, 18.7.35. Ger., 19.7.34).—Addition of 0·1—6 (0·8—2·5)% of Th to alloys of Al with Na ($\not>$2), Mg ($\not>$10), Mn ($\not>$3), Cu ($\not>$12), Zn ($\not>$10), or Si ($\not>$24%) is claimed to increase their resistance to corrosion by sea-H_2O. A. R. P.

Metal working [*e.g.*, extrusion of aluminium alloys]. Aluminium, Ltd., Assees. of R. L. Templin (B.P. 452,885—6, 21.6.35. U.S., 22.6.34).—(A) The ingot is extruded through a die at 260—450° to 50% reduction, then restored to the original shape by an upsetting or die-forging operation. (B) The apparatus and details of the procedure are claimed. A. R. P.

Manufacture of [rubber-]coated [steel] articles. (A, B) Nat. Standard Co., (A) Assees. of E. C. Domm (B.P. 453,224 and 453,190, 29.12.34. U.S., [A] 30.7.34. Addns. to B.P. 425,297; B., 1935, 679).—Steel wire is pickled in 8—10% HCl, passed through a bath of (A) molten Pb or Sn or a Pb–Sn alloy, or (B) Cd, then through a wiper to remove excess of the coating metal, electroplated with Cu, and finally coated with a rubber mix which is subsequently vulcanised. A. R. P.

Decoration of metal articles by electrolysis. H. D. Elkington. From Kansas City Testing Lab. (B.P. 452,464, 30.8.35).—The articles are made cathodes in an alkaline lactate solution containing $CuSO_4$ or salts of Fe and/or Co, whereby they become coated with oxide films the colour of which varies with the thickness and operating conditions. A. R. P.

Porous consolidated products of metal and/or metal carbides. V. Sauter and F. Klonnek (B.P. 452,411, 19.11.34).—Mixtures of granular and powdered metals and/or carbides are consolidated by subjection to high-frequency, high-tension a.c. in A, NH_3, or hydrocarbon atm. A. R. P.

Electrolytic recovery of silver from photographic baths. H. G. Doffin (B.P. 452,466, 13.12.35. Fr., 20.12.34).—A Cu–stainless steel couple is immersed in spent developing solution to deposit the Ag on the steel. A. R. P.

Production of magnesium and alkaline-earth metals by electrolysis of fused starting materials. Magall A.-G. (B.P. 452,269, 7.3.36. Austr., 13.3.35).—Compressed lumps of an intimate mixture of MgO and C are used as anode material in the electrolysis of fused $MgCl_2$ so as continually to replenish the bath with $MgCl_2$. A. R. P.

[Apparatus for] electrolytic oxidation of small [aluminium] articles in bulk. Langbein–Pfanhauser-Werke A.-G. (B.P. 452,257, 11.1.36. Ger., 12.1.35).—A perforated container with a plunger for keeping the articles in contact is used as the anode. A. R. P.

Welding rod. W. W. Sieg (U.S.P. 2,022,439, 26.11.35. Appl., 18.6.34).—A Zn alloy, suitable for brazing, m.p. 1020°, contains Si 0·02—0·12 (0·1), Mn 0·02—0·12 (0·1), Fe 0·01—0·05 (0·05), B 0·0005—0·05 (0·05), Sn 0·05—0·1 (0·05), and Cu 58—59·5%. L. C. M.

Hg-vapour generator. Plating articles. Ore-crushing mill. Separating mixed solids.—See I. **Sb_2O_3 from antimonial Pb. Magnetite deposits containing U.**—See VII. **Guide for molten glass.**—See VIII. **Cu-wire fuses.**—See XI.

XI.—ELECTROTECHNICS.

Electrical external and internal heating of vessels of fused silica, with especial reference to internal heating by submerged units. A. (Frhr.) von Beaulieu Marconnay (Chem. Fabr., 1936, 9, 541—544).—Fused SiO_2 possesses ideal qualities for the application of external electrical-resistance heating with good efficiency. With internal heating, however, 90—95% thermal efficiency can be readily obtained. It may be applied directly to the concn. of acids (except HF and H_3PO_4), the heating unit being enclosed in a SiO_2 tube. Various types are described. C. I.

Selection of materials for production of heat by electricity. W. Hessenbruch (Chem. Fabr., 1936, 9, 525—529).—A review of the materials used in electric furnaces, and their deterioration. R. S. B.

Klein accumulator with small self-discharge. G. Nehlep and K. H. Koepernik (Chem. Fabr., 1936, 9, 531).—The cell has an anode of PbO_2 rod surrounded by a cylindrical Cd plate as cathode, in 32% H_2SO_4, the reaction being $Cd + PbO_2 + 2H_2SO_4 \rightleftharpoons CdSO_4 + PbSO_4 + 2H_2O$, and the e.m.f. 2·24 volts with no load. Charge and discharge curves are given for 100 milliamp. The self-discharge is only 1% in 1 month, 2—3% in 2 months, and 7% in 3 months. The cell is lighter than a Pb accumulator, and is suitable for use in high-tension batteries. R. S. B.

Electrical control of chemical processes. A. D. E. Lauchlan (Chem. & Ind., 1936, 969—974).—The control of processes, manually and automatically by p_H and κ measurements, is discussed. D. K. M.

Progress in p_H-value determination. A. Kufferath (Arch. Wärmewirts., 1936, 17, 307—309).—Various types of apparatus developed for boiler work are diagrammatically described. R. B. C.

Gas-insulating film on aluminium electrodes. O. Jansch (Aluminium, 1936, 18, 486—487).—A practically insulating film is formed on Al electrodes immersed in an aq. NH_3 bath and subjected to a.c. Film formation is accelerated by additions of $(NH_4)_2CO_3$, and retarded by glycerol or $(NH_4)_2Cr_2O_7$. In H_2O or H_2SO_4 the film causes the formation of a luminescent gas layer, and the production of an Eloxal film from H_2SO_4 solution is prevented. C. E. H.

German specification tests [for insulating materials free from rubber]. Z. Szirak (Mat. Plast., 1936, 3, 123—125).—The methods of testing mechanical, thermal, and electrical properties are described and considered to be satisfactory. The tests are carried out on small bars of material. L. A. O'N.

[Air-]dedusters. Automatic regulators.—See I. **Coke for electrodes. Chemical analysis. Combustion control. Determining benzol in gas. Separation of lignite tar. Transformer oil.**—See II. **CO indicators.**—See VII. **Fused SiO_2 in heating processes.**—See VIII. **Electric steel foundry. Cu–Be alloys. Electrolytic Pb. Corrosion of Pb–Na alloys. Plating. Ni sheets. Ni coatings. Ag-plating. Sheet Cr. Mn-plate. Colouring metals. Electrolytic oxidation of Al. Welding. Analysis of Ag–Cu alloys. Analysis by internal electrolysis.**—See X. **Determining ash in raw beet sugar.**—See XVII. **Flour-mite control.**—See XIX. **Dust and smoke meter. [Control of] residual chlorination of H_2O.**—See XXIII.

See also A., I, 22, **Heat conductivity of conductors.** 29, **Colloid science and radio technique.** 33, **X-Ray study of surface Al–Cu alloys. κ of $Ca(HCO_3)_2$ solutions.** 37, **Prep. of D_2O and persulphates. Black Ag. Electrolysis of aq. solutions of Na_2SO_4 and $ZrOSO_4$.** 38, **Action of electric discharge on N_2–O_2 mixture.** A., II, 10, **Electrolysis of MgMeI in $Bu^{a}{}_2O$.**

Patents.

Electric reduction furnace. A. E. Greene (U.S.P. 2,033,029, 3.3.36. Appl., 2.4.31).—Most of the hearth is covered by a combined combustion and electric reverberatory chamber, but over the deepest end of the hearth is a chamber heated by electric arcs only. B. M. V.

[Electrical] test-tube heater. H. A. Walker and H. P. Strand (U.S.P. 2,031,019, 18.2.36. Appl., 7.3.35).—Resistance-heating is used. B. M. V.

Temperature-controlling arrangements. Associated Electric Labs., Inc. (B.P. 456,348, 7.5.35. U.S., 9.5.34).—The Wheatstone bridge of a resistance thermometer is excited only at regular intervals, to prevent overheating of the temp.-sensitive resistances. B. M. V.

Potentiometric balancing and indicating apparatus. R. W. Gilbert (B.P. 455,831, 27.12.35. U.S., 5.1.35).—Thermoelectric devices excited by the beam of light from a mirror galvanometer, grid valves, and bridges of various forms are utilised. B. M. V.

Electric-discharge devices emitting ultraviolet radiation. Gen. Electric Co., Ltd. From Patent-Treuhand Ges. f. Elektr. Glühlampen m.b.H. (B.P. 452,337, 13.6.35).—High-pressure Hg-vapour discharge lamps are made with a double wall, the inner consisting of ordinary glass and the outer of glass containing NiO or CoO to absorb visible light, but allow ultra-violet light to pass. A. R. P.

Electric-discharge tubes. N. V. Philips' Gloeilampenfabr. (B.P. 457,253, 6.4.36. Ger., 27.6.35).—An insulating member, *e.g.*, of ceramic material, supporting a no. of electrodes is coated with conducting or semi-conducting material, *e.g.*, C, serving as a potentiometer. J. S. G. T.

[Electric-]discharge tube. A. Claude, Assr. to Soc. Anon. pour les Appl. de l'Electricité et des Gaz Rares Etabl. Claude–Paz & Silva (U.S.P. 2,030,963, 18.2.36. Fr., 8.4.23).—Luminescent or phosphorescent material is applied to a very thin and homogeneous cementing film coating the inner surface of the tube, the film being finally eliminated. A method of producing the film is claimed. J. S. G. T.

Electric-discharge lamps. Brit. Thomson-Houston Co., Ltd. (B.P. 457,371 and 457,378, [a] 22.4.36, [b] 19.5.36. U.S., [a] 23.4.35, [b] 20.5.35).—(a) The discharge passes in vapour containing Na, Hg, and/or Cd. (b) In a gas-filled discharge lamp containing, *e.g.*, Ne, A, and Hg, opposing faces of electrodes are coated with glow-resisting material, *e.g.*, powdered Al, and their back surfaces are coated with an alkaline-earth substance of low work function. A fluorescent mantle, *e.g.*, of $CaWO_4$, is mounted between the electrodes. J. S. G. T.

Electric-discharge lamps. Gen. Electric Co., Ltd., and H. G. Jenkins (B.P. 457,486, 30.5. and 27.11.35).—In a discharge lamp containing Ne at 2—10 mm. Hg pressure, luminescent material in contact with the discharge is composed of willemite and/or $CaWO_4$. J. S. G. T.

Luminescent materials for use in electric-discharge lamps. Gen. Electric Co., Ltd., and J. T. Randall (B.P. 457,126, 22.5.35).—A form of impure Zn silicate, believed to be $ZnO,2SiO_2$, and identified by its specified *X*-ray spectrum, is claimed. It may be prepared by mixing ZnO with SiO_2 gel, adding 1% of Mn as nitrate, drying at 180°, and then heating at 850° for 15 hr. J. S. G. T.

Manufacture of luminous electric-discharge containers with fluorescence. W. J. Tennant. From Soc. Anon. pour les Appl. de l'Electricité et des Gaz Rares Etabl. Claude–Paz & Silva (B.P. 457,317, 15.6.36).—Hard-glass containers of softening point $>577°$, *e.g.*, of Pyrex, having superposed coatings of binding agent, *e.g.*, a mixture of glycerol and H_3BO_3, and fluorescent material, *e.g.*, $CaWO_4$, are heated above 577° but below the softening point of the glass. J. S. G. T.

Apparatus for electrolysis of aqueous solutions of sodium sulphate. I. G. Farbenind. A.-G. (B.P. 455,429, 9.5.36. Ger., 4.10.35).—The cell contains a horizontal, corrugated electrode arrangement in its lower part and a discharge outlet for the dil. H_2SO_4 formed below the electrodes. This arrangement consists of a corrugated, perforated, Pb-sheet anode with a thin upper coating of asbestos paper, above which is a layer of corrugated, perforated, rubber-coated sheet Fe, along the corrugations of which the Hg cathode flows constantly. Electrolysis of aq. Na_2SO_4 (*d* 1·31) in this apparatus affords 12·5% aq. H_2SO_4 with a current yield of 97%. A. R. P.

Electrolytic condensers. Dubilier Condenser Co. (1925), Ltd., and N. C. Moore (B.P. 453,058, 6.3.35).—The spacer is made of plasticised cellulose acetate containing $C_2H_4(OH)_2$ and $(NH_4)_2B_4O_7$ as electrolyte. A. R. P.

Electrolytic device. F. M. Clark and J. H. Koenig, Assrs. to Gen. Electric Co. (U.S.P. 2,022,500, 26.11.35. Appl., 2.2.35).—In the construction of condensers, cells, etc., claim is made for cryohydric electrolytes consisting of molten mixtures of two salts, *e.g.*, NH_4OAc 75 and Na_2HPO_4 25; HCO_2NH_4 75 and $HO{\cdot}C_6H_4{\cdot}CO_2NH_4$ 25; or NH_4OAc 70 and Ca lactate 30%. L. C. M.

Production of highly ohmic resistances. Radio-A.-G. D. S. Loewe (B.P. 458,085, 11.6.35. Ger., 14.6.34).—C is deposited on an insulating support from a hydrocarbon (I) in the gas phase at a pressure considerably $>$ the dissociation pressure of (I). Thus, *e.g.*, the support is led through a furnace containing the gas at a speed depending on the desired thickness of C. [Stat. ref.] J. S. G. T.

Electric fuses [of copper wire]. V. Hope (B.P. 452,156, 21.2.35).—The wire is coated with H_3BO_3 and a synthetic resin and packed in insulating powder which quenches the arc caused by breaking of the fuse with an overload. A. R. P.

Thermostats [for electric ovens]. L. Satchwell (B.P. 456,220, 4.5.35).

Manufacture of electric cables or other insulated conductors having mineral powder insulation. Conducteur Electrique Blindé Incombustible (B.P. 458,254, 12.3.35. Fr., 12.3.34).

Plating articles. Detecting suspended matter in fluids.—See I. **Water-gas [producer].**—See II. **Si-containing rayons.**—See V. **Persilicates. Dehydration of $MgCl_2$.**—See VII. **Tunnel kilns. Opal glass for discharge lamps. SiC resistors.**—See VIII. **Metal-fusing furnace. Heat-treatment furnaces. Product from Ti. Rubber-coated steel. Decorating metals. Consolidated metals or metal carbides. Ag from photographic baths. Mg and alkaline-earth metals. Oxidation of Al articles. Welding rod.**—See X. **Plastic insulating compound.**—See XIII. **Gelatin for mechanical recording.**—See XV. **Ageing beverages.**—See XVIII.

XII.—FATS; OILS; WAXES.

Purity of cacao butter and its mixture with butter from the shell. Vizern and Guillot (Ann. Falsif., 1936, **29**, 484—487).—The fat from cacao shells had m.p. 34°, I val. 57, and unsaponifiable matter 8·80% having I val. 122·9. The fatty acids had m.p. 46°, I val. 51, and mol. wt. 287. The fat gave a negative result with the Halphen test. The latter will indicate the presence of $\nless 5\%$ of karité butter in cacao butter, but the test is less sensitive and more variable with illipé butter. E. C. S.

Semi-micro-butyric acid value. III. Semi-micro-butyric acid value and new Kirschner value of Dutch butter fat. F. T. van Voorst (Chem. Weekblad, 1936, **33**, 742—743; cf. B., 1936, 418).—Complete analytical data are given on samples of butter taken from two factories in Friesland and North Holland throughout the year. The new Kirschner and semi-micro-$PrCO_2H$ vals. show a min. in late autumn and max. in spring due to differences in feeding. S. C.

Determination of iodine value. W. Schmitt (Margarine-Ind., 1935, **28**, 171—173, 185—187; Chem. Zentr., 1935, ii, 2599).—A crit. comparison of existing methods. H. N. R.

Comparison of macro-methods of determining the iodine value of fats. F. Fink and J. Hadáček (Časop. čechoslov. Lék., 1935, **15**, 103—112; Chem. Zentr., 1935, ii, 2470).—The Rosenmund–Kuhnhenn method is preferred. H. N. R.

Determination of unsaponifiable matter [in fats]. H. P. Kaufmann (Fette u. Seifen, 1936, **43**, 218—222).—The discussions of the Annual Meeting of the International Commission (I.C.) for the Study of Fats (Lucerne, 1936) concerning the determination are summarised and full details of the English (Et_2O-extraction) method and the German and I.C. light-petroleum and Et_2O-extraction methods are given. The light-petroleum method is retained as a rapid, reproducible method suitable for use with oils with only a low content of unsaponifiable matter, but details of the Et_2O-extraction method are to be re-studied. E. L.

Twitchell reagents. XVIII. Relation between the constitution of sulphonic acids and their [fat-splitting] properties. K. Nishizawa, T. Kawasaki, and S. Hiraoka (J. Soc. Chem. Ind. Japan, 1936, 39, 360—361b; cf. B., 1936, 1214).—The ease of hydrolysis of olive oil by Idrapid–H_2SO_4 is much enhanced by aromatic sulphonic acids containing alkyl in the nucleus; cetylbenzenesulphonic acid is very active. (Cf. B., 1930, 870.) J. L. D.

Detection of hardened fats and train [marine-animal] oils. Anon. (Fette u. Seifen, 1936, 43, 222—224).—Details of the method prescribed by the German Customs for the separation of *iso*oleic acid (Pb salt–EtOH method, together with a determination of the I val. of the "solid acids") are reproduced from the Reichsministerialblatt of Oct. 17, 1936. E. L.

Irradiation of fats. II. Methods of analysis of oxidised fats. Interrelation of results. L. H. Lampitt and N. D. Sylvester (Biochem. J., 1936, 30, 2237—2249; cf. B., 1935, 558).—In the Kreis test for incipient rancidity accuracy is increased by measuring the intensity of colour with a photometer. For the determination of the peroxide (I) val. by Lea's method (B., 1934, 802) the wt. of fat taken should be such that about 10 ml. of $0{\cdot}002N$-$Na_2S_2O_3$ are required for titration. The Issoglio val. is apparently $\propto$ the reduction in the aldehyde (II) val. and to the (I) and (II) vals. of the original fat, and is best determined with fat stirred with N_2 during extraction with H_2O. The extraction causes a 55% reduction in the intensity of colour in the Kreis test and in the (II) val., and a 16% reduction in the (I) val., the reductions being independent of the degree of oxidation of the fats. The (I), (II), and Issoglio vals. and the colour intensities in the Kreis test are recorded for samples of butter fat oxidised by irradiation. W. McC.

Spoilage of fats and their constituents by heat and light in relation to [industrial] economy and life. I. H. Schmalfuss, H. Werner, and A. Gehrke (Fette u. Seifen, 1936, 43, 211—214).—Sterilised coconut, soya-bean, olive, and other oils and fats and lauric acid (I) develop ketone-rancidity on exposure to ultra-violet light and/or warmth, even in total absence of micro-organisms or combined N and H_2O. The presence of O_2 is not essential for the development of ketone-rancidity in irradiated (I), but it accelerates the process. An improved version of the Täufel–Thaler test (B., 1932, 515) for ketone-rancidity is detailed. (Cf. B., 1933, 555.) E. L.

Emulsion stability and fat embolism. H. L. Davis and C. E. Goodchild (J. Chem. Educ., 1936, 13, 478—481).—Fat embolism is discussed as the result of the breaking of the normal fat emulsion in the blood. Preliminary experiments on the breaking of comparable oil-in-H_2O emulsions stabilised by egg-albumin are reported. L. S. T.

Mechanical technology of soaps. III. Milling, stamping, and packing. K. Rössner (Fette u. Seifen, 1936, 43, 228—231; cf. B., 1936, 1215).—Modern soap mills etc. are described. E. L.

Soft soaps and their manufacture. R. Krings (Allgem. Oel- u. Fett-Ztg., 1936, 33, 576—578). E. L.

Perfuming of washing-soaps. R. L. Datta and T. Basu (Seifensieder-Ztg., 1934, 61, 1021—1023; Chem. Zentr., 1935, ii, 2470).—An enhanced effect is obtained by using 15% of perfume, 60—65% of $C_{10}H_8$, and 20—25% of fixative; examples are given. H. N. R.

Free alkali determinations in soap. H. H. Uhlig and F. C. Duemmling (Oil & Soap, 1936, 13, 307—314).—The differences in the figures for "free NaOH" obtained by the $BaCl_2$ method (which is regarded as accurate, but inconvenient) and the "abs. EtOH" or "95%-EtOH" (A.O.C.S.) methods are attributed to the appreciable solubility of Na_2CO_3 in the EtOH in the last two methods. A new "C_6H_6–EtOH" method is detailed in which the free NaOH is determined by titration at room temp. of a solution of the soap in C_6H_6–EtOH, in which mixture Na_2CO_3 is practically insol. If allowances are made for the effect of temp. on the titration (which has been found to be appreciable even in absence of Na_2CO_3) and for the solubilities of Na_2CO_3 under the conditions of the various methods, the results agree by all four methods. Questions arising from the presence of silicates, fillers, or H_2O, etc. in the soap are considered. E. L.

Utilisation of bile, pancreas, and castor cake in the manufacture of detergents. L. Ivanova (Maslob. Shir. Delo, 1934, 10, No. 9/10, 15—17).—Bile of Bovidæ possesses detergent properties. In neutral or faintly alkaline media it hydrolyses starch, lowers the σ of H_2O, has an emulsifying action, and retains these properties when mixed with clay or Na_2CO_3. It has no action on albumin. The uses of pancreatic and castor-seed enzymes in detergents are discussed. Ch. Abs. (*p*)

Colloid-chemical and detergent properties of hydratisable colloids in comparison with soap. I. Detergent action and hydratisable colloids. K. Lindner (Fette u. Seifen, 1936, 43, 214—218).—A preliminary note. The surface-activity, reciprocal Au no., and apparent mol. wt. are listed for nine colloids (SiO_2, Al_2O_3, potato-starch, gelatin, Na protalbinate, etc.) which are to be compared with Na oleate for washing properties. E. L.

Heat-bodied [linseed] oils. Baltimore Club (Nat. Paint, Var. Assoc., Nov., 1936, Circ. 523, 315—322).—Raw and alkali-refined linseed oils were cooked (*a*) in an open kettle over an oil fire, and (*b*) with electric heating elements outside the kettle, the space over the oil being filled with CO_2. Graphed data show variations in I val., *d*, *n*, acid val., and heating time with η. Lower I vals. and higher *d* were attained with (*a*) than with (*b*), probably in consequence of oxidation. With (*b*) large increase in η was accompanied by very small decrease in I val., probably in consequence of association. With both (*a*) and (*b*) *d* and *n* increased much more rapidly during the early stages of the cooking than η; thereafter η increased more rapidly. Low acid vals. were obtained with efficient removal of the evolved vapours; presence of CO_2 was without influence. When rubbed with

Milori-blue (*b*) products showed the greater dispersive power; this is attributed to absence of over-polymerised or gelled particles which are formed in (*a*) by local overheating. The oils had the same livering tendencies with ZnO and a Tangerine lake struck on $Al(OH)_3$; the acid val. is a greater factor than η in livering. S. M.

Rapid [method for] hexabromide determination [of linseed oil]. E. Rossmann (Fette u. Seifen, 1936, **43**, 224—228).—The present modification is rapid (2 hr.) and yields higher hexabromide vals. [*e.g.*, 65—67 for (Baltic ?) linseed oil of Hanus I val. 179—180] than the original Eibner–Muggenthaler (E.–M.) method. The oil is saponified for 15 min., and the fatty acids are not isolated and weighed as in E.–M. method, but a 5-c.c. portion of the Et_2O solution (I) of fatty acids extracted from the acidified soap is chilled to $-15°$ and brominated by mixing with a small excess of a chilled solution of Br in Et_2O; a further 5-c.c. portion of (I) is evaporated to determine the amount of acids concerned. The pptd. bromides (II) are filtered or centrifuged (open-tube) in the cold, washed, and dried at 100°. As freshly pptd. (II) is appreciably sol. in cold Et_2O, the amount of (II) recovered must be corr. by a determination (by evaporation) of any (II) lost in the washings; alternatively, the corr. figure is obtained by the difference between the amounts of (II) recovered from two parallel tests—one as above, and one employing only half the quantity of fatty acids. The m.p., 182° (185° if heated rapidly) and 173° after melting and cooling, of (II) compared with 185° and 180—185°, respectively, recorded by Lombard (B., 1933, 155) and Kaufmann and Keller (" Studien auf dem Fettgebiet," 1935) and 173—177° for the pure (II) obtained by the E.–M. method suggest the occurrence of isomerism. E. L.

Tung oil, its occurrence, production, and uses. Anon. (Farve og Lak, 1936, No. 8, 14—16).—A historical review. D. R. D.

Condensation of maleic anhydride with tung oil; new " constant " for oils. B. A. Ellis and R. A. Jones (Analyst, 1936, **61**, 812—816).—The sample (*x* g.) is heated under reflux with 25 ml. of a 6% solution of maleic anhydride in PhMe for 3 hr., H_2O is then added, and the aq. extract titrated with *N*-NaOH to phenolphthalein (*v* ml.). The unsaturated linkings may be expressed in terms of I by the " maleic anhydride val." $= 12{\cdot}692v/x$. A val. of 69·7 is equiv. to an elæostearin content of 80·0%; data for various oils are tabulated. Addition of 0·2 ml. of 0·1*N*-I in PhMe reduces the refluxing period to 1 hr. The method gives less variable results and is more practicable than that of Kaufmann and Baltes (A., 1936, 966). J. G.

Causes of acidity of palm oil. R. Wilbaux (Bull. Mat. Grasses, 1936, **20**, 255—257).—Oil from fresh fruit has a greater acidity than that from sterilised fruit because in the process of sterilisation the highly acid oil in the region of wounds or bruises is lost and hence escapes analysis when the oil is extracted later. The economics of different methods of picking, transporting, and dealing with the crop in the Belgian Congo are discussed. F. C. B. M.

Methylene-blue induction period and virginity of olive oils. B. B. Cunningham and L. G. Saywell (Food Res., 1936, **1**, 457—464).—The antioxidant potency of oils cannot be used as a criterion of virginity. P. G. M.

Partial hardening of highly unsaturated oils. II. Perilla oil. F. Wittka (Allgem. Oel- u. Fett-Ztg., 1936, **33**, 515—518; cf. B., 1936, 1053).—The increase in formation of solid unsaturated acids (I) when hydrogenation is performed above 70° (cf. *loc. cit.*) is also observed with perilla oil, but, in contradistinction to linseed oil, the former yields a heterogeneous mixture of solid and liquid glycerides and the formation of (I) is more prominent. Low-temp. hydrogenation of tung oil induces isomerism of α-elæostearic acid to the β-form. E. L.

Shea nuts from the Gold Coast. Anon. (Bull. Imp. Inst., 1936, **34**, 437—448).—21 samples of nuts from the Yendi Reserve yielded 63·5—80·3% (mean 70·0) of kernels containing 42·6—52·7% (mean 48·7) of oil, $\equiv$47·1—56·9% (mean 53·1) on a H_2O-free basis; the oils contained 3·6—8·3% (mean 4·9) of unsaponifiable matter. The correlation of a low oil content of the kernels with a high proportion of unsaponifiable matter in the oil appears in this case also (cf. B., 1933, 75). Comparison with nuts from the same trees in 1931 shows that both oil content of the nuts and % of unsaponifiables in the oil from a particular tree may vary in different years. On the whole, the Gold Coast results fall within a narrower range, and the kernels contain more oil, and the oil less unsaponifiable matter, than in the case of the Nigerian samples (cf. B., 1930, 825). E. L.

Elderberry-seed oil (*Sambucus canadensis*, L.). H. A. Schuette and J. W. Brooks (Oil & Soap, 1936, **13**, 314—316).—The yield of oil from the seeds varied, according to the solvent (8 tested) employed, from 28% [light petroleum (I)] to 31·9% ($C_2H_4Cl_2$); the consts. of the variously extracted oils obtained varied within the ranges: d^{20} 0·9320—0·9523, n^{20} 1·4781—1·4795, relative η^{25} 26·4—40·8, σ^{25} 33·8—36·6 dynes/sq. cm., sap. val. 186·5—195·9 [257·0 for $CHCl_3$-extracted oil (II)], I val. (Wijs) 162 (C_6H_6-extracted) to 171·7 (Et_2O-extracted), unsaponifiable matter 1·48 (I)—4·0% (II); for the fatty acids, n^{20}, I val., and SCN val. were, respectively: 1·4696—1·4712, 173·0—179·4, 98·9—110. Thin films of the oils dry hard somewhat more quickly than do those of linseed oil. E. L.

Constituents of the oil of *Verbascum* seeds. E. Votoček, F. Valentin, and J. Bulíř (Coll. Czech. Chem. Comm., 1936, **8**, 455—460).—Bohemian *V. thapsus* seeds yield to Et_2O an oil, n_D 1·46975, sap. val. 188·6, I val. 132, CNS val. 78·9, acid val. 93·2, and ester val. 95·4, which contains 1·1% of unsaponifiable matter and yields 94·99% of acids (88·8% of saturated and 6·1% of unsaturated), including linolenic (8%), oleic and linoleic (30 : 61·3), and stearic acids. R. S. C.

Optical investigation of some Indian oils. I. Depolarisation of the scattered light. C. V. Jogarao (Proc. Indian Acad. Sci., 1936, **4**, **A**, 327—331).—Vals. of the depolarisation of scattered light, using horizontally polarised and unpolarised white and red light, and vals. of n for λ 4358 and λ 5460 were measured for highly purified gingelli, coconut, groundnut, castor, and olive oils. Results do not support the view that aggregates are present in pure liquids. N. M. B.

Microdetermination of the acid value of castor oil. L. Szebellédy and S. Tanay (Z. anal. Chem., 1936, **107**, 269—276).—0·1 g. of oil is dissolved in 90% MeOH and titrated with 0·01N-KOH (also dissolved in 90% MeOH), using phenolphthalein. J. S. A.

Microcolorimetric determination of acidity of fatty oils. V. V. Illarionov and I. S. Kogan (Mikrochem., 1936, **21**, 11—16).—The oil is dissolved in EtOH (when very little acid is present) or $C_5H_{11}\cdot OH$ (in presence of larger amounts of acid) to which bromocresol-purple has been added, and the colour compared with standard solutions containing known quantities of oleic acid. The alcohol–indicator solution is preferably made in bulk and alcoholic alkali added till the colour is blue-violet. J. W. S.

Deacidification of oils with dilute lyes. F. Wittka (Allgem. Oel- u. Fett-Ztg., 1936, **33**, 563—569).—The practical manipulation of the method is discussed. Although it is rather more expensive and less simple than the refining with conc. NaOH, it possesses advantages in the case of good-quality oils ($\not>$5% of free fatty acids) when it is required to reduce loss of neutral oil to a min.; treatment with conc. and dil. lyes may be alternated with good results. E. L.

Identification of minor component fatty acids in fats and oils. J. B. Brown (Oil & Soap, 1936, **13**, 303—306).—A review of the available methods for the isolation and/or identification of fatty acids occurring in very small amounts in oils and fats. E. L.

Rancidity as a problem in oils and fats. E. E. Russell (Canad. Chem. Met., 1936, **20**, 346—348).—A discussion.

Bleaching of Japan wax. VIII. I. Sakuma and I. Momose (J. Soc. Chem. Ind. Japan, 1936, **39**, 351B; cf. B., 1936, 1055).—Bleaching is unaffected by 10 or 20% of $MgSO_4$ or Na_2SO_4 in dil. (1 : 10) H_2SO_4 at 90°, by 10% of $CaCl_2$ in dil. (1 : 5) HCl at 90°, or by $K_2Cr_2O_7$ in dil. (1 : 1) HCl. J. L. D.

Emulsion floor waxes. C. S. Glickman (Soap, 1936, **12**, No. 12, 121, 123, 125, 127, 129, 139).—Modifications of the standard method for preparing $N(C_2H_4\cdot OH)_3$ oleate waxes are suggested: thus the wax and acid are melted together; the wax–acid–base mixture is kept at 102—103° while the boiling borax solution is added; all the H_2O is added boiling; forced cooling with stirring is employed. A suitable plant is described. L. A. O'N.

Abiogeneous synthesis of carbohydrates. Motor-car lubricants.—See II. **Textile auxiliaries.**—See III. **Metallic soaps.**—See XIII. **Determining fat in leather.**—See XV. **Shortenings in crackers. Artificial cream. Butter fat. Vitamin-*A* in margarine. Storage and prep. of foods. Coffee fat. Soya-bean meats as pig feed.**—See XIX. **Castor oil in ointments.**—See XX.

See also A., I, 10, **Optical study of Indian oils.** 28, **Behaviour of heavy-metal soaps in org. solvents.** A., III, 9, **Higher saturated fatty acids of butter fat.** 43, **Identifying vitamins by mol. distillation.** 43—6, **Vitamins.**

Patents.

[Medicated etc.] soap tablets. G. von Kereszty (B.P. 457,975, 4.6.35).—Medicinal, cosmetic compounds, etc. which are normally incompatible with soap are introduced into holes or channels formed in the soap block, which have been coated internally with an insol. coating such as lacquer, hardened gelatin, or insol. metal soaps formed by introducing a solution, *e.g.*, of a Zn salt, into the holes before filling, or incorporated in the filling. E. L.

Complex phenolic soaps. Röhm & Haas Co. (B.P. 457,391, 24.5.35. U.S., 28.5.34).—A non-aliphatic *sec.* amine (1 mol.) and CH_2O (1 mol.) are condensed with a phenol ($\not>$1 mol. for each NH), not carrying an acidic substituent and having $<$4 C in side-chains. The products with soap-forming acids above C_7 give bactericidal soaps sol. in H_2O and oils. Examples of the condensation products are oils, (*a*) b.p. 97°/3 mm., from PhOH (94), 36% aq. $NHMe_2$ (125), and 30% CH_2O (100 g.) at 25—30°, (*b*) b.p. 104°/4 mm., from *o*-cresol, $NHMe_2$, and CH_2O, (*c*) b.p. 135—145°/12 mm., m.p. 40°, from *m*-xylenol, $NHMe_2$, and CH_2O (1 mol. each), (*d*) PhOH (94), $NH(C_2H_4\cdot OH)_2$ (103), H_2O (100), and 30% CH_2O (100 g.), (*e*) $CMe_2(C_6H_4\cdot OH\text{-}p)_2$ (228), 36% $NHMe_2$ (250), and 30% CH_2O (200 g.), (*f*) m.p. 78°, from $\beta\text{-}C_{10}H_7\cdot OH$, CH_2O, and $NHMe_2$, and (*g*) PhOH (2), CH_2O (2), and triethylenetetramine (1 mol.). Examples of acids used are oleic acid and lauryl H sulphate. R. S. C.

Soap stabiliser. R. M. Reed, Assr. to Procter & Gamble Co. (U.S.P. 2,029,506, 4.2.36. Appl., 29.8.33).—0·01—0·25% of *p-tert.*-amyl- or -butyl-phenol is added to soap to prevent rancidification and discoloration. E. L.

Continuous distillation of higher fatty acids. Procter & Gamble Co. (B.P. 457,624, 26.8.35. U.S., 16.5.35).—In a continuously-acting plant, the crude fat acids in the liquid state are preheated to about 316°, and injected into a vac. chamber (*C*) (through a nozzle situated in the upper part thereof), where they volatilise under the prevailing low pressure of $\not>$3 in. (0·5 in.) Hg; any unvaporised material drops down through *C*, meeting a current of (superheated) steam introduced through a jet situated below the nozzle in the lower part of *C*. The condenser for the acids serves as a steam generator. E. L.

Refining of fats and oils. V. Jersey, Assr. to S.M.A. Corp. (U.S.P. 2,029,722, 4.2.36. Appl., 7.6.33).—In order to deacidify oils rich in carotene (I) (etc.) (*e.g.*, palm-fruit or carrot-pulp oil) without destroying the (I) content, such oils are gently agitated with a min. excess of aq. NaOH (14—20% solution) and then warmed to 50—60° before settling and removing the soap and washing the refined oil. For oils containing

$>$10—12% of free fatty acids, multi-stage neutralisation is claimed. E. L.

Apparatus for degreasing by means of volatile solvents. N. R. Hood, and Imperial Chem. Industries, Ltd. (B.P. 456,821, 16.5.35).—A no. of degreasing compartments of known type are connected to a common still. The goods pass through countercurrentwise to the liquid solvent. The still receives dirtiest liquid from the goods-entry end, but delivers vapour to all the compartments. A gas-heated drying compartment is provided at the finished-goods end. B. M. V.

[Wax] emulsions [for sizing paper etc.]. G. J. Manson, Assr. to Manson Chem. Co. (U.S.P. 2,030,385, 11.2.36. Appl., 8.7.26. Renewed 27.10.33).—Waxes are emulsified in H_2O in presence of a gel pptd. in presence of the wax, *e.g.*, by adding molten wax to H_2O containing a sol. salt such as $MgCl_2$, and then adding another salt, such as a silicate, which will react to form a gel with the first salt. E. L.

Non-slippery floor wax. T. G. Dixon (U.S.P. 2,030,055, 11.2.36. Appl., 27.1.34).—In order to reduce slipperiness, about 10% of rubber, previously dissolved and warmed in about 15—20 pts. of turpentine or other solvent, is incorporated (hot) in a pasty floor-wax composition. E. L.

Grease solvent.—See II. **Phosphoric esters of glycerides.**—See III. **Emulsifier. Animal feed.**—See XIX. **Phytosterol products.**—See XX.

XIII.—PLASTICS; RESINS; PAINTS; COATING COMPOSITIONS.

Development, use, and chemistry of synthetics. G. Kränzlein (Angew. Chem., 1936, **49**, 917—926).—The properties, uses, and development during the last 100 years of synthetic and artificial products (celluloid, resins, rubber substitutes, linoleum, etc.) are reviewed, particularly with reference to the raw materials employed. F. C. B. M.

Physical requirements of synthetic materials. R. Vieweg (Angew. Chem., 1936, **49**, 893—895).—Mechanical properties to be desired in synthetic plastics are discussed. J. S. A.

Organic glass. O. Röhm (Chem. Fabr., 1936, **9**, 529—530).—The polymerisation of $CH_2\!:\!CMe{\cdot}CO_2Me$ at 75—80° produces a glass, "Plexiglas" (I), which is resistant to H_2O (increase in wt. = 0·17% in 24 hr.), HCl, HF, HNO_3, and H_2SO_4. The Et and higher esters produce softer material. EtOAc, C_6H_6, $CHCl_3$, and EtOH dissolve (I), but benzine, oil, fat, wax, and putrefactive bacteria have no action. Models of blood vessels may be made by polymerisation *in situ* and removal of the vessel wall by NaOH. The physical properties and uses are listed; d = only 1·18, in comparison with 2·8 for silicate glass, and on account of the greater breaking strength (I) is suitable for use in automobiles etc. R. S. B.

Testing objects for galalith or horn. A. S. Cocosinschi (Z. anal. Chem., 1936, **107**, 197—199).—Galalith (I), on boiling with dil. H_2SO_4, gives an odour distinct from that afforded by material containing keratin (II). The solution so obtained from (II) requires $\ngtr 3$ c.c. of $KMnO_4$, that from (I) $\nless 6$ c.c. of $0{\cdot}1N$-$KMnO_4$, for oxidation, using 0·5 g. of material. J. S. A.

Polymerised vinyl acetate and related compounds in the restoration of objects of art. R. J. Gettens (Tech. Stud. Field Fine Arts, 1935, **4**, 15—27).—Polyvinyl acetate solutions permit the application of H_2O-white, elastic, strongly-adhering coatings. Solutions do not satisfactorily penetrate stone or clay surfaces. Ch. Abs. (p)

Determination of phthalate plasticisers. F. C. Thames (Ind. Eng. Chem. [Anal.], 1936, **8**, 418—419).—The plastic with boiling dil. HNO_3 (1 : 1 mixture by vol. of conc. HNO_3 and H_2O) affords o-$C_6H_4(CO_2H)_2$ (I) and $H_2C_2O_4$ (II). The (II) is removed with $KMnO_4$ at 100°, and the (I) converted quantitatively into the Pb salt and the Pb determined as $PbSO_4$. J. L. D.

Analytical methods and studies in technical practice of the linoleum and cork industry. II. Determination of linoxyn in linoleum cement. B. Glassmann and D. Rosenblum (Z. anal. Chem., 1936, **107**, 194—197; cf. B., 1936, 1108).—The material is saponified with 50% aq. KOH at 100°, acidified with H_2SO_4 after dilution, and filtered from the fatty acids. Oxidisable substances other than glycerol (I) are removed from the filtrate by pptn. with $Pb(OAc)_2$, the excess of Pb being then removed by addition of H_2SO_4. (I) in the solution is then determined by titration with approx. N-$K_2Cr_2O_7$ at 100°. J. S. A.

Chemistry of natural and synthetic resins. II. Unsaturated organic compounds. F. W. Brown (Paint, Oil, and Chem. Rev., 1936, **98**, No. 20, 9—10; No. 23, 42—44; cf. B., 1936, 1056).—The additive reactions of unsaturated org. compounds are reviewed. D. R. D.

Condensation of dichloromethane with phenols. P. P. Schorigin, I. P. Losev, and V. V. Korschak (J. Appl. Chem. Russ., 1936, **9**, 1432—1436).—A fusible, EtOH-sol. resin is obtained by autoclaving a 1 : 2 : 2 CH_2Cl_2–PhOH–NH_3 mixture at 180° for 1 hr. The product is converted into a bakelite-type resin by pressing for 7 min. at 150—160°/300 atm. with 10% of $(CH_2)_6N_4$. R. T.

Reaction between phthalic anhydride and glycerol. II. Phthalic anhydride and polyglycerols. A. I. Kogan (J. Appl. Chem. Russ., 1936, **9**, 1446—1455; cf. A., 1936, 1251).—The mol. wt. of the products of condensation of triglycerol (I) and phthalic anhydride at 160° rises with duration of heating and with increase in relative concn. of (I). The no. of OH groups falls to a const. val. after 14 hr., but the amount of free acid continues to fall, pointing to unmasking and esterification of fresh OH groups. R. T.

Composition of synthetic resins and varnishes for the piano industry. Anon. (Farbe u. Lack, 1936, 631—632).—The use of nitrocellulose, phenol and alkyd resins, etc. is discussed. S. M.

Synthetic resins in varnishes for wood protection. R. J. Moore (Paint and Var. Prod. Man., 1936, **15**, No. 5, 26—34).—Mainly historical, the development of methods for testing and for obtaining impermeability to H_2O being specially noted. D. R. D.

Indene–coumarone resins in coatings. J. Rivkin (Paint, Oil, and Chem. Rev., 1936, **98**, No. 22, 9—11).—The properties and uses of such resins are reviewed. A new type, consisting of a condensation product of a phenol with indene hydrocarbons, is described. D. R. D.

What are coumarone resins and how are they tested? Anon. (Vernici, 1935, **11**, 31—37; Chem. Zentr., 1935, ii, 2135).—Methods of prep., their properties and methods of analysis are described. H. N. R.

Modified phenolic resin varnishes. St. Louis Club (Sci. Sect. Nat. Paint, Var. Assoc. Inc., 1936, Circ. 523, 331—334).—15 unmodified phenol resins were incorporated with ester gum in proportions to give products having approx. the cost of 15 modified phenol resins supplied by various manufacturers. Tung–linseed oil varnishes were prepared from each and tested for acid val., drying time, skinning, film hardness, alkali-resistance, behaviour when stoved, etc. No marked differences were observed between the two types. S. M.

Properties of China-wood [tung] oil varnishes cooked at different temperatures. Cincinnati–Dayton–Indianapolis & Columbus Club (Sci. Sect. Nat. Paint, Var. Assoc. Inc., 1936, Circ. 523, 355—363).—Five samples of a " 30-gal." ester gum–100% phenolic resin–tung oil varnish cooked respectively at 288°, 274°, 260°, 246°, and 230° to the same η showed no significant differences in drying time, skinning tendency, gas-resistance, physical properties, durability, etc. Another range of varnishes of the same composition, but cooked at 260° for various times and therefore varying in η, did, however, show differences in skinning tendency, degree of " livering " with ZnO, etc. S. S. W.

Oil or cellulose filler? Anon. (Decorator, 1936, **35**, No. 414, 69—70).—The historical development of cellulose fillers for use in finishing coachwork is traced, and the cases in which each type (oil or cellulose) is more suitable are outlined. D. R. D.

Permeability and structure of films. H. F. Payne (Off. Digest, 1936, No. 159, 297—304).—The mechanism of permeation of solid films by H_2O and the methods of measuring permeability are discussed, van Heuckeroth's method (B., 1930, 1119) being preferred. Shellac films are considerably more permeable than films of linseed oil or spar varnish. Over-pigmentation of cellulose nitrate lacquers leads to very permeable films. D. R. D.

Measurement of consistency of coating materials. Chicago Club (Sci. Sect. Nat. Paint Var. Assoc. Inc., 1936, Circ. 523, 365—374).—Comparative measurements carried out with various cup and paddle types of viscosimeters are reported. Calibration and interconversion of results are feasible for materials having true liquid flow, *i.e.*, in absence of turbulent flow or pronounced plasticity and thixotropy. S. S. W.

Experimental varnish making. R. A. Sears (Oil and Col. Tr. J., 1936, **90**, 1729—1730).—The work of the chemist in a varnish factory is described. D. R. D.

British paint fragments. W. Krumbhaar (Oil and Col. Tr. J., 1936, **90**, 1650—1654).—An account of recent advances in the paint industry, based on observations during a tour of British paint works and the Paint Research Station. D. R. D.

Necessities, possibilities, and limitations in the paint field [of the German Four-year Plan]. H. Rasquin (Farben-Ztg., 1936, **41**, 1237—1239).—Substitute boiled oils [" EL Firnis "], " true synthetic " resin varnishes, anticorrosive paints, chlorinated rubber paints, etc. are discussed broadly from the aspect of " self-sufficiency." S. S. W.

Paints for [German] army stores and their testing. F. J. Peters (Z. Ver. deut. Ing., 1936, **80**, 1469—1474).—Paints employed for Fe and steel, and as wood preservatives, are discussed. R. B. C.

Painting of steel structures and plant. C. Boller (Farben-Ztg., 1937, **42**, 10—12).—A general dissertation is given on the corrosion problems involved, *e.g.*, protection of rivets, the need for freeing steel from oil, grease, millscale, and rust before painting (with notes on hand, mechanical, and chemical derusting), and types of rust-inhibitive pigments and paints available. S. S. W.

Aluminium paint as a primer on wood. Anon. (Decorator, 1936, **35**, No. 414, 46).—Adhesion of paints to wood depends on H_2O-resistance and elasticity rather than on penetration into the wood. A paint containing Al in a long-oil varnish medium is recommended. D. R. D.

Collection and uses of larch turpentine. H. Schmied (Farben-Chem., 1936, **7**, 445—451).—An account is given of the distribution, sources, collection (illustrated), purification, physical and chemical properties, components, adulteration, and uses of Venice turpentine. S. M.

Specific properties of solvents. H. Wolff and H. Hesse (Paint and Var. Prod. Man., 1936, **15**, No. 6, 7—13).—The properties of terpene hydrocarbons as paint thinners are studied. There is no apparent relationship between the rate of peroxide formation by the thinner on exposure to air and the rate of drying of paints diluted with the different thinners. D. R. D.

Primary reference mineral spirits method for standardising kauri–butanol values. Philadelphia Club (Sci. Sect. Nat. Paint, Var. Assoc., 1936, Circ. 523, 323—326).—The concn. of the kauri–BuOH solution is adjusted so that a val. of 40 is obtained with specially prepared mineral spirits. Other solvents are then examined according to a recommended procedure. Duplicate determinations should not differ by $>1\%$, and data from different laboratories should show max. variation of 2%. S. M.

Silicon ester as a paint medium. G. King (Paint, Oil, and Chem. Rev., 1936, 15, No. 6, 26—33).—The use of $Si(OEt)_4$ in paints is discussed from both the theoretical viewpoint (mechanism of drying) and the practical [formulation and uses of $Si(OEt)_4$ paints]. D. R. D.

Influence of the method of preparation of zinc oxide (zinc-white) on its physical properties and its suitability as determined by such properties. M. Feise (Chem.-Ztg., 1936, 60, 1023—1026).—Methods for preparing pyrogenic Zn-white and pptd. ZnO are discussed with reference to colour, covering power, oil requirements, and other properties. C. R. H.

Properties of zinc oxide as a paint pigment. G. Anderson (Paint and Var. Prod. Man., 1936, 15, No. 6, 22—24).—A review of the advantages of ZnO. D. R. D.

Durability characteristics of various types of zinc oxide [in paint]. G. Anderson (Paint, Oil, and Chem. Rev., 1936, 98, No. 23, 36—40).—The selection of ZnO to produce paints of high durability and tint retention is discussed. Pure acicular ZnO is preferable to pure " amorphous " ZnO and to leaded ZnO. D. R. D

Application of titanium oxide in industry. G. F. New (Sands, Clays, and Minerals, 1936, 3, 31—32).—Use of TiO_2 as a white pigment is described. C. I.

Titanium pigments [in papermaking]. W. R. Willets (Paper Trade J., 1936, 103, TAPPI Sect., 319—321).—A summary of the papermaking characteristics and uses of a no. of grades of Ti loading materials. H. A. H.

Iron oxide pigments. G. S. Wade (Oil and Col. Tr. J., 1936, 90, 1656—1658).—The properties of synthetic Fe_2O_3 pigments and natural earths are reviewed. D. R. D.

Physical processing of earth colours. Waldmann (Farbe u. Lack, 1936, 629—630).—The production and properties of ochres, umbers, and siennas are outlined. S. M.

Stability of red pigments. Philadelphia Club (Sci. Sect. Nat. Paint, Var. Assoc., 1936, Circ. 523, 335—349).—Steel panels were coated with enamels made from a tung–perilla oil ester-gum varnish and 12 red inorg. and org. pigments with and without addition of 6 white extenders. The stability of the enamels in the can, initial characteristics of the films, and their condition after submission to outside exposure (3—4½ months), accelerated weathering (220 hr.), and to a fadeometer (200 hr.) are evaluated and tabulated. Fe oxides were superior; Cd-red possessed good durability but inferior hiding and staining power and tendency to loss of gloss and development of chalk-fading. Of the org. compounds examined, Toluidine Toner was the most satisfactory. The usefulness of the white substrates for each red pigment is rated according to resistance to checking, gloss, and colour retention. White-leads were generally best; their tendency to hard-setting and deficient hiding can be overcome by addition of lithopone, TiO_2, or ZnO. Accelerated weathering produced greater checking and less loss of gloss than natural exposure, but the colour changes in polished films were correctly recorded. S. M.

Dry pigments. Method of carrying out specification tests: V 877—Zinc oxide; V 878—White lead; V 879—Lithopone; V 880—Red lead; V 881—Ferric oxide; V 882—Ochre, umber, and terra di Siena. Hoofdcommissie voor de Normalisatie in Nederland (Verfkroniek, 1936, 9, 350—357).—New Dutch specification procedures are given. D. R. D.

Organic coatings on pigments in relation to flotation. V. Cleveland Club (Sci. Sect. Nat. Paint, Var. Assoc., 1936, Circ. 523, 379—382; cf. B., 1934, 71).—The effect of precoating pigments with solutions of gelatin, nitrocellulose, methylcellulose (I), rubber, casein, gum arabic, gum tragacanth, stearanilide, and Na cellulose xanthate (sensitivity of Lake Red to Co salts, floating of yellow in olive-green enamels) was studied. Further investigation on (I) (best in previous tests) shows that in mixed-pigment enamels each pigment should be precoated separately. S. S. W.

Adsorption of metallic driers by pigments. Montreal Club (Sci. Sect. Nat. Paint, Var. Assoc., 1936, Circ. 523, 351—353).—Solutions of ter- (green), bi- (blue), and uni-valent (red) Co naphthenate (prep. described) in mineral spirits were left in contact with nine common pigments and linseed oil. The quantities of Co (tabulated) retained in the solutions after periods up to six months indicate that pptn. of Co is most marked when the valency changes. ZnO, white-Pb, and whiting had reducing effect; TiO_2, Fe_2O_3, and C black had oxidising effect. The drying time of the oil was reduced when some of the drier had been thus removed by pptn.; this improvement is attributed to dispersion changes during ageing. S. M.

Wetting of solids by solutions. Wetting of pigments by binary liquid systems. F. E. Bartell and N. F. Miller (Sci. Sect. Nat. Paint, Var. Assoc., 1936, Circ. 523, 303—314).—d and γ of amyl acetate (I)–PhMe (II) mixtures are tabulated together with their contact angles (C) on gypsum and ice and the calc. adhesion tension (A). None of these functions is simply related to the proportion of (I). Addition of a small amount of the polar component produced a relatively large decrease in A and thus acted in the contrary sense to a wetting agent. C showed a max. with $\not>5\%$ of (I), and the shape of the graphs for the d of the mixtures varied also with the temp. of determination. Graphs showing that the work required to spread the liquids (calc. vals.) follow those for C. Sedimentation vols. of ignited ZnO in (II) increased rapidly with initial additions of (I) to 12%, but decreased thereafter to a min. with 60% of (I); addition of BuOH gave similar effects and presence of H_2O increased these vals. Rapid settling and flocculation were observed where wettability was low and packing vols. high. S. M.

Metallic soaps. H. Silman (Amer. Ink Maker, 1936, 14, No. 12, 18—21).—The manufacture, properties, and uses of heavy-metal soaps are reviewed. D. R. D.

Driers. Anon. (Farve og Lak, 1936, No. 8, 19—21).—The merits of various metal salts as driers for oils are discussed. Drying times with different amounts of Pb and Co resinates and linoleates are illustrated graphically. F. C. B. M.

Pigmenting of bituminous paints. W. Ludwig (Farben-Ztg., 1936, **41**, 1282).—The problems of colouring bituminous paints other than black are discussed, the use of light-coloured bitumens, the need for unextended and specially resistant pigments, the admixture of oils, resins, etc., and the use of metal powders in bituminous vehicles being considered. S. S. W.

Colour standards [in paint factories]. New York Club (Sci. Sect. Nat. Paint, Var. Assoc. Inc., 1936, Circ. 523, 375—377).—Progressive observations of colour change on representative pigments ground in raw linseed oil, lard oil, paraffin oil, petroleum spirit, and dammar varnish indicate the desirability of using appropriate media for particular pigment groups in the prep. of wet colour standards. S. S. W.

Standardisation and matching of opaque paint colours. Pittsburgh Club (Sci. Sect. Nat. Paint, Var. Assoc. Inc., 1936, Circ. 523, 383—384).—Colour-comparison tests carried out with two types of colorimeter using secondary standards, based on colour analysis using light reflected from the paint film and thence to a photoelectric cell, are described and their limitations indicated. S. S. W.

Constant-volume method of tinting-strength determination. C. E. Reynolds (Amer. Ink Maker, 1936, **14**, No. 11, 21, 39).—Full details of the method are given, the essential feature of which is the maintenance of a const. vol. ratio between pigment and oil. D. R. D.

Dyestuffs in printing ink manufacture. A. McNeil (Amer. Ink Maker, 1936, **14**, No. 8, 17—19).—The dyes used in the different types of printing and stamping inks are reviewed. D. R. D.

Titanium dioxide in printing inks. D. W. Robertson (Amer. Ink Maker, 1936, **14**, No. 11, 18—20).—No advantage is gained by using linseed oil of acid val. >5—6. Lightly blown oils give the best results. Wetting agents (*e.g.*, Zn soaps) assist dispersion and reduce the abrasive action of the resultant ink. D. R. D.

Metallic soaps in printing inks. Anon. (Amer. Ink Maker, 1936, **14**, No. 8, 25—26).—A review. D. R. D.

Testing printing ink vehicles. I, II. Anon. (Amer. Ink Maker, 1936, **14**, No. 11, 22—25, 41; No. 12, 23—26).—Methods of determining η, d, colour, intensity of odour, acid val., and n are reviewed. D. R. D.

η of cellulose acetate dopes. Impregnating paper. TiO_2 sizing of paper.—See V. **Tests for safety glass.**—See VIII. **Determining resin in road materials.**—See IX. **Painting of Fe and steel.**—See X. **Linseed, tung, and elderberry-seed oils.**—See XII. **Synthetic rubber.**—See XIV. **Rennet casein. Soya-bean proteins.**—See XIX.

See also A., II, 28, **Resin alcohols of mistletoe.**

Patents.

Production of asphaltic material. Standard Oil Co. of California (B.P. 456,600, 3.8.35. U.S., 11.8.34).—Gaseous olefines are polymerised, *e.g.*, by treatment with $AlCl_3$, H_2SO_4, etc., to give viscous liquid products which are then oxidised by O_2 and/or S or Cl_2 at $>150°$ to form "synthetic" asphalts having improved plastic properties. These products have higher penetrations, ductilities, and solubilities in light petroleum, and lower d, than air-blown petroleum asphalts of the same m.p. A. B. M.

Production of chemical products [polymerides from β-chloro-αγ-butadiene]. W. H. Carothers, A. M. Collins, and J. E. Kirby, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,029,410, 4.2.36. Appl., 11.4.33. Cf. U.S.P. 1,967,860; B., 1935, 618).—Substances which resemble (*a*) rubber and (*b*) resins are produced by polymerising β-chloro-αγ-butadiene in presence of (*a*) a polymerisable compound, *e.g.*, $C_2H_4Cl_2$, acrylonitrile, styrene, (*b*) tung oil, rosin, a synthetic resin, nitrocellulose, etc. 30 examples are given. S. M.

Manufacture of [fireproof] celluloid. G. S. Adlington and L. A. White (B.P. 457,350, 18.7.35).—Celluloid sheet is immersed until it becomes plastic in a liquid prepared by adding aq. solutions of $SnCl_2$, $ZnCl_2$, or $SbCl_3$, and $COMe_2$ or other plasticising solvent to, *e.g.*, methylated spirit, and then removed and dried. S. M.

Cellulose organic ester compositions containing a propionyl ester of glycerol. D. C. Hull, Assr. to Eastman Kodak Co. (U.S.P. 2,029,925, 4.2.36. Appl., 10.4.33).—Transparent flexible sheet or moulding composition is produced from 100 pts. of cellulose org. ester and 10—75 pts. of glycerol dipropionate or dipropionate acetate as plasticiser. F. R. E.

Seasoning [extruded cellulose ester] plastic. P. W. Crane and R. T. Fields, Assrs. to Du Pont Viscoloid Co. (U.S.P. 2,028,502, 21.1.36. Appl., 27.4.35).—Extruded cellulose ester sheets are run through a series of baths of aq. NaCl the temp. of which is gradually raised, *e.g.*, from 9° to 70°, as the amount of solvent retained decreases; seasoning is completed in air. S. M.

Flexible composite planographic plate. W. B. Wescott, Assr. to Multigraph Co. (U.S.P. 2,032,779, 3.3.36. Appl., 26.1.34).—The plate comprises (1) a cellulosic base, (2) adhesive, (3) metal particles, carefully sized and not entirely coated with (2), and (4) ink-receptive image, applied, *e.g.*, by a typewriter. (3) are preferably of Zn and the exposed parts must be chemically reactive; this may be attained by formation of a layer of basic salt by treatment with $2N$-$NH_4H_2PO_4$ for a few min. B. M. V.

Manufacture of phonograph record. H. T. Beans, G. H. Walden, jun., and L. P. Hammett (U.S.P. 2,029,012, 28.1.36. Appl., 20.11.29).—The base material, *e.g.*, thick paper, is coated with the reaction product of resorcinol, p-$NH_2\cdot C_6H_4\cdot NO_2$, and CH_2O, to which a plasticiser (Turkey-red oil) has been added, and then heat-hardened. S. M.

Plastic materials containing rubber. D. D. Pratt (B.P. 457,781, 4.6.35).—Pitch, bitumen, etc., as such or in solution, is mixed with a solution of natural rubber in a suitable solvent (C_6H_6, low-b.p. neutral fractions of low-temp. tar oil), and the solvent is partly or wholly removed by vac. or steam-distillation as desired, leaving a plastic mixture. S. S. W.

Plastic compound applicable to electric insulating purposes. W. T. Henley's Telegraph Works Co., Ltd., and B. B. Evans (B.P. 452,361, 18.12.34).—A permanently plastic and sticky composition for insulating paper- or fabric-coated electric cables consists of reclaimed rubber (15) or Duprene (6), gutta-percha resin (28 or 26), and French chalk (57 or 68%). A. R. P.

Fusion and esterification of copals. Walpamur Co., Ltd. (B.P. 457,076, 4.12.35. Ger., 10.12.34).—The molten mass of gum is subjected to superheated steam emerging from series of jets disposed, respectively, near the kettle bottom and above the fluid surface, frothing and foaming being thereby minimised, fire hazard lessened, and esterification processes (elimination of glycerol) simplified. Plant is claimed. S. S. W.

Shellac substitutes. W. Krumbhaar (B.P. 457,637, 21.4.36).—Copal gum (Congo, Manila) is masticated, while plastic, at 32—49° under pressure ($\not<$50 lb./sq. in.) for $\not<$15 min., giving a product completely sol. in EtOH. S. S. W.

Casein dispersion. D. A. Rankin and F. G. Uhler, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,030,226, 11.2.36. Appl., 27.2.32).—A homogeneous fluid dispersion of approx. equal pts. of casein and benzylcellulose in a solvent mixture composed essentially of org. solvents and including $CH_2Ph\cdot OH$, EtOH, and a sulphonated fixed oil is claimed. The product can be used for coating paper etc. to produce leather substitutes etc. E. B. H.

Manufacture of [embossed] plastic material [artificial leather]. H. Jenett, Assr. to Celanese Corp. of America (U.S.P. 2,030,066, 11.2.36. Appl., 29.6.34).—Sheets of fabric, paper, etc. which have been coated or impregnated with a nitrocellulose or other thermoplastic composition are heated by passage through a bath of Hg and then embossed between cool surfaces. S. M.

Manufacture of tubes and other hollow articles from thermoplastic compositions. Celluloid Corp. (B.P. 456,908, 24.5.35. U.S., 24.5.34).—Close-joint tubes are formed from strip and hardened by cooling. The butted edges may be joined by a solvent. B. M. V.

(A) Manufacture of condensation products. (B) Moulding composition [from thiourea and formaldehyde]. K. Ripper (U.S.P. 2,029,893—4, 4.2.36. Appl., [A] 5.3.31, [B] 17.9.32. Austr., [A, B] 15.12.30).—CH_2O (2 mols.) is caused to react without heating in an aq. medium (p_H 3) with $CS(NH_2)_2$ (1 mol.) which may be partly replaced by urea. The products are sol. in H_2O and EtOH and may be used for (A) impregnating paper, lacquers, etc., (B) moulding powders. S. M.

[Alkyd] resin films. Brit. Thomson-Houston Co., Ltd. (B.P. 457,752, 26.8.36. U.S., 31.8.35).—A liquid (*A*-stage) alkyd resin is sprayed on a continuously moving belt made of suitable metal (Zn- or Sn-coated Fe) the surface of which is treated with Hg so that the resin does not permanently adhere to the belt, the coated belt is heated, and the semi-cured resin film is stripped therefrom and further heat-cured, or curing can be completed before stripping. For thicker films, several coats may be applied and heated before the composite film is stripped from the belt. Apparatus is figured. S. S. W.

Production of [modified alkyd, oil-soluble] synthetic resins. I. Rosenblum (B.P. 457,494, 31.5.35. Addn. to B.P. 444,021; B., 1936, 511).—In the prior process (*loc. cit.*), mol. proportions of maleic acid (I), based on the wt. of o-$C_6H_4(CO)_2O$ (II), may be used if the quantity of drying-oil acids is also increased to $\not>$1 mol. for each mol. of (I) and (II). S. M.

Production of (A) polyhydric alcohol–polybasic acid–monobasic aliphatic acid anhydride condensation product, (B) resin-like materials. (A) G. F. Hoffmann, (B) W. A. Noyes and G. F. Hoffmann, Assrs. to Pittsburgh Plate Glass Co. (U.S.P. 2,028,908 and 2,028,914, 28.1.36. Appl., [A] 26.6.29, [B] 27.6.29. Renewed [A] 20.5.33).—(A) The condensation product of, *e.g.*, glycerol and o-$C_6H_4(CO)_2O$ (I) is heated with Ac_2O until no more AcOH and H_2O distil over. (B) The partial ester of a polyhydric alcohol and a monobasic aliphatic acid, *e.g.*, monoacetin, is heated with an org. dibasic acid anhydride, *e.g.*, (I). The products are sol. in $COMe_2$, EtOAc, PhMe, etc. and have low acid val. S. M.

Preparation of synthetic resin [from cuprene]. C. P. Haskins, Assr. to Gen. Electric Co. (U.S.P. 2,031,481, 18.2.36. Appl., 23.3.34).—Cuprene is heated with maleic anhydride and a polyhydric alcohol (glycerol). S. M.

Manufacture of artificial filaments, films sheets, and like shaped products. Deuts. Bekleidungsind. G.m.b.H. (B.P. 456,552, 5.11.35. Austr., 21.11.34).—Synthetic resin components (excluding S derivatives and colloidal substances), after precondensation if desired, are dissolved in aq. cellulose solutions (viscose, cuprammonium cellulose), and, at any suitable stage after shaping the solution, are rendered insol. by condensation, interaction, polymerisation, etc. F. R. E.

Manufacture of welded artificial composition [resin]. Albert Products, Ltd. (B.P. 452,410, 19.11.34. Ger., 13.1. and 25.6.34).—Artificial resins from PhOH–CH_2O or similar condensation reactions are hardened by heating until a plastic product is obtained which becomes brittle on cooling. This is broken into small lumps which are moulded into shapes by heat and pressure. [Stat. ref.] A. R. P.

Preparation and forming of the surface of moulded articles from synthetic resins capable of being hardened. Albert Products, Ltd. (B.P. [a] 457,986 and [b] Addn. B.P. 457,987, 29.7.35. Ger., [a] 3.11.34).—(a) A solution or suspension of the finishing material (synthetic resin and colouring matter) is applied to the inner walls of a heated mould, which is then filled with the moulding material; pressing and hardening of both substrate and surface layer are done simultaneously. (b) The inner surface of the mould is replaced partly or wholly by suitably-shaped metallic inserts that have already been treated with coloured resin solution(s) (containing a lubricating agent, if desired) where they come in contact with the mouldable material. S. S. W.

Cementitious paint and plastic composition. H. A. Scholz, Assr. to United States Gypsum Co. (U.S.P. 2,032,071, 25.2.36. Appl., 10.9.34. Can., 30.10.30).—For the prep. of an exterior, cold-H_2O paint the consistency of a suspension of cement is lowered by addition of gum arabic, and $Ca(OH)_2$ added to render it alkaline. *E.g.*, a suitable mixture consists of $Ca(OH)_2$ 43, hydraulic cement 19·5, talcy inert filler 23·5, NaCl 6·5, mica 5·0, gum arabic 1·6, karaya gum 0·5, Irish moss 0·1, and Ca stearate 0·3%. B. M. V.

Production of protective coating compositions. A. H. Stevens. From Congoleum–Nairn, Inc. (B.P. 456,848, 4.6.35. Addn. to B.P. 446,658; B., 1936, 655).—Chlorinated rubber (3 pts.) is incorporated with 1—6 pts. of the oxidised oil or oil–resin component described in the prior patent. S. S. W.

[Pentaerythritol ester] product [coating composition] and its preparation. J. A. Arvin, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,029,851, 4.2.36. Appl., 8.4.32).—The prep. and use in varnishes of pentaerythritol esters of unsaturated monobasic aliphatic carboxylic acids ($\nless C_{16}$, I val. $\nless 120$), *e.g.*, linseed, tung, soya-bean oil fatty acids, prepared at 150—275° in presence, if desired, of catalysts (PbO, CaO, NaOH) and inert gas, are claimed. S. S. W.

Undercoat for [nitrocellulose] lacquers and lacquered material. W. D. Bowlby, Assr. to Hercules Powder Co. (U.S.P. 2,028,189, 21.1.36. Appl., 12.10.32).—Porous paper, carton board, etc. are first coated with a prep. containing starch (2—25%), glycerol or other plasticiser (0·5—20%), and H_2O (rest). S. M.

Varnish composition. J. B. Dietz and E. F. Oeffinger, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,028,758, 28.1.36. Appl., 19.2.32).—Batu gum (20—40), resinous material (0—20), *e.g.*, limed rosin (4), and drying- or semi-drying oil, *e.g.*, tung oil (2—8 pts.), are cooked for 5—20 min. at 232—254°, and thinned with turpentine, petroleum spirit, etc. S. S. W.

Finish-removing process. C. Ellis, Assr. to Chadeloid Chem. Co. (U.S.P. 2,029,992, 4.2.36. Appl., 17.9.32).—Before removal with brush or rag, the finish is softened to a slush by means of C_6H_6–wax or other known remover, and a bulky, finely-divided, loose, solid absorbent material (wood-flour, kieselguhr) is sprinkled on the surface to give a solid meal-like mass. S. S. W.

Calcination of lithopone. "Sachtleben" A.-G. f. Bergbau u. Chem. Ind. (B.P. 456,486, 20.2.36. Ger., 21.2.35).—Continuous calcination is effected during downflow through shallow (10 cm. deep), completely filled muffles inclined at approx. the angle of repose of the material. Various arrangements of the muffles in the setting are claimed. B. M. V.

(a) Treatment of zinc sulphide or zinc oxide pigment. (b) Apparatus for treatment of pigments. H. A. Depew, Assr. to Amer. Zinc, Lead & Smelting Co. (U.S.P. 2,021,990—1, 26.11.35. Appl., [a] 19.6.33, [b] 2.11.33).—(a) A mixture of pigment with S is heated at 400—900° (500°) in an atm. of steam or CO_2. (b) A horizontal tube-furnace, provided with a helical conveyor, is employed in the process of (a). L. C. M.

Transfer ink. F. Solomon, Assr. to B. Brier (U.S.P. 2,029,204, 28.1.36. Appl., 28.5.34).—Compositions (mixed hot) of shellac (5), rosin (5 pts.), TiO_2 (1), $(C_6H_4Me)_3PO_4$ (½), and heavy lithographic varnish (½ pt.) are claimed as transfer inks solid at room temp. and flowable with gentle heat. S. S. W.

Printing inks, and the printing of artificial foils, films, etc. Brit. Celanese, Ltd., and W. H. Moss (B.P. 456,898, 17.5.35).—Printing inks comprising cellulosic or resinous plasticisable base (cellulose acetate, PhOH–CH_2O resin; 1 pt.), appropriate plasticiser ($\nless 5$ pts.), pigment, and volatile solvent and/or diluent as required, are claimed. S. S. W.

Enamelling etc. articles.—See I. **[Plastic from] acid sludge.**—See II. **[Maleic acid from] turpentine oils. Polymeric products from aromatic vinyl hydrocarbons. Cumylphenol.**—See III. **Artificial horsehair. Fibrous product. Sheet vulcanised fibre. Transparent tissue. Plastic paper. Coating paper.**—See V. **Textile treatments. Coating flexible materials. Non-creasing fibres etc.**—See VI. **Adhesive for sandpaper.**—See VIII. **Electric fuses.**—See XI. **Substances for use in rubber. Chlorinated rubber. Polymerised β-chloro-αγ-butadiene.**—See XIV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

***Hevea brasiliensis* as a producer of rubber.** G. van Iterson, jun. (India-Rubber J., 1936, 92, 869—875; 1937, 93, 23—30, 60—65).—A review is given of the method of tapping, productiveness, structure of the latex-vessel system, bark regeneration, phenomena of the latex flow, and the probable plant mechanism by which the caoutchouc is produced in the latex vessels. Aschan's view that the necessary isoprene is formed by condensation of $COMe_2$ and MeCHO is favoured, but the manner of its subsequent polymerisation (a single tree can produce 200 g. of rubber in one night) is uncertain. The structure of the rubber globule also still calls for further investigation. D. F. T.

Viscosity of [rubber] latex and latex mixtures. I. O. Bächle (Kautschuk, 1936, 12, 210—213, 232—235).—The Höppler viscosimeter is superior to the simple capillary and falling-sphere viscosimeters for latex. With increasing concn. the η of latex rises more rapidly than would be expected from the Einstein formula; the effect of addition of NH_3 is associated with chemical change in the latex and is not reversible by ordinary de-ammoniation. In the use of latex for manufacture of dipped goods, the η of the mixture is of great importance; it can be raised by increase of the % of total solids or of the η of the aq. phase by the addition of H_2O-sol. colloids. The influence of the latter is due, at least in part, to adsorption with increase in the effective size of the suspended globules; this is confirmed by the fact that the serum obtained on creaming latex by the addition of a colloid, *e.g.*, gum tragacanth, has a lower η than would be expected from the original proportions of gum and serum. Control of η by the addition of thixotropic substances is not satisfactory. Prevulcanisation of latex mixtures also leads to increased η and eventual coagulation; these changes can be checked by the presence of suitable protective colloids and the selection of vulcanisation accelerators, *e.g.*, $(NEt_2{\cdot}CS_2)_2Zn$, which are insol. in H_2O, but in the final dried mixtures are nevertheless as active as other ultra-accelerators. The insol. accelerators can be rendered still more inactive to η changes by increasing the $[NH_3]$ of the latex mixture from 1% to 2—3%.

D. F. T.

Benzine and latex in the manufacture of seamless dipped [rubber] articles. ANON. (Gummi-Ztg., 1936, **50**, 1203—1204, 1228—1229, 1251—1252).—A description is given and comparison made of the practical aspects of the production of articles from rubber solution and latex, respectively, by dipping.

D. F. T.

Highly transparent mixtures containing magnesium carbonate [in rubber]. E. A. HAUSER and W. F. BIXBY (Kautschuk, 1936, **12**, 229—231; cf. Tanaka, B., 1927, 341).—The fact that Japanese pptd. $MgCO_3$ is more transparent than the American and European product (and still much more so than magnesite) is not due to its special amorphous character; *X*-ray examination shows the cryst. character of all. The Japanese product also has much less reinforcing effect in rubber. The only difference revealed by *X*-rays is a possibly greater particle size in the Japanese material, which also shows a composition with $6H_2O$ to each $5MgO,4CO_2$ complex, whereas the American pptd. carbonate shows about $9H_2O$. It is suggested that the Japanese material gives greater transparency by reacting with the diffracting constituents of the rubber mixture and rendering them sol. The reinforcing effect of the American product is attributed to its surface character and smaller particle size and also to its possible formation of bridge-linkings in the mol. structure of the rubber.

D. F. T.

Influence of fillers on the properties of vulcanised rubber. D. J. VAN WIJK (Ingenieur ['s-Gravenhage], 1935, **50**, Suppl., 23—25, 27—29; Chem. Zentr., 1935, ii, 2746—2747).—Factors governing the effect of the nature of the filler on the properties of the rubber are enumerated.

H. N. R.

Machinery for mixing and compounding [rubber]. J. BROWN (Trans. Inst. Rubber Ind., 1936, **12**, 230—243).—A description is given of the equipment for and operations of bale-cutting, mastication (roll mills, Banbury "mixer," Gordon plasticator), and mixing.

D. F. T.

Chemical aspects of vulcanisation. A. VAN ROSSEM (India-Rubber J., 1936, **92**, 845—851).—Formation of small proportions of H_2S during vulcanisation of $COMe_2$-extracted rubber to the soft stage is confirmed. Vulcanisation is regarded as consisting essentially of bridge-building between the long hydrocarbon mols. with formation of large complexes. The bridges may result by coupling of C atoms directly or with intermediate S linkings. A similar conception explains vulcanisation with other agents than S. Addition of S at the double linkings occurs in the production of ebonite (cf. Prins, B., 1919, 152A).

D. F. T.

Secondary changes during vulcanisation of ebonite. I. B. L. DAVIES (Trans. Inst. Rubber Ind., 1936, **12**, 244—264).—Experiment shows that during vulcanisation of rubber with a high % of S, part of the S is lost from the surface. The loss on vulcanisation in steam is > that in H_2O and occurs mainly by volatilisation of S, but in part as H_2S formed by interaction of H_2O and S. Absorption of H_2O by the rubber also occurs, being more marked in H_2O than in steam. No difference was observed in 3 years between the degree of natural ageing of thin slabs vulcanised, respectively, in H_2O and steam.

D. F. T.

***X*-Ray spectrography of soft natural rubber.** J. R. KATZ (India-Rubber J., 1936, **92**, 806—808, 813—817).—A review is given of the method of investigation of the structure of rubber by means of *X*-rays and of the results obtained. The existence of a crit. extension below which no crystallisation of the rubber is observed is believed to be a characteristic of fundamental importance.

D. F. T.

Tests on crêpe [rubber] soling. III. Water absorption. T. H. MESSENGER and [in part] J. R. SCOTT (J. Res. Assoc. Brit. Rubber Manufrs., 1936, **5**, 121—130; cf. B., 1936, 847).—Soling crêpes vary widely in rate of H_2O absorption; absorption continues almost indefinitely and is increased by rise in temp. On the average, factory-prepared crêpes absorb rather more rapidly than estate crêpes, but there is no sharp distinction. No obvious relation exists between H_2O absorption and the mechanical properties or solution-η of the rubber. The presence of solutes in the H_2O reduces the absorption of the latter to an extent quantitatively in accord with the osmotic theory of the process. H_2O-absorption tests will probably prove useful in the control of the gripping power of rubber soles on a wet pavement.

D. F. T.

New German synthetic rubber—Buna. A. KOCH (Brit. Plastics, 1936, **8**, 302—304).—Abstracts of a paper read at 74th general meeting and 80th anniversary of V.D.I. are given. Four grades of Buna synthetic rubber are being marketed and are distinguished by the suffixes *N*, *S*, *85*, and *115*. All are obtained by polymerisation of butadiene, the

polymerisation processes being special for grades *N* and *S*. "Letter" products are harder than the "no." Bunas and are superior to natural rubber in abrasion-resistance, particularly under hot-weather conditions. Buna-*N* is of exceptional quality and also shows marked resistance to oil and benzine. All resist ageing better than natural rubber.
D. F. T.

PATENTS.

Concentration of rubber latex. A. T. B. KELL (B.P. 457,455, 27.5.35).—Prior to concentrating (*e.g.*, by centrifugation or evaporation), an aq. solution of K (or Na) silicate and K_2CO_3 is added as stabilising agent. D. F. T.

Apparatus for purifying rubber latex and like dispersions. RUBBER PRODUCERS RES. ASSOC., H. P. STEVENS, and J. W. W. DYER (B.P. 458,130, 17.6.35).—The dispersion is dialysed against H_2O or an aq. solution, the process being expedited by application of pressure so as to cause movement of the dispersion and also prevent its dilution. A suitable form of dialyser is claimed. D. F. T.

Rubber dispersion in alkali silicates. M. H. KLIEFOTH, Assr. to C. F. BURGESS LABS., INC. (U.S.P. 2,028,397, 21.1.36. Appl., 20.1.33).—Conc. aq. Na silicate is mixed with $<12\%$ of rubber in solution or, preferably, suspension (latex) form. On addition of an alkali-neutralising agent (Na_2SiF_6, org. acid, etc.) delayed coagulation or gelation can be effected; the rubber remains in dispersion and imparts resiliency and flexibility to the finally dried material.
D. F. T.

Manufacture of rubber and the like. P. SCHIDROWITZ and J. W. MALDEN (B.P. 458,355, 17.5.35).—An aq. dispersion of rubber (latex) is thickened and stabilised by addition of a small proportion of a mixture of an alcohol or an ester thereof (*cyclo*- or a methyl*cyclo*-hexanol or *cyclo*hexyl acetate, or a mixture of these) with a fatty acid (stearic or oleic) and a substantially non-volatile dispersive agent for the acid [glycerol, Turkey-red oil, $N(C_2H_4{\cdot}OH)_3$, or a mineral alkali]. D. F. T.

Manufacture of sponge rubber. G. S. HIERS, Assr. to COLLINS & AIKMAN CORP. (U.S.P. 2,029,617, 4.2.36. Appl., 31.7.33).—An aq. dispersion of rubber mixed with a vegetable gum (locust- or carob-bean gum etc.), derived from fruit of the botanical group *Ceritonia siliqua* or *Conaphallus konjah* and containing an inflating agent (NH_4 carbonate), is gelled by addition of borax. Heating (*e.g.*, at 99°) then causes frothing and drying of the gel and coagulation of the rubber. D. F. T.

Manufacture of rubber films. P. H. WATKINS, Assr. to UNITED STATES RUBBER CO. (U.S.P. 2,030,729, 11.2.36. Appl., 10.6.33).—The removal of rubber films from a surface on which they have been deposited by evaporation of a rubber-containing liquid (latex) is facilitated by prior treatment of the deposition surface with a hypochlorite (of Ca or Na). D. F. T.

Manufacture of finely-divided substances for use, for example, in rubber mixings. SOC. ITAL. PIRELLI (B.P. 457,437, 4.5.36. It., 3.5.35).—An aq. solution of an alkali zincate (possibly after pretreatment with CO_2 or an alkali bicarbonate) is treated with $Mg(HCO_3)_2$. The resulting finely-divided ppt. of carbonated ZnO and MgO is separated, washed, and dried without materially impairing its colloidal nature. It has marked reinforcing properties, accelerates vulcanisation, and does not interfere seriously with the colour of the mixing in which it is incorporated. D. F. T.

Vulcanisation of rubber. WINGFOOT CORP. (B.P. 457,285, 29.5.35. U.S., 14.9.34).—Vulcanisation is accelerated by a condensation product of an aldehyde (I) (MeCHO, PrCHO, $CHMe{:}CH{\cdot}CHO$), a primary amine (II) (NH_2Ph), and an alkylene polyamine (III) $[C_2H_4(NH_2)_2]$. The products have the formula $CHRR'{\cdot}NHR''$ or $CHR'{:}R{\cdot}CHR'{\cdot}NHR''$, where R, R′, and R″, respectively, represent the residues of the (III), (I), and (II). D. F. T.

Rubber repair material. A. B. KEMPEL, Assr. to REX-HIDE, INC. (U.S.P. 2,031,960, 25.2.36. Appl., 21.1.35).—The attaching face of the repair material consists of unvulcanised rubber containing a stable terpene oil (chiefly dipentene, with possible minor proportions of pinene, terpinene, terpinolene, and cymene). D. F. T.

Production of chlorinated rubber products. C. R. BARSBY, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 458,120, 14.6.35).—Chlorinated rubber is obtained in finely-divided form by bringing in contact a (preheated) solution of it in a fine state of division with a preformed atm. consisting essentially of the superheated vapour of the solvent, which may be under reduced pressure. D. F. T.

[Production of] transparent films of rubber hydrochloride. WINGFOOT CORP. (B.P. 456,855, 11.10.35. U.S., 22.1.35).—A high degree of transparency is obtained by subjecting films containing $\ngtr 15\%$ of residual solvent to a smoothing operation (pressure-contact with a highly polished roller at $\nless 65{\cdot}6°$ ($87{\cdot}8$—$93{\cdot}3°$). Apparatus is described.
D. F. T.

[Stabilisation of] rubber-like chloro-2-butadiene-1 : 3 [β-chloro-$\Delta^{\alpha\gamma}$-butadiene] polymer[ides]. UNITED STATES RUBBER PRODUCTS, INC. (B.P. [A,B] 457,310—11, 4.5.36. U.S., 4.5.35).—The thermoplastic state of $CH_2{:}CH{\cdot}CCl{:}CH_2$ polymerides is stabilised by addition of 3—35% of (A) triaryl phosphate or (B) dialkyl (C_{2-4}) phthalate. 20% of (A) does not affect the consistency of the final product.
R. S. C.

Polymeric products from aromatic vinyl hydrocarbons.—See III. **Rubber-coated steel.**—See X. **Plastics containing rubber. Protective compositions.**—See XIII.

XV.—LEATHER ; GLUE.

Filtration of vegetable tannin solution. G. A. KERR (J. Amer. Leather Chem. Assoc., 1936, **31**, 434—448).—Tannin infusions of analytical concn. were not rendered clear, as judged by the Tyndall effect, after filtration by either the Official or the Riess method. The no. of aggregates observed microscopically (×400) was reduced more by the Riess than by the Official method of filtration, but there was progressive increase in their no. when the filtered solutions were set aside for some days. Particles of kaolin of colloidal size pass through the filter-paper in the Official method. Tannin reactions are given by filtered aq. solutions of non-tannins after they have been kept for 24 hr. D. W.

Analysis of [vegetable] tanning materials, using dry chromed hide powders. J. G. Parker and A. Harvey (J. Soc. Leather Trades Chem., 1936, **20**, 545—550).—Analytical results in close accordance with those given by the Official method of analysis have been obtained by the use of dry prechromed hide powder, even when the powder had been kept for 3—6 years. D. W.

New form of Darmstadt apparatus for determining non-tans in tannin analysis. P. H. Prausnitz (Collegium, 1936, 703; cf. B., 1929, 140).—A modified form is described and illustrated. D. W.

Effect of different tan liquors on the progress of the tannage and the properties of the finished leather. G. Rezabek (J. Soc. Leather Trades Chem., 1936, **20**, 530—544; cf. B., 1936, 754).—Pieces of delimed pelt were treated for 16 days with cold-sol. quebracho-extract liquors at p_H 3, 4, 8, 9, and 5, respectively, and the tannage was completed in chestnut-extract liquors at the same p_H vals., respectively. The finished leathers were tested mechanically and analysed. Min. turgescence was shown by pelt tanned at p_H 8 and 9. The rate of penetration was a min. at p_H 4; it was increased in the early stages by tanning at p_H 8 or 9, but not to the extent usually claimed. The H_2O-sol. matter in the finished leather was a max. for the alkaline tannages. The hide substance figures varied little. The degree of tannage was very low for the alkaline tannages, but became normal when the tannage was completed in untreated instead of alkaline chestnut liquors. The permeability to H_2O was least for the leathers tanned at p_H 3 (AcOH), 8, and 9; it was high for the leathers pretanned in alkaline liquors and completely tanned with the natural chestnut liquors, and also for leather tanned in liquors maintained at p_H 3 with H_2SO_4. Max. Thuau wear-resistance figures were obtained at p_H 4, and min. at p_H 3 (AcOH). There are indications that the purely alkaline tannage confers special properties on the leather fibres. D. W.

Effect of p_H value on [vegetable] sole-leather tanning. J. A. Wilson (J. Amer. Leather Chem. Assoc., 1936, **31**, 449—452).—A series of comparative tanning tests has been made on hide pieces with mixtures of chestnut, sulphited quebracho, and cutch or mimosa-bark extracts, respectively, at different p_H vals. and the products were analysed. The degree of tannage and time of penetration were both max. at p_H 3·0, and diminished with increase in p_H. Leather yield depends on both the extract mixture and the p_H val. at which the tannage is conducted. A higher degree of tannage was obtained with the chestnut–quebracho–cutch mixture than with the mimosa-bark mixture. D. W.

Analytical determination of nitrogen, fat, and moisture in leather. V. Kubelka and V. Němec (Collegium, 1936, 689—697).—20 g. of the leather are dried for 1 hr. in an electric oven at 100°, and then without weighing are transferred to a Soxhlet apparatus and extracted with a solvent to determine the fat. The fat-free leather is dried to const. wt. at 100° in an open dish for 2—3 hr., cooled, and weighed, to obtain the loss due to H_2O and fat. N is determined (Kjeldahl) on 0·75 g. of the dried, fat-free leather. The I vals. of the fat extracted from a leather containing fish oil (I val. 146) by the new and old methods of determination were 121 and 79, respectively. It is claimed that oxidation of the extracted oil is reduced to a min. in the new method. D. W.

Colorimetric determination of nitrogen in leather. F. K. Fischer (Abh. Staatsuniv. Saratov, 1936, **1**, 107—112).—The leather is destroyed by H_2SO_4 and $K_2S_2O_8$ and NH_3 determined colorimetrically with Nessler's reagent. J. J. B.

Oxidation catalysis: its influence and effect on leather chemistry. An addendum. A. O. Jaeger (J. Amer. Leather Chem. Assoc., 1936, **31**, 433—434; cf. B., 1936, 948).—The presence of CO_2 is general in the exhaust gases from the catalytic vapour-phase oxidation of $C_{10}H_8$ to o-$C_6H_4(CO)_2O$. D. W.

Testing objects for galalith or horn.—See XIII. **Soya-bean proteins.**—See XIX. **Tannery waste disposal.**—See XXIII.

Patents.

Manufacture of tanning agents. J. R. Geigy A.-G. (J. R. Geigy Soc. Anon.) (B.P. 456,741, 13.5.35. Ger., 11.5.34).—The process claimed in B.P. 305,013 (B., 1929, 1025) is carried out under milder conditions, at a lower or higher temp. for a longer or shorter time, and with an acidity $\ngtr$ that obtained by neutralising 77% of the sulphonation mixture. D. W.

Tanning [of raw hides or skins]. H. G. Turley and I. C. Somerville, Assrs. to Röhm & Haas Co. (U.S.P. 2,029,088, 28.1.36. Appl., 12.5.34).—Hides and skins at p_H 4·25—5·0 are treated with an aldehyde (CH_2O) capable of reacting with the collagen and subsequently with a basic Al salt (sulphate) and a synthetic tanning material made by condensing $PhSO_3H$ with CH_2O. D. W.

[Gelatin for] mechanical recording. C. J. Dippel, Assr. to N. V. Philips' Gloeilampenfabr. (U.S.P. 2,032,741, 3.3.36. Appl., 17.12.34. Ger., 9.1.34).—The p_H of the gelatin suitable for cutting of an optically reproducible sound track is maintained outside 4—7, *i.e.*, very remote from the isoelectric point of the colloid. B. M. V.

Manufacture of adhesive composition. G. G. Pierson, Assr. to Perkins Glue Co. (U.S.P. 2,030,073, 11.2.36. Appl., 22.3.30. Renewed 16.3.35).—A glue base consisting chiefly of cassava starch having η $>$44,000—48,000 poises (as determined by a specified method using the McMichael viscosimeter) is mixed with a Cu salt. This when mixed with sufficient caustic alkali and 2—3 pts. of

H_2O will produce a glue of η 44,000—48,000 poises, suitable for glueing wood. E. B. H.

Manufacture of adhesive composition. H. E. Holcomb, Assr. to Johns-Manville Corp. (U.S.P. 2,030,633, 11.2.36. Appl., 13.1.32).—The adhesive consists of a H_2O-insol., readily volatile, org. liquid such as gasoline emulsified in a fairly conc. alkaline solution of casein. The adhesive may be used in the production from various fibres of porous blocks for sound insulation. E. B. H.

Assistants in leather industry.—See III. **Patent leather.**—See VI. **Artificial leather.**—See XIII.

XVI.—AGRICULTURE.

Formation of structure in soil. I. Structure of soil colloids. D. I. Sideri (Soil Sci., 1936, **42**, 381—393).—The existence of aggregate phases in soil colloids is discussed. The properties of agglomerate groups of particles are considered in relation to the formation structural units in soils. A. G. P.

Effect of products of sterilisation [of soil] on the properties of test materials. P. Oesterle (Arch. Hyg. Bakteriol., 1936, **117**, 16—32).—The sporing organisms of garden soil did not show seasonal fluctuations in resistance to sterilisation by heating at 120° for 5 min. *B. mesentericus* spores mixed with sterile soil showed a slight increase of resistance to sterilisation with saturated steam. Soil-sporing organisms subjected to high vac. and steam-sterilisation were not more resistant. W. L. D.

Manganese in New Jersey soils. A. W. Blair and A. L. Prince (Soil Sci., 1936, **42**, 327—333).—The distribution or Mn in these soils is recorded. In certain areas Mn contents tended to decrease with depth below the surface. The Mn contents of crops diminished with increasing applications of CaO to the soil, but yields were not affected. CaO probably lowers the availability of soil-Mn. A. G. P.

Properties of hydroxyl groups of clay as a basis for characterising a mineral soil. W. Thomas (Soil Sci., 1936, **42**, 243—259).—The mol. structure of clay is represented as including OH in 3 different forms of combination. Titrimetric methods, using $Ba(OH)_2$ or HCl, are given for establishing the proportions of the different OH groupings and thence the base status, CaO requirement, "free" Al and Fe, the PO_4'''' required to satisfy the Al and Fe, the availability of replaceable K, and the influence on these factors of cultural treatment and manuring. A. G. P.

Subsoil waters of Newlands (Nevada) field station. C. S. Scofield, C. L. Moon, and E. W. Knight (U.S. Dept. Agric. Tech. Bull., 1936, No. 533, 30 pp.).—Variations in depth of H_2O table and of salinity in irrigation areas are examined. Lateral movement of saline subsoil H_2O is very small. A. G. P.

Rapid indirect determination of wilting coefficient of soils. G. J. Bouyoucos (J. Amer. Soc. Agron., 1936, **28**, 581—586).—The H_2O content at which soil just fails to solidify after supercooling (freezing mixture —2·5°) is an indirect measure of the wilting point. A. G. P.

Comparative moisture-absorbing and moisture-retaining capacities of peat and soil mixtures. I. C. Feustel and H. G. Byers (U.S. Dept. Agric. Tech. Bull., 1936, No. 532, 25 pp.).—The H_2O-holding capacity of peat is $>$ twice that of an equal vol. of soil. Mixtures (1 : 1) of peat and soil absorbed 40—50 and 80% more H_2O than untreated clay and sandy soils, respectively. Evaporation rates from initially saturated peat–soil mixtures were similar at first, but peat accelerated evaporation in the later stages. Fibrous moss peat lost H_2O more rapidly than a more decomposed reed peat. At lower and identical H_2O contents peat reduced evaporation rates except in a clay loam. Improvements in the H_2O supply to plants under greenhouse conditions were obtained by admixture of peat with sandy but not with clay soils. Well decomposed peats contained more unavailable H_2O than did fibrous varieties. Addition of peat to soil increased the wilting point moisture content. A. G. P.

Factors which modify the rate and total amount of infiltration in field soils. G. W. Musgrave and G. R. Free (J. Amer. Soc. Agron., 1936, **28**, 727—739).—Effects of cultivation and cropping on H_2O infiltration and surface erosion are examined. A. G. P.

Hydrogen-ion concentration of forest soils in vicinity of Dunedin, New Zealand. J. S. Thomson and G. Simpson (Trans. Roy. Soc. New Zealand, 1936, **66**, 192—200).—Trees have a marked ability to effect changes in p_H of soil around their roots, the change being of a definite character for each species. Species differences in soil-p_H of >2 units are recorded. A general correlation is established between the p_H of soil and the ash content of leaves. A. G. P.

Rapid agricultural analysis using "kit" methods: soil reaction (p_H). F. E. Hance (Internat. Sugar J., 1936, **38**, 467—468).—Using the Lamotte–Morgan p_H block, a small sample of the soil is placed in the compartment above the perforated partition, and the indicator added dropwise until the soil is saturated. The solution is drawn by capillary action down the channel into the lower depression, and the colour of the liquid thus obtained is matched with a suitable colour chart. J. P. O.

Effects of wind erosion and cultivation on the total nitrogen and organic matter contents of soils in the southern high plains. H. A. Daniel and W. H. Langham (J. Amer. Soc. Agron., 1936, **28**, 587—596).—Drifted soil contained 24% less org. matter and 28% less N than the control virgin soil. A. G. P.

Liming investigations. I. Calcium carbonate equilibrium method of liming soils for fertility investigations. J. A. Naftel (J. Amer. Soc. Agron., 1936, **28**, 609—622).—Sorption of Ca by soils is determined by adding varying amounts of $Ca(OH)_2$ to a series of soil samples, subsequently saturating with CO_2, and finally aërating for 18—24 hr. The amount of Ca sorbed at the equilibrium point is termed the "Ca sorption val." and this val. added to the native exchangeable Ca is designated "Ca sorption capacity." The latter val. is utilised in determining CaO requirements of soils. A. G. P.

Soil-liming investigations. II. Influence of lime on the sorption and distribution of phosphorus in aqueous and soil-colloidal suspensions. J. A. Naftel (J. Amer. Soc. Agron., 1936, **28**, 740—752; cf. preceding abstract).—The p_H at which Ca phosphates were formed in aq. solutions was: $Ca(H_2PO_4)_2$ 3·0—5·0, $CaHPO_4$ (I) 5·0—6·4, $Ca_3(PO_4)_2$ >6·4. Formation of (I) is transitory and [H˙] increases during the transition. In alkaline media a basic phosphate, probably hydroxyapatite, $3Ca_3(PO_4)_2,Ca(OH)_2$, is produced. The distribution of Mg phosphates was similar, but these are more sol. than the Ca series. The distribution of PO_4''' in presence of $Ca[Mg](HCO_3)_2$ differed from that in presence of Ca or Mg alone. Ca¨ had no appreciable effect on the sorption of PO_4''' by colloids of low SiO_2/R_2O_3 ratio, but increased the sorption by colloids of high ratio. In presence of CO_2 excess of PO_4''' was always pptd. except when the system was saturated with CO_2, when excess of PO_4''' remained in solution. Liming acid soils lowers the available P by increasing sorption by soil colloids only when these have a high SiO_2/R_2O_3 ratio. The effect reaches a max. before saturation point with Ca is attained. A. G. P.

Effects of twelve-year residues of lime and magnesia on the outgo of subsequent additions of potassium. W. H. MacIntyre, W. M. Shaw, J. B. Young, and B. Robinson (J. Amer. Soc. Agron., 1936, **28**, 202—215).—In soils receiving annual dressings of K_2SO_4 following 12 previous annual treatments with CaO and MgO, increased leaching of K was not apparent until after the third dressing of K_2SO_4. In absence of the CaO–MgO pretreatment and when S had been applied K appeared earlier in the drainage. CaO and MgO depressed the outgo of K in proportion to the amounts given. S treatments ($FeSO_4$, pyrites, S) lowered the Ca and Mg contents of the leachings. A. G. P.

Reagent for eliminating the influence of high ammonia concentrations on potash results in short soil tests. W. R. Kenny (J. Amer. Soc. Agron., 1936, **28**, 682—683).—Addition of CH_2O prevents the interference of NH_4 in the cobaltinitrite–EtOH test. A. G. P.

Intensity of removal of added cations from soil colloids by electrodialysis. H. P. Cooper and W. R. Paden (J. Amer. Soc. Agron., 1936, **28**, 597—608).—A relation between the oxidation–reduction potential of nutrients in soils and the intensity of their removal by electrodialysis is indicated. The absorption and removal of an electrolyte from soil is an additive property of its constituent ions. The quant. adsorption and removal of an individual cation is influenced by the solubility of compounds it may form in the soil complex. Na and Ca form compounds which are more readily sol. than the K compounds and are more readily removed. Applications of these results to the interpretation of plant responses to fertilisers are discussed. A. G. P.

Dispersion of soil for mechanical analysis by sodium carbonate or sodium oxalate treatment. A. N. Puri (Soil Sci., 1936, **42**, 267—272).—Exchangeable Ca and free acidoid are determined by the author's rapid method, and additions are made of Na_2CO_3 or $Na_2C_2O_4$ equiv. to the former and of NaOH equiv. to the latter. The suspension is shaken overnight. Highly org. soils should be boiled with H_2O_2 or $(NH_4)_2CO_3$ prior to the above treatment. A. G. P.

Analysis of soils: report of Sub-Committee. R. Stewart and E. M. Crowther (Agric. Progress, 1934, **11**, 106—114).—Collaborative results are recorded for determinations of p_H, C, N, and AcOH-sol. K in soils. In certain soils showing a potential drift when examined by the quinhydrone electrode, satisfactory results were obtained by the glass electrode. Ch. Abs. (p)

Determination of phosphate requirement of soils. G. Aubert (Ann. Agron., 1936, **6**, 587—594).—In non-calcareous soils having considerable absorptive power the absorption curve for H_3PO_4 permits determinations of the P reserve, easily-sol. P, absorbing capacity, and saturation point. For soils of low absorptive capacity, available P is preferably determined by extraction with 1% AcOH in the case of samples giving no effervescence with acid, or with aq. NH_4 citrate at p_H 8·2 for calcareous samples. A. G. P.

[Report of] Gezira chemical section. H. Greene (Sudan Govt. Ann. Rept. Gezira Agric. Res. Service, 1934, 78—98).—A modification of Vageler's method is described for determining exchangeable bases in saline, base-saturated soils. Soils in which the exchangeable Na amounts to 15, 10, and <5% of the total capacity are classed as bad, fair, and good, respectively. To change these soils from the 10 to the 5% Na level 10—15 tons of gypsum per acre-ft. are necessary. Surface soils become less alkaline during the dry fallow and more alkaline after rain or irrigation. The H_2O-extractable matter in surface soils was greater after irrigation than after fallow, and increased with the proportion of H_2O used for extraction and with the time of contact.

HCN occurred in leaves of young and mature durra. The toxicity of durra in various stages of development is examined. Ch. Abs. (p)

Nitrification in presence of organic matter. K. M. Pandalai (Science, 1936, **84**, 440—441).—Although org. matter tends to depress nitrification by *Nitrosomonas* present alone in an Omeliansky medium, the adverse effect is removed in presence of other organisms; enhanced nitrification then generally occurs. L. S. T.

Base-exchange capacity of decomposing organic matter. H. C. Millar, F. B. Smith, and P. E. Brown (J. Amer. Soc. Agron., 1936, **28**, 753—766).—The exchange capacity of various plant materials during the process of decomp. in presence of $CaCN_2$ is recorded. Vals. increased as decomp. proceeded and were directly correlated with the lignin and N, but not with the C or acid-hydrolysable matter contents, of the material. A. G. P.

Applicability of alkaline permanganate for oxidation of organic matter in soils for mechanical analysis. J. N. Chakraborty (Soil Sci., 1936, **42**, 261—266).—The sample is heated with $KMnO_4$–NaOH. $CaCO_3$ and MnO_2 pptd. during oxidation are removed by treatment with HCl and $NaHSO_3$. The soil is collected on a filter, washed with aq. NaOAc faintly acidified with HCl, till free from Mn, and finally with H_2O, and suspended in dil. aq. NaOH for pipette-sampling. Gypseous soils are washed through a 70-mesh sieve after oxidation and before HCl treatment in order to remove coarse gypsum. Results so obtained agree with those of the International A method for normal, gypseous, peat, and lateritic soils. A. G. P.

Decomposition of organic matter in relation to soil fertility in arid and semi-arid regions. P. C. J. Oberholzer (Soil Sci., 1936, **42**, 359—379).—In calcareous soils the decomp. of org. matter caused a temporary increase in sol. salts, notably of $Ca(HCO_3)_2$, for a few weeks, but subsequently no difference between vals. for treated and untreated soils was apparent. The p_H was unchanged and the availability of soil PO_4''' was affected only by the amounts provided by the added org. matter. Soil NO_3' was influenced by the nature and C : N ratio of the org. matter applied. CO_2 produced during decomp. was $>$ in humid soils and reached a max. during the first or second day. Glucose, lignin, cellulose, and starch were decomposed in the (decreasing) order named. Rates of decomp. increased with the soil-H_2O content and with temp. (max. 45°), and were $>$ those usually reported. Actively decomposing org. matter was injurious to seedlings, but increased the availability of native soil-K. A. G. P.

Base exchange in soil separates and soil fractions (sand and silt). A. T. Perkins and H. H. King (Soil Sci., 1936, **42**, 323—326).—In soil separates obtained by sedimentation, as the particle size diminished, the base exchange capacity per unit wt. increased and that per unit surface area decreased. Further subdivision of separates into fractions of varying d was attained by flotation in CCl_4–$CHBr_3$ mixtures. With diminishing particle size the exchange capacity of the fraction having d 2·0—2·4 remained const., but that of fractions having d 2·4—2·6 and $>$2·6 increased on a unit-wt. basis. A. G. P.

Base-exchange properties of certain Philippine soils. D. I. Aquino (Philippine Agriculturist, 1936, **25**, 128—144).—Higher exchangeable Ca and Mg contents in heavier than in lighter soils are attributed largely to differences in org. matter accumulations. The total exchangeable base contents of the soils decreased with p_H, possibly as a result of the leaching action of CO_2 and org. acids. The exchangeable Ca/Mg ratio was lower in surface soils than in subsoils. A. G. P.

Behaviour of multivalent cations in base exchange [of clays]. J. E. Gieseking and H. Jenny (Soil Sci., 1936, **42**, 273—280).—Exchange reactions with single-cation clays are examined. Certain irregularities in the exchange process are recorded, but, in general, the size and charge of the ions are the major factors influencing the position of the ion in adsorption or release series. A. G. P.

Physical changes in soils of the southern high plains due to cropping and wind erosion: relation between the (sand + silt)/clay ratios in these soils. H. A. Daniel (J. Amer. Soc. Agron., 1936, **28**, 570—580).—Soil drifts contained less silt and clay than did corresponding cropped and virgin soils. The ratio (sand + silt)/clay was high in drifts from coarse-textured and low in those from clay soils, but no definite relation was apparent between the ratio and the extent of wind erosion. A. G. P.

Availability of soil phosphates for the plant from the viewpoint of colloid chemistry. A. T. Tiulin (Soil Sci., 1936, **42**, 291—299).—$Fe(OH)_3$ gel and soil colloids exhibit a crit. zone of saturation with PO_4''' below which the P is unavailable to plants and above which the availability increases with the degree of saturation with PO_4'''. A theoretical explanation of the phenomenon is given and direct determinations of availability in pot cultures are recorded. A. G. P.

Effect of phosphates on the cation-exchange capacity of certain soils. A. L. Prince and S. J. Toth (Soil Sci., 1936, **42**, 281—290).—Applications of superphosphate had little effect on the p_H of field soils, but increased the exchangeable $H^{\cdot}$, lowered the ultimate p_H, and with heavier dressings increased the total exchange capacity. Exchangeable Ca, Mg, K, and Na showed no significant differences in relation to the PO_4''' added. Phosphation probably increases the acidoid/basoid ratio of the clay. An explanatory mechanism is suggested. In one instance the increased cation exchange produced by PO_4''' treatment was correlated with a diminution in free $Fe(OH)_3$. A. G. P.

Concentrated fertilisers. W. S. Landis (Chem. & Ind., 1937, 3—9).—A lecture.

Agricultural-chemical evaluation of common forms of nitrogenous fertilisers. L. I. Korolev (Min. Udobr. Insektofung., 1935, **1**, No. 1, 75—82).—Manufacture, properties, and uses of various simple and mixed fertilisers are discussed. Ch. Abs. (p)

Sorption of calcium cyanamide by certain kinds of soil. A. Wiadrowski (Rozn. Nauk. roln. Suppl., 1935, **34**, 3—30; Chem. Zentr., 1935, ii, 2268).—The sorptive power of soils for $CaCN_2$ was in the (descending) order garden soil, heavy loam, neutral loess, acid loess, sandy soil. The time of sorption varied with the soil type, the time effect being least in those having least adsorptive power for $NH_4^{\cdot}$. Sorption increased, though not proportionally, with the concn. of the solution. In presence of PhMe sorption is decreased, but the amount of N taken up increases with time. Sorption of N from urea also depends on soil type, time, and the concn. of the solution. In garden soils rapid ammonification of urea leads to actual loss of NH_3. In loams, high absorption of urea-N is associated with low absorption of $CaCN_2$-N. A. G. P.

Phosphoric acid as fertiliser. F. Scheffer and W. Nagel (Phosphorsaüre, 1935, **5**, 312—324; Chem. Zentr., 1935, ii, 2267).—The val. of phosphatic fertilisers is discussed in respect of their action as plant nutrients, and in improving the physical and chemical properties of soil (notably as buffering agents). Utilisation of other nutrients by plants is improved. A. G. P.

Vivianite as a phosphatic fertiliser. N. D. Smirnov (Min. Udobr. Insektofung., 1935, **1**, No. 3, 84—88).—Peat vivianite is serviceable as a P fertiliser. Ch. Abs. (p)

Fertiliser value of basic slags and other phosphates. E. M. Crowther and R. G. Warren (Agric. Progress, 1934, **11**, 99—105).—Comparative tests of basic slags, mineral phosphates, and superphosphate on grassland on several soil types are recorded. Various slags were adequately differentiated by the citric acid test. Ch. Abs. (p)

Comparative efficiency of "ammonitrophoses" [fertiliser]. F. V. Turtschin (Min. Udobr. Insektofung., 1935, **1**, No. 3, 41—49).—The product obtained by treatment of HNO_3 extracts of phosphorites with NH_3, sufficient to cause partial separation of Ca, is a mixture of NH_4NO_3 (I) and $Ca_3(PO_4)_2$, and is suitable only for acid soils. Complete separation of Ca from the extracts by $(NH_4)_2SO_4$ (II) and subsequent neutralisation with NH_3 yields a mixture of (I) and $NH_4H_2PO_4$. Separation of half the Ca by (II) followed by neutralisation, to p_H 6·3—6·5, with NH_3 produces mixtures of (I) and $Ca(H_2PO_4)_2$. The efficiency of these fertilisers depends on temp. conditions during prep. and is indicated by the citric acid (III) solubility of the PO_4''', except in products contaminated with Fe or Al phosphates. The latter are sol. in (III), but their availability to plants is $<$ that of $CaHPO_4$. Ch. Abs. (p)

Effectiveness of nitrogenous phosphate fertilisers, prepared by nitric acid extraction of phosphorites. F. V. Turtschin (J. Chem. Ind. Russ., 1936, **13**, 1141—1147).—Data are recorded for the effectiveness of a no. of compound fertilisers, for different crops and soils. R. T.

Effect of various fertilisers on soil acidity. A. Lauder and A. M. Smith (Agric. Progress, 1934, **11**, 93—98).—Effects of superphosphate, mineral phosphates, and basic slags on the p_H of aq. suspensions of clay and sandy loams and peats are examined. Ch. Abs. (p)

Production of magnesium sulphate fertilisers from rocks containing magnesium silicates. N. E. Pestov (Min. Udobr. Insektofung, 1935, **1**, No. 2, 50—52).—Fertilisers containing P, Mg, and active SiO_2 are obtained by treating waste dunite (from Pt extraction) with H_3PO_4 at 60° for 7—15 min., keeping for 1 hr. at 80—100°, and drying at 110°. With varying amounts of acid, $MgHPO_4$ or $Mg(H_2PO_4)_2$ may be obtained. Ch. Abs. (p)

Natural magnesium silicates (dunites) as fertilisers for acid soils. E. I. Ratner (Min. Udobr. Insektofung., 1935, **1**, No. 2, 73—78).—Beneficial effects of dunite tailings (from Pt extraction) on acid soils is due to the presence therein of active Mg silicates, easily decomposed by acids to yield colloidal SiO_2. Absorption of P by plants is thereby facilitated. Dunite has a sp. effect on flax growth. It does not induce unfavourable Ca/Mg ratios in soils. Ch. Abs. (p)

Boron as a fertiliser. M. V. Kataluimov (Min. Udobr. Insektofung., 1935, **1**, No. 1, 67—71).—B improved the yield of flax on acid soils and that of wheat on carbonate–saline soil. It counteracted the injurious effect of CaO on flax and mustard. Ch. Abs. (p)

Plant-food reserve in lowland and upland soils. N. L. Galvez (Philippine Agriculturist, 1936, **25**, 221—232).—The amounts of K and P sol. in 10% HCl in lowland and upland soils were similar, but the former had the larger proportions of N. No appreciable difference in the K and P contents was observed between surface soils and subsoils. Surface soils had the higher N content. A. G. P.

Substitution of commercial fertilisers for manure in vegetable production. J. W. Lloyd and E. P. Lewis (Illinois Agric. Exp. Sta. Bull., 1935, No. 421, 579—610).—Replacement of 50% of the manure by artificial fertilisers slightly increased yields. Complete replacement sometimes produced somewhat smaller yields, but crops were produced more economically. A. G. P.

Fertilising muck soil. P. M. Harmer (Ohio Veget. Growers Assoc. Proc. 20th Ann. Meet., 1935, 136, 138—142, 144).—On certain alkaline muck soils ($p_H \nless 7{\cdot}1$) crops respond to application of Mn, although the total Mn in these soils is $>$ that of acid soils on which crops give no response to Mn. Application of S converts native into available Mn. $CuSO_4$ is beneficial to all truck crops on very acid ($p_H \ngtr 4{\cdot}5$) and to many crops in less acid (p_H 6·0) muck soils. Mangels, beet, chard, celery, and turnips respond to NaCl, probably because of actual need of Na. Ch. Abs. (p)

Fertilising constituents in the solid excreta of sheep and goats. V. Villegas and L. A. Ynalvez (Philippine Agriculturist, 1936, **25**, 161—167).—Analyses are recorded and the vals. of the excreta in terms of artificial fertilisers are calc. A. G. P.

Nitrogen fixation with cow dung. N. R. Dhar and S. K. Mukerji (Nature, 1936, **138**, 1060).—N_2 fixation occurs when fresh cow dung is mixed with soil and exposed to sunlight. The cellulose and pentosans present in the dung undergo oxidation on the soil surface and liberate the energy necessary for fixation. L. S. T.

Manurial trials at agricultural stations, 1935. I. General. II. Nitrogen, phosphate, and potassium. III. Other elements. Anon. (Ann. Agron., 1936, 6, 187—310).—A detailed report. A. G. P.

Mineral nutrition of plants as a function of the composition of the substrate. G. Barbier (Ann. Agron., 1936, **6**, 568—586).—Antagonism between Ca and K in respect of intake by plants is related to the influence of Ca on the mechanism of fixation of K in soil rather than to physiological inhibitions. The ionic balance of the nutrient influences the intake of individual cations to extents which vary in the order Na $>$ Ca, Mg $>$ K. Absorption of K by plants and the K/Ca ratio in the plants are largely controlled by the K/Ca ratio of the nutrient. The intake of K cannot be correlated with the exchangeable K content of the soil. Addition of $CaCl_2$ and $CaSO_4$ to the medium slightly increases the Cl′ but not the SO_4'' content of the plant. Addition of very small amounts of humus colloids improves the growth of plants without modifying their mineral intake. A. G. P.

Plant-food value of molasses and filter cake. R. J. Borden (Hawaiian Planters' Rec., 1935, **39**, 180—190).—The K in molasses and the P in filter cake possess nutrient vals. equiv. to those of fertilisers. Effects varied with soil type, and the N status of the soil was an important controlling factor. Ch. Abs. (*p*)

Seed treatments for control of certain diseases of wheat, barley, and oats. B. Koehler (Illinois Agric. Exp. Sta. Bull., 1935, No. 420, 499—575).—Treatments with Cu carbonate, Ceresan, CH_2O, and hot H_2O are described. A. G. P.

Effects of tar on germination of wheat seed. H. A. Lafferty (J. Dept. Agric. Saorst. Éir., 1936, **34**, 63—72).—Treatment of seed with tar as a preventive against attack by birds and rodents caused injury if the amount used was $\gg$1 pint per barrel of wheat. CaO used as a drying agent minimised the injury. A. G. P.

Vernalisation of winter rye during ripening. F. G. Gregory and O. N. Purvis (Nature, 1936, **138**, 973).—Winter rye has been vernalised by keeping the ears at 1—1·5° for several weeks during ripening of the parent plants. L. S. T.

Devernalisation of winter rye by high temperature. F. G. Gregory and O. N. Purvis (Nature, 1936, **138**, 1013—1014; cf. preceding abstract).—Winter rye is not vernalised at 1° in N_2; low temp. and not checked growth is the potent factor in vernalisation. Seeds can be devernalised by keeping in N_2 at 20° for a period = the duration of exposure at 1°. The higher temp. negatives the effect of the lower progressively as its relative period is increased. L. S. T.

Influence of unbalanced fertilisers on growth of wheat. G. Guyon (Ann. Agron., 1936, **6**, 559—567).—Effects of repeated omission of N, P, or K from fertiliser mixtures on the development and yield of wheat grain and straw and on the baking quality of the grain are examined. A. G. P.

Statistical significance of wheat-protein percentage differences in varietal trials. A. G. O. Whiteside (Canad. J. Res., 1936, **14**, **C**, 387—393).—Errors due to plot variability were > those of analysis. After elimination of the effects of environment, replication, and variety no correlation was apparent between yield and protein content. A. G. P.

Mutual replacement of growth factors in plant nutrition. B. Stempel (Sborn. czechoslov. Akad. Zemed., 1935, **10**, 327—332; Chem. Zentr., 1935, ii, 2870—2871).—Comparison is made of the increased yields of barley obtained by watering and by application of nitrogenous fertilisers. A. G. P.

Orientation phosphate pot tests with maize. H. Gonggrijp (Med. Algem. Proefsta. A.V.R.O.S. Algem. Ser., 1933, No. 56, 15 pp.).—Under tropical conditions in acid (p_H 4·8) or alkaline (p_H 7·9) soils the availability of rock phosphates is not related to the state of subdivision. Comparative data for different phosphates are given. Ch. Abs. (*p*)

Nitrogen and organic carbon of soils as affected by crops and cropping systems. W. H. Metzger (J. Amer. Soc. Agron., 1936, **28**, 228—233).—Effects of a no. of crops and of crop rotations on the org. C and N contents of soils are examined. Of the crops recorded, maize causes the greatest reduction in both vals. Total crop production over 25 years and the total N in soil were closely related. Applications of manure did not significantly increase the N or C contents beyond vals. which could be attributed to increased crop residues. The N content approached an equilibrium val. characteristic of the crop or rotation employed. A. G. P.

Relation of growth to nutrition of rice plant. L. C. Kapp (Arkansas Agric. Exp. Sta. Bull., 1936, No. 335, 33 pp.).—Rice grows to maturity when N is supplied as NO_3' or $NH_4^{\cdot}$, the latter being slightly superior. The toxic action of Fe and Mn in nutrient solutions is diminished by increasing the supply of N or Ca. Rice yields are increased by heavy application of N but not of P or K. On an acid soil grain yields are higher when basic than when acidic N fertilisers are given. The reverse is true on non-acid soils. Straw from poor-yielding plants grown on acid soil contains relatively high proportions of N, Mn, and Fe and low proportions of Ca, the % N being increased by $(NH_4)_2SO_4$ and decreased by $NaNO_3$. Addition of acid increases the sol. Ca, Mn, and Fe to a greater extent in non-acid than in acid soils. The adjustment of soil reaction to maintain a suitable balance between Ca, Fe, Mn, and, possibly, N supplies is an important factor in rice culture. A. G. P.

Pasture studies. XI. Pasture research in Quebec. Chemical, ecological, and nutritional phases. L. C. Raymond (Canad. J. Res., 1936, **14**, **C**, 394—411).—Botanical data and species enumerations in the sward are discussed. Applications of superphosphate (700 lb. per acre) are followed by fixation of nearly all the P in the top 0·5 in. of soil. In pot cultures Ca depressed and S increased the yield of herbage and the intake of P. The org. P of soils contains 0·5% of lecithin and 65% of nucleic acid. The customary feeding-stuff analyses are not closely correlated with the results of feeding trials with mixed herbage or pure grass species. Discrepancies are possibly related to the proportion of ligno- and hemicellulose in the samples. A. G. P.

Effect of fertiliser applications on composition of pasture grasses. H. N. Vinall and H. L. Wilkins (J. Amer. Soc. Agron., 1936, **28**, 562—569).—N fertilisers increase the crude protein and, to a larger extent, the non-protein-N of blue grass pasture. P and K fertilisers cause a small increase in protein content. P fertilisers increase both the Ca and P of the herbage. With white clover N fertilisers decrease all forms of N and the Ca content of the crop. P fertilisers increase the N (largely in the non-protein fractions), Ca, and P contents. K fertilisers lower the Ca content. A. G. P.

Sources of nitrogen [for Sudan grass]: anhydrous ammonia *versus* ammonium sulphate *versus* ammonium nitrate. R. J. Borden (Hawaiian Planters Rec., 1935, **39**, 198—199).—On a soil having p_H 5·6 the order of efficiency was NH_4NO_3 (I) > aq. NH_3 (II) > $(NH_4)_2SO_4$ (III), but differences were small. With a soil of p_H 6·5 all three forms of N gave similar results. With p_H 7·1 the order was (III) > (I) = (II), and at p_H 7·5 it was (I) = (III) > (II). Ch. Abs. (*p*)

Influence of fertilisation, irrigation, and stage and height of cutting on yield and composition of Kentucky bluegrass (*Poa pratensis*, L.). G. B. Mortimer and H. L. Ahlgren (J. Amer. Soc. Agron., 1936, **28**, 515—533).—The principal factors limiting the growth of the grass were H_2O and the available N supply. Total yields of grass cut 5—16 times per season were greater when cutting was done at ground level than when at 4 in. above. When moisture was not a limiting factor the P content of regularly cut grass was min. in spring, max. in July—Aug., and fell later in the season. The Ca content rose uniformly from spring to autumn. Grass cut when 10 in. high had lower Ca and P contents than when cut at 4—5 in. high. N fertilisers lowered both vals. High-N grass was secured only by repeated application of fertiliser throughout the season. K and P fertilisers increase the % N in grass. The crude and true protein-, non-protein-, and H_2O-sol. N in grass was directly ∝ the amount of N fertiliser given. A. G. P.

[Report of] plant physiology section. F. Crowther (Sudan Govt. Ann. Rept. Gezira Agric. Res. Service, 1934, 40—67).—Rain affects the growth of cotton through its influence on nitrification and on subsoil conditions. Application of $Ca(NO_3)_2$ (I) to soil 2—5 months prior to sowing increased the N content of young plants. Ploughing-in of durra straw had adverse effects. Waterlogging lowered the N content of green cotton leaves. NO_3' in soil was depressed only when waterlogging occurred at periods of high surface evaporation. The NO_2' content was unaffected.

Yields of cotton were increased by spraying leaves with (I), but not by that with $(NH_4)_2SO_4$. Leaves absorb NO_3' but not $NH_4^{\cdot}$. Ch. Abs. (*p*)

Influence of fertiliser on potato maturity and type. F. M. Harrington (Amer. Potato J., 1936, **18**, 218—220).—In field trials, maturation was delayed by N fertilisers applied alone, and was still more delayed by K fertilisers. P fertilisers hastened maturity and improved the yield and quality of the tubers provided the N supply was adequately balanced. A. G. P.

Effect of manurial treatment on cooking quality in potatoes. M. G. Gray (Tasmanian J. Agric., 1936, **7**, 68—72).—With Medium Brownell potatoes, dressings of 1—4 cwt. of $(NH_4)_2SO_4$ per acre had little or no effect on cooking quality, as determined by the picric acid test and boiling trials. Nutr. Abs. (*m*)

Pure silica sand as a basis for phosphate-deficiency tests in lettuce. R. M. Woodman (Sands, Clays, and Minerals, 1936, **3**, 22—27).—Sand containing 99·8% SiO_2 was a suitable medium for pot trials, the P_2O_5 etc. being added in measured amounts in solution daily. Purple blotches on leaves and red stalks are a sign of P_2O_5 deficiency. Adequate P_2O_5 addition also promotes early hearting. C. I.

Yield and composition of lucerne as affected by various fertilisers and soil types. S. C. Vandecaveye and L. V. Bond (J. Amer. Soc. Agron., 1936, **28**, 491—505).—Effects of P and K fertilisers on the yield and mineral intake of lucerne are compared in humid and arid areas. Climatic conditions, exclusive of H_2O supply, influence the composition of the crop; *e.g.*, lucerne from humid districts has the higher % of P. A. G. P.

Comparative efficiency of free and combined nitrogen for nutrition of soya bean. W. W. Umbreit (J. Amer. Soc. Agron., 1936, **28**, 548—555).—Under conditions in which the plants have a balanced carbohydrate–N equilibrium, free N is the preferred source. Plants growing with unbalanced equilibrium (high light intensity–drought–high CO_2, or low light intensity–low temp.–short day) thrive better with fixed N. Under field conditions inoculated beans are more likely to be successful than those supplied with fixed N. A. G. P.

Relation of phosphorus to growth, nodulation, and composition of soya beans. T. B. Hutchings (Missouri Agric. Exp. Sta. Res. Bull., 1936, No. 243, 46 pp.).—Plants were grown in sand–clay mixtures, nutrients being adsorbed on the clay. The extent to which clay adsorbed PO_4''' was influenced by the proportion of adsorbed Ca present. Adsorbed PO_4''' was removed by electrodialysis and was available to plants. PO_4''' increased the growth of the plants, but had no influence on nodulation in the early stages of development. The N and P contents of the plants were closely related. The intake of $Ca^{\cdot\cdot}$ increased with the amount supplied. A. G. P.

Formation and nitrogen content of root tubercles of cowpea. M. L. Dinglasan (Philippine Agriculturist, 1936, **25**, 168—190).—The N content of nodules varied considerably in soils of different type. Cultivation tended slightly to increase the no. of nodules formed and their N content. Sterilisation of soil had a deleterious effect. Horse manure had no definite influence on N fixation. $(NH_4)_2SO_4$ lowered and K_2SO_4 and/or superphosphate increased the N content of nodules. The vigour of the plants had no effect on the no. or activity of nodule colonies. A. G. P.

Influence of soil acidity and type on growth and composition of Lima bean plants. J. B. Hester (Proc. Amer. Soc. Hort. Sci., 1934, **32**, 600—603).—The amount of Ca absorbed per g. of plant material was paralleled by the amount available in the soil. Absorption of Mg was uniform over all p_H ranges examined. For K and N absorption was higher at low p_H ranges. Intake of P was not greatly affected. Ch. Abs. (*p*)

Improving stands of vegetables on muck [soil]. J. D. Wilson (Ohio Veget. Growers Assoc. Proc. 20th Ann. Meet., 1935, 144, 146, 148, 150, 152).—Yields of peas and beans and particularly of beet and spinach were increased by dusting the seed with Cu_2O or treating the soil in the seed-row with CH_2O (1 : 128). Treatment of seed with ZnO or CH_2O dust (4—5%) was less satisfactory; that with MnO_2 was definitely inferior. (Cf. B., 1935, 246.) Ch. Abs. (*p*)

Influence of certain replaceable bases in soil on the elemental composition of vegetable crops. J. B. Hester and F. A. Shelton (Soil Sci., 1936, **42**, 335—340).—The proportion of individual exchangeable bases in the colloid complex of soils affected the mineral composition without altering the yield of crops. High exchangeable $Ca^{\cdot\cdot}$ contents depressed the intake of K, N, and Mg by plants; high Mg or K similarly lowered the absorption of the remaining three elements named. A. G. P.

Effects of magnesium deficiency in soil on yield, appearance, and composition of vegetable crops. R. L. Carolus (Proc. Amer. Soc. Hort. Sci., 1934, **32**, 4875).—The Mg, Ca, and N contents of various crops grown on Mg-deficient soils are recorded. Ch. Abs. (*p*)

Influence of ammonia- and nitrate-nitrogen on growth of greenhouse tomatoes in soils of different reaction. I. C. Hoffman (Ohio Veget. Growers Assoc. Proc. 20th Ann. Meet., 1935, 35—38).—On alkaline soil (p_H 7·8—8·0) $(NH_4)_2SO_4$ produced larger fruits and a greater total yield than did $NaNO_3$, for autumn crops on sterilised soils. On acid soils (p_H 5·0—7·0) $NaNO_3$ gave the better results. For spring crops on unsterilised soils these results were reversed. Ch. Abs. (*p*)

Oxygen and carbon dioxide content of culture solutions in relation to cation and anion nitrogen absorption by tomato plants. L. B. Arrington and J. W. Shive (Soil Sci., 1936, **42**, 341—357).—The higher O_2 tension of aërated culture solutions was not directly affected by their p_H. Aëration increased the rates of absorption of $NH_4^{\cdot}$-, NO_3'-, and total N, and the yield of the plants at p_H 4·0 and 7·0. The intake of $NH_4^{\cdot}$ at p_H 7·0 was > that at p_H 4·0. The reverse was true of NO_3'. Total N absorption and yields were slightly greater at p_H 7·0. Accumulation of CO_2 occurred in all solutions in contact with roots, and was greater at p_H 7·0 than at p_H 4·0, but had no influence on the growth or N intake of plants, or on the O_2 content of the culture media. A. G. P.

Effects of certain fertilisers on the carbon dioxide intake of mature Jonathan apple leaves. L. E. Tompkins (Proc. Amer. Soc. Hort. Sci., 1934, **32**, 97—120).—The CO_2-absorption capacity of leaves of trees receiving P fertilisers only was < of those of trees receiving N or N + P. Ch. Abs. (*p*)

Nitrogen intake and growth response in peach trees following autumn and spring fertiliser applications. J. H. Weinberger and F. P. Cullinan (Proc. Amer. Soc. Hort. Sci., 1934, **32**, 65—69).—$NaNO_3$ produced a greater increase in the N content of leaves of N-deficient peach trees than did $CaCN_2$ or $(NH_4)_2SO_4$. Ch. Abs. (*p*)

Responses of Yellow Transparent apple trees in Delaware to various nitrogen treatments. F. S. Lagassé (Delaware Agric. Exp. Sta. Bull., 1935, No. 195, 42 pp.).—N fertilisers increased the circumference and terminal growth of trees but did not influence either their biennial bearing habit or the yield or firmness of the fruit. Storage quality at ordinary temp. was not affected, but softening in cold storage was appreciably increased. N treatments caused no change in the H_2O content of seed or flesh. The N content of flesh (but not of seeds) was increased. A. G. P.

Ratio of calcium and magnesium to potassium and sodium and the chlorosis of grapefruit trees in the Jordan valley. F. Menchikowsky and M. Puffeles (Hadar, 1935, **8**, 161—164).—The ratio $(K_2O + Na_2O)/(CaO + MgO)$ in HCl extracts of soils and in leaf ashes was lower in chlorosis-inducing than in normal areas. The Cl content of healthy soils and leaves of healthy trees was > that of soils and leaves, respectively, in chlorotic areas. Chlorosis was unrelated to the Fe, Mg, or B contents of the soil. Resistance of trees to Cl toxicity is influenced by the base ratio of the soil. Ch. Abs. (*p*)

Sugar cane. II. Performance of canes as influenced by environmental conditions. T. Varahalu (Madras Agric. J., 1936, **24**, 394—417).—The performances of a no. of varieties planted (Sept., 1932, to July, 1933) at 6 stations in Madras were followed at several stages of their growth, and the general tendencies revealing the integrated influence of the seasons discussed, choosing Co. 352 as a type. Rainfall and seasonal conditions are studied and correlated with the behaviour of the canes in the different localities. J. P. O.

Effects on young sugar-cane plants of varying the moisture content of clay loam soil in pots. B. P. Javier (Philippine Agriculturist, 1936, **25**, 266—283).—Best growth and sucker production occurred in soils containing 60—70% of their saturation capacity for H_2O. A. G. P.

Comparative effects on yields of sugar cane of fertilising with ammonium sulphate and with green manure. V. C. Calma and A. V. Andam (Philippine Agriculturist, 1936, **25**, 145—160).—Application of $(NH_4)_2SO_4$ to the plant crop increased the yield of cane and sugar per acre, but the succeeding ratoon crop was not benefited. Green manures applied to the plant crop had a beneficial residual effect on the next ratoon crop. A. G. P.

Spacing in sugar beet cultivation. II. W. Krüger, G. Wimmer, and H. Lüdecke [with O. Ringleben, O. Vogt, O. Unverdorben, and J. Grimm] (Z. Wirts. Zuckerind., 1936, **86**, 515—563).—In trials at 4 places, in successive years, 1936—9, and with 3 types of beets, the rows were in all cases 50 cm. apart, and spacings of 25, 37·5, and 50 cm. between plants in the rows were compared. On the whole, but subject to exceptions, the 50-cm. spacing gave lower yields of beets and of sugar per acre than the narrower spacings; between the latter there was little difference. A spacing of 25—30 cm. between beets in a row and 50 cm. between rows is recommended. J. H. L.

Possible correlation between sugar content of beets and compactness of soil. F. Guilbert (Bull. Assoc. Chim. Sucr., 1936, **53**, 574—582).—A new instrument, the compacimeter, by which the resistance of soils to penetration by a pointed steel rod can be measured to a depth of 25 cm., is described and illustrated. Data obtained with it indicate that differences in the compactness of soil at different levels may account for certain abnormal root shapes, and that resistance of the soil to the growth of roots is related to the smallness of roots and high sugar content observed in dry seasons and with close spacing. J. H. L.

Effect of sylvinite, applied to chernozem, on sugar-beet crops. A. J. Antuikov (Kalii, 1935, No. 2, 24—25).—On exhausted chernozems crude sylvinite, alone or in combination with P and/or N fertilisers, markedly increased the yield of beet. Ch. Abs. (*p*)

Heredity: sugar content and weight of the sugar beet. B. Buszczynski (Bull. Assoc. Chim. Sucr., 1936, **53**, 570—573).—A record is made of the variations in sugar content and wt. of the descendants of a no. of selected individual beets. Increase in sugar content was most difficult to attain in families richest in sugar. Wt. of roots being more dependent than sugar content on cultural conditions, selection of the best roots for further propagation was difficult. J. H. L.

Nitrogen content of beet and molasses, pre- and post-war. E. Saillard (Compt. rend. Acad. Agric. France, 1935, **21**, 1222—1235).—The % of total N in beet declines with advancing growth. Protein-N (as % of total N) increases and NH_3, amides, and "harmful" N decrease as the season advances. In very dry seasons the total N is $>$, the proportion of protein-N $<$, and of "other N" $>$, normal. Post-war beet have higher sugar and N contents, higher N per 100 g. of sugar, and relatively less protein- and more "other N" than had pre-war samples. A. G. P.

Influence of agricultural methods and fertilisers on content of beet nematode cysts in the soil. G. Wimmer and H. Lüdecke [with G. Hüllweck] (Z. Wirts. Zuckerind., 1936, **86**, 583—659; cf. B., 1935, 1158).—At all times of the year only a small % of the cysts present in a soil contain larvæ. Causes of variations in the no. at different times of the year could not be established. With soils containing a large no. of cysts no definite relation was found between the no. present and the amounts of farmyard manure or artificial fertilisers applied. The no. is affected by the working of the soil, however, and increases if stubble is left standing for a long time. Long-period trials since 1910 with different crop sequences indicated that the nematode content of soils is not reduced by growing beet once in 4 years instead every 2 years. To effect a considerable reduction beets must be excluded from several successive rotations. J. H. L.

Vigour of vines in relation to soil, manure, and certain diseases. L. Moreau and E. Vinet (Ann. Agron., 1936, **6**, 541—558).—Of various fertiliser treatments examined only that with K affected (diminished) the incidence of fungal diseases. In some cases the yields were diminished and physiological disturbances were apparent. A. G. P.

Crop yields from Illinois soil experiment fields. F. C. Bauer, A. L. Lang, C. J. Badger, L. B. Miller, C. N. Farnham, and P. E. Johnson (Illinois Agric. Exp. Sta. Bull., 1936, No. 425, 147—243).—Numerous manurial trials are recorded and discussed. A. G. P.

Technique and evaluation of micromanurial experiments. F. Sekera (Phosphorsaüre, 1935, **5**, 261—311; Chem. Zentr., 1935, ii, 2571; cf. B., 1935, 72).—The method is further developed and shown to yield results in agreement with those of field trials. A. G. P.

Action of various potassium fertilisers. V. P. Belski (Min. Udobr. Insektofung., 1935, **1**, No. 3, 56—65).—Manurial trials with K fertilisers and a no. of K-bearing by-products on a no. of crops are recorded. Ch. Abs. (*p*)

Analysis of *Crotalaria juncea* with special reference to its use in green manuring and in fibre production. B. N. Singh and S. N. Singh (J. Amer. Soc. Agron., 1936, **28**, 216—227).—The % of N, org. matter, and other essential constituents of the plants increased with age to a max. at the late adolescent stage. The abs. amounts reached max. in the early senescent stage. The val. of the plant parts for green manuring decreased in the order leaves, roots, stems. A. G. P.

Growth-substances or hormones, and the rooting of cuttings. M. A. H. Tincker (J. Roy. Hort. Soc., 1936, **61**, 510—516).—Beneficial effects of α-naphthyl- and β-indolyl-acetic acids on the rooting of cuttings from many plants are recorded. Excessive amounts of the growth-substances may cause injury. A. G. P.

Influence of manganese on the nitrogen nutrition of plants. G. Bertrand (Compt. rend. Acad. Agric. France, 1935, **21**, 1215—1222).—$MnSO_4$ improves the assimilation of soil-N by plants and the translocation of N within the plant. A. G. P.

Particle size of insecticidal dusts. Differential manometer-type sedimentation apparatus. L. D. Goodhue and C. M. Smith (Ind. Eng. Chem. [Anal.], 1936, **8**, 469—472).—Apparatus and technique for sedimentation analysis of disperse solids in $EtOH–H_2O$ mixture of max. η are described. E. S. H.

Controlling insects in muck crops. J. P. Sleesman (Ohio Veget. Growers Assoc. Proc. 20th Ann. Meet., 1935, 130, 132, 134, 136).—Lubricating oil emulsions (2—6%) alone or in conjunction with Bordeaux mixture (I) failed to kill eggs of the onion maggot. A high % kill resulted from saturating soil around the eggs with aq. $HgCl_2$ (1 oz. in 8 gals.). (I), Cu–CaO dust, and S–pyrethrum dust were almost equally effective against potato leaf-hopper. Ch. Abs. (*p*)

Common Philippine termites. G. A. Pangga (Philippine Agriculturist, 1936, **25**, 233—265).—

Among control measures, dusting with Paris-green gave promising results. A. G. P.

Fungus diseases of bowling and golf greens. F. T. Bennett (Agric. Progress, 1935, **12**, 164—169).—*Fusarium nivale* and *Corticium fuciforme* were not controlled by 1% aq. $Ca(OH)_2$, $KMnO_4$, or $FeSO_4$. 1% $CuSO_4$ inhibited the latter but not the former. Effects of various concns. of $HgCl_2$ and malachite-green (I) are examined. *F. nivale* was completely controlled by weekly applications of (I) (1 : 20,000) in a Bordeaux mixture (II) diluted sufficiently to have only a negligible fungicidal action. (II) served as a sticker. Relations between soil-p_H and resistance of grasses to fungal attack are discussed. (Cf. B., 1934, 692.) Ch. Abs. (*p*)

Preventing injury from Japanese and Asiatic beetle larvæ to turf in parks etc. W. E. Fleming (U.S. Dept. Agric. Circ., 1936, No. 403, 11 pp.).—Methods of applying Pb arsenate to turf are described. A. G. P.

[Report of] section of botany and plant pathology. [Root rot of cotton.] R. E. Massey (Sudan Govt. Ann. Rept. Gezira Agric. Res. Serv., 1934, 119—141; cf. B., 1935, 516).—Experimental data indicate that the incidence of root rot is associated with high alkali contents (Na_2CO_3, $NaHCO_3$) in soil. Ch. Abs. (*p*)

Derris for control of vegetable insects. N. F. Howard, H. C. Mason, and R. H. Davidson (Ohio Veget. Growers Assoc. Proc. 20th Ann. Meet., 1935, 21—25).—Derris dusts were effective against a no. of insects. Ch. Abs. (*p*)

Control of the cabbage fly (*Phorbia brassicæ*, Bché.) by spraying and dusting. H. Gasow (Z. angew. Entom., 1935, **22**, 118—130; Chem. Zentr., 1935, ii, 2269).—Comparative trials with various insecticides are recorded. $HgCl_2$ was the most effective. A. G. P.

Control of sugar-beet webworm (*Loxostege sticticalis*, L.). V. M. Pivovarov (Plant Protection U.S.S.R., 1935, No. 1, 103—114).—Treatment with Paris-green or Ca arsenite is preferable. Ch. Abs. (*p*)

Control of asparagus insects. M. Dingler (Z. angew. Entom., 1935, **22**, 295—230; Chem. Zentr., 1935, ii, 2723).—Spraying and dusting (As) processes and cultural methods are discussed. A. G. P.

Bordeaux mixture substitutes on cucurbits. J. D. Wilson (Ohio Veget. Growers Assoc. Proc. 20th Ann. Meet., 1935, 8—14).—Efficiency of Bordeaux mixture was increased by addition of 1% oil emulsion. Best results were obtained with Cu phosphate, basic Cu chlorides or sulphates, Coposil (a Cu NH_4 silicate), Ca or Mn arsenate used as sprays or dusts. Ch. Abs. (*p*)

Reducing the lime content of Bordeaux mixture. H. C. Young (Ohio Veget. Growers Assoc. Proc. 20th Ann. Meet., 1935, 70—72).—Yields of potatoes were not significantly increased by reducing the CaO in Bordeaux mixtures to $<$ that corresponding with the 4 : 6 : 50 prep. Ch. Abs. (*p*)

Bordeaux mixture with reduced amounts of lime as a potato spray. F. M. Blodgett, E. O. Mader, O. D. Burke, and R. B. McCormack (Amer. Potato J., 1935, **12**, 171—177).—Best yields of potatoes were obtained after use of Bordeaux mixture containing half the customary proportion of CaO. The efficiency of the spray is related to some extent to the amount of sol. Cu in the prep. Ch. Abs. (*p*)

Potato spraying and potato scab. E. O. Mader and F. M. Blodgett (Amer. Potato J., 1935, **12**, 137—142).—With increasing proportions of Cu applied as Bordeaux mixture there was an increase in the wt. of foliage, delayed enlargement of tubers, but an increase in the final no. of tubers and in their N content. The Cu content of young tubers was increased by spraying, most of the Cu being located in the outer layers of the cortex. Ch. Abs. (*p*)

Fish-oil sprays as affecting the carbon dioxide intake by Jonathan apple leaves. G. W. Young (Proc. Amer. Soc. Hort. Sci., 1934, **32**, 101—103).—Three applications of herring oil–Pb arsenate sprays considerably reduced the CO_2 intake of leaves. Ch. Abs. (*p*)

Zinc sulphate in peach sprays: limited tests in apple sprays. K. J. Kadow and H. W. Anderson (Illinois Agric. Exp. Sta. Bull., 1936, No. 424, 131—144).—Addition of $Ca(OH)_2$ to acid Pb arsenate (I) sprays is followed by carbonation of the spray residue and a later increase in the amount of sol. As. Injury to peach trees due to this cause is diminished by addition of $ZnSO_4$ (II) ($\not>$1 lb. per 100 gals.). Use of large proportions of (II) (8 lb. per 100 gals.) with (I) or Bordeaux mixture causes russetting of apples. Use of (I) as a fungicidal agent for apple or peach is not recommended. No stimulatory effects of Zn were observed. A. G. P.

Effect of spraying apple leaves with certain less-used materials on their carbon dioxide intake. E. L. Overholser and F. L. Overley (Proc. Amer. Soc. Hort. Sci., 1934, **32**, 93—96).—Ca arsenate with either "safeners" or mineral oil had no ill-effect on CO_2 intake. Ch. Abs. (*p*)

Control of white mould disease of narcissus. P. H. Gregory (J. Min. Agric., 1936, **43**, 865—869).—Application of Bordeaux mixture (4 : 3 : 40) with a wetting agent, when shoots are 3—6 in. high, followed by 1 or 2 treatments at monthly intervals is recommended. A. G. P.

Sodium ethyl xanthate as a plant poison. R. B. Harvey, J. Zalar, and R. H. Landon (Science, 1936, **84**, 356).—An aq. solution is toxic to the aërial parts of herbaceous plants. L. S. T.

Wild bramble eradication. L. M. Cooley (New York State Agric. Exp. Sta. Bull., 1936, No. 674, 27 pp.).—Best results were obtained by treatment with NH_4CNS, $NaClO_3$, or Na_3AsO_3, preferably applied as a fine spray over the foliage, at the fruiting period. A. G. P.

Dry application of chlorates [weed killers]. H. W. Hulbert and L. V. Benjamin (Idaho Agric. Exp. Sta. Circ., 1935, No. 74, 8 pp.).—For controlling perennial weeds with running root stocks, autumn applications of $NaClO_3$ are more effective than those made in spring or summer. Dry applications give better results than wet ones. In many cases two applications with an interval of a few weeks are preferable to a single large application. A. G. P.

Bindweeds and their control. T. A. Kiesselbach, N. F. Petersen, and W. W. Burr (Nebraska Agric. Exp. Sta. Bull., 1934, No. 287, 47 pp.).—Among chemical treatments, use of $NaClO_3$ is recommended. A. G. P.

Bionomics and control of bursate nematodes of horses and sheep. III. Toxicity of urine and related substances for sclerostome larvæ in fæces. I. W. Parnell (Canad. J. Res., 1936, 14, D, 172—180; cf. B., 1935, 375).—Toxicity of cow urine towards the larvæ varies considerably and decreases with time of storage. Comparative tests of other urines and of drainage from manure heaps are recorded. The lethal effect of aq. NH_3 is much more marked than that of $COMe_2$. A. G. P.

Rôle of pine-tar oil in cattle fly sprays. A. M. Pearson (Delaware Agric. Exp. Sta. Bull., 1935, No. 196, 63 pp.).—Pine oil activates the toxic action of derris and pyrethrum, of which it may replace a considerable proportion in fly sprays without loss of toxicity. Chemical changes and loss of toxicity of pyrethrum preps. during exposure to sunlight are diminished by the oil. High grades of oil are more effective than low for combination with pyrethrum or derris. Pine-tar oil has no influence on the toxicity of aliphatic thiocyanates. A. G. P.

Granulated NH_4NO_3. K salts from sea-H_2O. Reworking phosphates. Apatite concentrate. Superphosphate.—See VII. **Antiparasitic agent.**—See XXII. **B in H_2O [and plant growth]. Sulphite waste liquor [in soil mixtures]. Tannery-waste disposal.**—See XXIII.

See also A., III, 48, **Plant growth and ultraviolet radiation.** 49—50, **Effects of plant-growth substances.**

Patents.

Bed material for flower bulbs. J. J. Grullemans, Assr. to Wayside Gardens Co. (U.S.P. 2,031,308, 18.2.36. Appl., 30.12.33).—A compost comprises comminuted peat 1 bushel, comminuted shell or other form of $CaCO_3$ 10 lb., and powdered charcoal 2 lb. B. M. V.

Fertiliser production from sewage. O. V. Austin (U.S.P. 2,029,648, 4.2.36. Appl., 28.9.33).—Sewage, slaughter-house refuse, sewage sludge, screenings, etc. are subjected to superheated steam at about 1000 lb. per sq. in. pressure for several min. and the pressure is then suddenly released, thereby causing explosive disintegration and discharge of the contents into a condenser. The fats, fatty acids, and soaps which float on the surface can be recovered; the glycerin dissolved in condensed steam is recoverable by distillation, whilst the mineral and org. (humus) matter settles and can be utilised as sterile fertiliser. O. M.

Impermeabilising and tightening soils, earthy and stony masses and structures, and filling the voids, cavities, and fissures therein. N. V. de Bataafsche Petroleum Maats. (B.P. 456,695, 4.11.35. Holl., 23.1.35).—Stabilised aq. dispersion of bitumen and a fine filler (Portland cement, CaO, $CaCO_3$, sand, micro-asbestos, infusorial earth, trass, shale, or coal) is injected and allowed to break down in the voids, followed, if desired, by dispersion without filler. B. M. V.

Manufacture of agricultural spray materials. E. I. Du Pont de Nemours & Co. (B.P. 457,828, 7.6.35. U.S., 9.6.34).—CuCN (33), gelatin, agar-agar, or gum tragacanth (0·5—1·5%), and H_2O (remainder) are ground together in a colloid mill to produce a suspension suitable, after dilution, as a fungicidal spray. A. R. P.

Insecticidal spray. I. Stone (U.S.P. 2,028,109, 14.1.36. Appl., 9.4.34).—$ZnCO_3$ or similar inert carbonate is added to arsenical sprays to assist in removal of the spray residue in a subsequent acid-washing operation. A. R. P.

Insecticides [for destroying locusts]. Industrias Quimicas Argentinas "Duperial" Soc. Anon., and E. Garsoglio (B.P. 458,024, 7.5.35).—Commercial Zn or a compound of Zn (*e.g.*, zincate) is allowed to react for $\not<30$ min. with an aq. solution of an alkali hydroxide in presence of an aromatic hydrocarbon or a derivative thereof, these latter serving as penetrants. W. J. W.

[Lauryl] parasiticides. E. W. Bousquet, G. D. Graves, and P. L. Salzberg, Assrs. to Grasselli Chem. Co. (U.S.P. 2,030,093, 11.2.36. Appl., 29.12.32).—Compounds, $n\text{-}C_{12}H_{25}\cdot XH$ (where $X =$ an element of group V, VI, or VII, or an org. or inorg. radical), and laurylamines are claimed as insecticides. 0·2% of lauryl alcohol in aq. sprays controls aphids; 10% in kerosene controls flies etc. The C_{12} compounds are the most effective of the series. R. S. C.

Cumylphenol.—See III. **Oil–metal dispersions.**—See X.

XVII.—SUGARS; STARCHES; GUMS.

Determination of sugar in the beet. M. Martraire (Bull. Assoc. Chim. Sucr., 1936, 53, 609—616, 617—639).—The sugar content of beets calc. from the sugar content of expressed juice, on the assumption that the % of such juice in the beet $= 100$ less the % of dried marc, was irregularly $>$ that determined directly by hot aq. digestion. Juice expressed from pulped beets by moderate pressure was richer in sugar than the further quantities obtained by higher pressures. Hot aq. digestion gave higher results with very fine than with coarser pulp. The vol. occupied by the marc and the Pb ppt. is estimated at 0·9 c.c. for the French normal wt. of pulped beets (16·29 g.), or 1·2 c.c. for 26 g. The author considers, however, that if with the French normal wt. the vol. is made up to 100 c.c. the error due to the vol. of the marc is almost compensated by adsorption of sugar by the marc. J. H. L.

Comparison of the marc content of fresh and exhausted beet cossettes. E. Muck (Zentr. Zuckerind., 1936, 44, 511—512; Internat. Sugar J., 1936, 38, 471).—In carefully controlled tests it was found that the marc introduced into a beet factory during the campaign amounted to 3022·93 metric tons, but that found in the exhausted pulp was 2948·60 tons, a difference of 0·14% on the wt. of fresh beets worked, or 2·45% of the marc accompanying the beets. It appears, therefore, that an appreciable amount of marc went into solution during the diffusion process. J. P. O.

Continuous [sugar-beet] diffusion by the Bergé system. Anon. (Facts about Sugar, 1936, **31**, 373—377; Internat. Sugar J., 1936, **38**, 475).—At the Meaux factory, the Bergé installation has a capacity of 1000 tons per 24 hr., the diameter of the drum being 4·6 m. and its length 22 m. It has 28 compartments, and rotates at 21 r.p.m. Each compartment carries 2000 kg. of cossettes, and the same wt. of H_2O. Its continuous operation has been successfully established, and some unexpected advantages observed, such as the complete absence of foam during diffusion, during liming, and during carbonatation, and the absence of so-called "undetermined losses." J. P. O.

Single liming [of sugar juice] with the theoretical amount of lime. K. Smolenski and M. Werkenthin (Internat. Sugar J., 1936, **38**, 433).—Juices treated with the theoretical amount of CaO (*i.e.*, that necessary to produce the optimum isoelectric point, approx. p_H 11·0) are inferior in quality to that which has been purified with 1·5% of CaO. It has twice the amount of colour, several times the content of Ca salts, and a 20% lower non-sugar elimination. In practice, such juice is found to foam during carbonatation, filtration, and evaporation. Filtration, moreover, is difficult. J. P. O.

Cold main defecation [of sugar juice] with dry lime. F. W. Meyer (Deuts. Zuckerind., 1936, **61**, 583—584; Internat. Sugar J., 1936, **38**, 471).—Raw juice is automatically treated with the requisite amount of milk-of-CaO for its pre-defecation (0·3% CaO, on the wt. of roots), this being done in the measuring tanks. After keeping for 4—11 min., it is sent to the main defecation tanks, which are provided with rotating cylindrical screens containing the whole of the dry CaO for the main defecation. A pump circulates the juice from this tank through the heaters, and back again, until its alkalinity has reached 0·2% CaO (≡1·5% CaO, on the wt. of roots), the temp. being meanwhile raised to 85°. Then the juice thus limed is carbonatated. J. P. O.

Report of the South African Sugar Technologists' Association, 1935—6, on clarification. G. C. Dymond (Internat. Sugar J., 1936, **38**, 480).—"Harloff's process," *i.e.*, heating the juice to 60°, followed by liming and sulphitation, gave the highest alcogel removal (gum elimination) of any process, and in practice was also found to give the lowest incrustation in heaters and evaporators. Simple defecation with CaO alone gave the lowest, and the result was only a little better when H_3PO_4 was added. J. P. O.

Action of activated carbons on amino-acids in connexion with sugar-juice analysis. G. Mezzadroli and E. Minetti (Rev. Brasileira Chim., 1936, **1**, 146—149; Internat. Sugar J., 1936, **38**, 471).—"Appula-Z" activated C adsorbed about 3% of the total NH_2-acid-N from 0·5% solutions of various NH_2-acids, "Antichromos" about 11, and neutral "Norit-Super" about 42%. Using beet juice, the adsorption was 16—31·3% and there was an increase in the polarisation of 0·15—0·6%; the bearing of this fact on analytical results when activated C is used for clearing the solution is indicated. J. P. O.

Purification of cane juice in the manufacture of white sugar. J. Guillaume (Internat. Sugar J., 1936, **38**, 470).—Under conditions in which the juice of the cane is deficient in H_3PO_4, and clarification consequently difficult, it is recommended that sulphuring the raw juice with 0·6—1·0% of SO_2, or about 300 g. of S per ton of cane, which generally results in a p_H of 3·8—4·2, should be carried out. It is then heated to 100° and defecated with enough CaO to bring the p_H to 7·0—8·5, but the CaO should not be added before sulphuring. J. P. O.

Practical value of mechanical circulation in [sugar-juice] vacuum pans. A. L. Webre and J. Diaz (Internat. Sugar J., 1936, **38**, 463—464).—Using the new design of "circulator," crystal formation is found to be incomparably better from low-grade to refinery products of the highest purity. Control is easier and boiling faster. There is no superheating of the massecuite, and colour formation is eliminated. At Central Senado, before the installation of the circulator, it took 2½—3½ hr. to make an *A*-strike, but now the same operation under the same conditions requires 1½—2½ hr. In pans so equipped, a method of cooling low-grade strikes has been developed which greatly reduces the work of the crystallisers. J. P. O.

Isoelectric point of beet juice. E. J. Hugel (Internat. Sugar J., 1936, **38**, 471).—Teatini's "integral process" of purifying beet-diffusion juice is criticised. It is considered that replacement of the SO_2 by CO_2 in the process is impracticable. J. P. O.

Refrigeration in sugar laboratories (for the preservation of samples of mixed juice). G. C. Dymond (Internat. Sugar J., 1936, **38**, 427—428).—A description (with sketch) is given of a suitable type of refrigerator for cooling six 100-ml. hourly samples of mixed juice from 33° to −3° in 5 min. Using this apparatus, there was no change in the composition of the juice (sucrose and reducing sugar content) during 140 hr. J. P. O.

[Sugar-]juice control processes and their applicability in works. Wallenstein (Zentr. Zuckerind., 1935, **43**, 431—439; Chem. Zentr., 1935, ii, 2464).—Methods of determining the final alkalinity of the purified juice are critically discussed; it is concluded that titration is the most certain. H. N. R.

Exhaustion of final molasses. L. I. A. Micheli and O. S. de Gyulay (Internat. Sugar J., 1936, **38**, 460—463).—Attention was conc. on the development of a practical crystallisation test by which a sample of molasses can be brought to the lowest final purity attainable in a well-conducted factory for the particular material; a method of conducting such tests, using a small vac. pot, is described. Measurements of the final true purities at const. impurities : H_2O ratios depend on the factors inherent in the particular material. The saturation coeff., as calc. from the sucrose, H_2O, and saturation temp., was found to be a valuable criterion of the exhaustion of any molasses, being a true indication of the exhaustibility under conditions where crystallisation is to be carried out near equilibrium at a given temp. J. P. O.

Determination of betaine in sugar-beet by-products. J. W. Blood and H. T. Cranfield (Analyst, 1936, **61**, 829—835).—Proteins are pptd. by basic Pb acetate, NMe_3 oxide is reduced to NMe_3 by means of a Zn–Cu couple, and volatile bases are removed by boiling. Betaine (I) is then pptd. by means of I solution, a solution of the resulting peroxide in EtOH being titrated with $0{\cdot}05N$-$Na_2S_2O_3$ to a starch end-point; the factor is 0·001181. If $>2\%$ of sugars are present, they are first removed by addition of conc. H_2SO_4 to the conc. solution, the aq. extract of the charred mass being used. Existing methods give results which are higher owing to pptn. of other bases, or lower owing to losses of (I) during the isolation process. J. G.

Determination of amino-nitrogen and the glutamic acid nitrogen in molasses. F. Massa (Ind. sacc. ital., 1935, **28**, 127—129; Chem. Zentr., 1935, ii, 2144).—Existing methods are discussed and improved procedures described. H. N. R.

Impurities in white sugars. IX. Loss of anions from certain salts during evaporation of concentrated sugar solutions. J. A. Ambler (Ind. Eng. Chem., 1936, **20**, 1266—1268; cf. B., 1935, 648).—No chlorides, iodides, or sulphates, when present alone, are lost from boiling solutions at $<176°$. Between 107° and 176° sulphites may be lost to the extent of 100%, and if sulphates are present they also may be lost. Sugars in solution are capable of reacting as non-volatile acids at higher temp. and of causing a loss of volatile and unstable acids present in the solution. J. P. O.

Refining quality of raw sugars in Queensland. V. Thorp (Internat. Sugar J., 1936, **38**, 423—424).—To improve the clarification, a p_H of 7·5 for the limed juice was aimed at, this being the min. ash point and offering at the same time a reasonable colloid elimination. Juice entering the subsiders was superheated to 101—103°, ample subsider capacity being found all-important. In graining, uniform conditions in the seeding pan were essential for producing a *C*-massecuite with an even crystal (0·3—0·35 mm. diameter), free from conglomerate. Recording conductivity apparatus and a microscope were necessary on the pan stage, and alterations to the pans such as the provision of H_2O-pipes of larger diameter for washing out false grain, and of H_2O sprays for clearing the coils of adhering sugar after striking, were advantageous. An adequate circulation in the pans was essential. J. P. O.

Hydrolysis of sawdust and fermentation of hydrolysed products. III. M. Schoen, P. Béraud, and P. Bréchot (Ann. Off. nat. Comb. liq., 1936, **11**, 591—609; cf. B., 1935, 1064).—The effects of acid concn., temp., and other factors on the yields of sugar obtained from raw cotton, and from pine, poplar, beech, and birch sawdusts by H_3PO_4 hydrolysis are discussed. About 90% of the total yield of sugar is fermentable with yeast. Optimum yields of sugar, and of EtOH therefrom, are tabulated for each substance. R. B. C.

Polarisation of raw sugar. T. W. Harrison (Internat. Sugar J., 1936, **38**, 424).—A reply to Stoyle (B., 1936, 1120). No differences in polarisation have been found to result from the use of Al_2O_3 cream in the manner prescribed in the Government Laboratory. Further, the account given of the British Customs method is obsolete, and the International method, using 26 g. in 100 ml., is employed together with the International sugar scale. J. P. O.

Oxidation of sucrose in aqueous solution. M. Garino (Bull. Assoc. Chim. Sucr., 1936, **53**, 541—546).—Small quantities of CO_2 are produced when air is passed through pure sucrose (I) solutions, even at 15°, and at higher temp. oxidation is much more rapid. Considerable oxidation of non-sugars, and probably of (I), occurs in beet-sugar manufacture, *e.g.*, during carbonatation and evaporation of juice. About 8—9 g. of O_2 per cu.m. of carbonatation gas may be absorbed by the juice. The use of SO_2 must protect (I) from oxidation. J. H. L.

Values of the Clerget divisor [for sucrose inversion] under different conditions. O. Spengler, Z. Zablinsky, and A. Wolf (Z. Wirts. Zuckerind., 1936, **86**, 670—689).—Refined sugar free from raffinose and ash was used. For the standard procedure a solution of 13 g. in 75 c.c. was treated with 5 c.c. of HCl (*d* 1·19) and, with an immersed thermometer, heated in a bath at 75° as rapidly as possible to 67° (or 70°) and kept at this temp. for exactly 5 min., the bath being cooled to the same temp. with cold H_2O. The inverted solution, cooled rapidly and made up to 100 c.c., was read after ½ hr. at 20°. The same inversion const., 133·00, was obtained at 67° and 70° with 5 min. heating, and also at 60° with 5, 10, or 15 min. heating. At 75° lower vals. were obtained except with 1 min. heating. With 4, 3, and 2·5 c.c. of acid instead of 5 c.c., heating at 70° for 5 min. gave 132·63, 132·56, and 132·37, only the last of which changed slightly (to 132·50) after keeping for 24 hr. Inversion with 5 c.c. of acid at room temp. gave 133·16 after 22 hr. and 133·22 after 48 hr. The difference between these vals. and that for the standard procedure (133·00) is shown to be due to slight decomp. of fructose under standard conditions. With the standard procedure neutralisation of the cooled solution with NaOH before making up to 100 c.c. gave 133·70. Addition of inorg. salts before inversion increased the inversion reading appreciably, *e.g.*, 2 g. of K_2SO_4 increased it from −16·50° V. to −16·9° V., but salts of $PrCO_2H$, lactic and succinic acids had scarcely any effect, and 2 g. of betaine lowered the reading only from −16·50° V. to −16·46° V. Inversion of 13 g. of sucrose with invertase gave 132·06; addition of 5 c.c. of HCl before making up to 100 c.c. changed the const. to 133·22, the final val. obtained by inversion with acid at room temp. All the data given are averages for a no. of experiments, and all refer to readings taken at 20°. J. H. L.

Rapid determination of the moisture content of sugars, using a special oven. Martineaus, Ltd., and F. S. Baxter (Internat. Sugar J., 1936, **38**, 427).—The sample is weighed into a counterpoised Al tube (1 in. diameter × 3 in. long) having a bottom of very fine gauze, placed in an oven where it is surrounded by a steam-jacketed wall, and a current of dried air is made to pass through it from top to bottom for 10 min. Then cold H_2O is turned into the jacket, the current of dried air being meanwhile continued, until the tube and its contents are cooled, when it is re-weighed. Determinations of small amounts of moisture can thus be carried out in about 20 min. J. P. O.

Specific heats of sugar solutions. W. Taegener (Deuts. Zuckerind., 1936, **61**, 681—682, 706—708; Internat. Sugar J., 1936, **38**, 475).—Of the several vals. which have been presented for the sp. heat of sugar solutions, those of Janovski and Archangelski appear the most acceptable, these averaging 0·3085 between 22° and 51°. Moreover, they relate to actual beet-factory syrups. Formulæ are given for calculating the sp. heat of massecuites when the sp. heat of the syrup and that of the crystal are known. J. P. O.

Determination of sucrose (especially small quantities) in mixtures with reducing sugars. A. Jolles (Z. Wirts. Zuckerind., 1936, **86**, 572—573).—The method described by Schapiro (B., 1936, 469) is a modification of one proposed by the author (B., 1910, 1467). J. H. L.

Quantitative methods available for the evaluation of consumption sugars; possibility of a simple type system. H. Buse (Z. Wirts. Zuckerind., 1936, **86**, 564—571).—Determination of ash is the most valuable means of distinguishing between refined sugars (defined as produced from clear colourless and odourless syrups of 99—100% purity) and other consumption sugars. Next in val. is the measurement of colour, and a test of odour is also useful, for refined sugars should be odourless. Without the exacting technique required for the determination of extinction coeffs. of dissolved sugars, precise colour measurements can be made on solid sugars if these are finely ground. For routine grading of consumption sugars, colour matching of unground samples against a series of standard-type samples is recommended. Ten standards would suffice: 1 and 2 for refined sugars, 3—5 for crystal sugars or granulated, 5—8 for melis or washed sugars, and 8—10 for soft after-products. J. H. L.

Determination of the ash content of raw [beet] sugar; comparison of sulphate and electrometric methods. O. Spengler and K. Zablinsky (Z. Wirts. Zuckerind., 1936, **86**, 660—669).—Data from 17 laboratories, relating to about 15,000 samples analysed by both methods, showed results identical to the nearest 0·01% with 25% of the samples; only with about 10% of the samples did the difference amount to ±0·04% or more, and only with 10 samples did it exceed ±0·08%. J. H. L.

Determination of nitrogen in sugar products. D. Sidersky (Bull. Assoc. Chim. Sucr., 1936, **53**, 533—541).—A survey of published methods for determining total, protein-, harmful (melassigenic), and amide- and ammoniacal-N in beets and beet sugar-factory products. J. H. L.

Differentiation of refined beet sugar from other grades. H. Juttner (Deut. Zuckerind., 1936, **61**, 563—574; Internat. Sugar J., 1936, **38**, 472).—Tests were made on the following grades of German white sugars: raffinade, factory granulated, and melis. Determining the rate of crystallisation from a syrup of 80·4° Brix is a reliable characteristic only when it is markedly rapid. Boiling a 60° Brix syrup under reflux for 7 hr. gave no consistent indications of quality, except that the unrefined grades gave a distinct beet odour, and the same result was obtained with the browning test, in which the sugar on a watch-glass is heated for 1 hr. at 140°. When using the conductometric ash, however, it was generally possible to distinguish between the 3 grades. J. P. O.

Modern equipment of starch factories. C. Mariller (Bull. Assoc. Chim. Sucr., 1936, **53**, 553—558).—Some general observations are made on types of rasping apparatus, sieves, centrifuges, and drying plant now used. The bases present in the ash of starch depend very much on the character of the H_2O used in manufacture, as "base exchange" occurs readily in starch. J. H. L.

Vac. pans.—See I. **Bagasse.**—See V. **Sugar cane and beet. Molasses as plant food.**—See XVI. **Ferments. Fermentation of molasses.**—See XVIII. **Potato protein. Evaporation in syrup factories. Jerusalem-artichoke cossettes. Determining sucrose in chocolate pastes. Sugar industry waste products for horses.**—See XIX.

See also A., II, 6, **Determining reducing sugars.** A., III, 51, **Starch polysaccharide from leaf tissue of apple** (*Malus malus*).

Patents.

Polariscopes. I. M. E. Aitken (B.P. 456,286, 3.5.35).—Plane polarised light is passed through: (1) the substance (liquid) to be tested, (2) an adjustable analysing system, in which the plane of polarisation may be varied, having a scale in degrees or % of sugar or the like, (3) a photo-electric cell, the current from which passes through (4) a suitable indicator. (2) may be a Nicol prism and quartz wedge; (3) and (4) are used to find the min. position. B. M. V.

Decolorising materials.—See VII. **Digesting industrial wastes.**—See XXIII.

XVIII.—FERMENTATION INDUSTRIES.

Attempts to detect alkaloids in hops. H. Fink and F. Just (Woch. Brau., 1936, **53**, 417—421).—All attempts to prove the presence of an alkaloid in hops (cones and/or seeds) failed. The methods employed were based on alkaloid solubility in dil. acids, extraction from alkaline solutions with org. solvents, pptn. and turbidity tests, and the stability of alkaloids during the methods of extraction employed. The physiological effects of hops and hop extracts cannot therefore be referred to the presence of alkaloids. I. A. P.

Assimilation of alcohol and of amino-acids by yeast in the aëration yeast process. H. Claassen (Z. Spiritusind., 1936, **59**, 440).—From a reconsideration of the results of Braun and Pfundt (B., 1937, 76) it is reaffirmed that, during the ripening period, NH_2-acids form together with the EtOH a principal source of C; the yeast cells meanwhile do not bud, but increase in size or in dry wt. Further, the assumption that EtOH is absorbed in great amount while sugar is still present in the wort is untenable. I. A. P.

Malt diastases. III. Attenuation of beer wort in presence of malt diastase. M. Hamburg and S. Pickholz (Brau- u. Malzind., 1935, **28**, No. 35, 63—65; Chem. Zentr., 1935, ii, 2144—2145; cf. B., 1936, 565).—Addition of a filtered diastase solution during the fermentation process improves the keeping qualities of the beer. H. N. R.

Preservation of beer grain. Kraus (Allgem. Brauer- u. Hopfen-Ztg., 1935, **75**, 572—573; Chem. Zentr., 1935, ii, 2466).—A method of producing valuable silo-fodder, with very small protein loss, is described. H. N. R.

Protein hydrolysis in malt mashes, "spent-grain" mashes, and malt extracts. P. Kolbach and H. Simon (Woch. Brau., 1937, **54**, 1—6).—In malt mashes, the optimum temp. for the production of permanently sol. N is approx. 55° and for formol-N approx. 50°. The protein-hydrolysis products increase in complexity with rising mash temp. The protein hydrolysis during mashes of "spent grains" (here signifying the residue after repeatedly extracting malt with H_2O at 20°) follows essentially the same course with the same temp. relationships as in the normal mash. Little proteolytic activity is shown by (cold-H_2O) malt extract, and the temp. optima for proteolysis are appreciably lower. Thus, the sol. proteases of malt have relatively little effect during mashing, and at the higher mashing temp. essentially only the more stable, insol. proteases are active. Similarly, insol. diastase has an important effect on starch hydrolysis. I. A. P.

Oxidation of worts and beers. M. van Laer (Ann. Zymol., 1936, [ii], 3, 118; Woch. Brau., 1937, **54**, 6—7).—A review, in which are considered the effects of oxidation of wort and beer constituents, rather than the effects of simple physical aëration alone. The presence of oxidisable constituents in worts and beers is noted, and the effects of varying r_H on biological and chemical beer stability and on pasteurisation changes are shown. I. A. P.

p_H measurements in fermenting beer wort. A. Hansen and A. Lund (Woch. Brau., 1936, **53**, 409—412).—Removal of yeast cells from wort by centrifuging or filtering through acid-treated, ash-free paper is necessary in order to obtain reliable p_H measurements [quinhydrone (I)], whilst CO_2 must also be removed, preferably in a stream of air or N_2. The effect of CO_2 is greatest in the early stages of fermentation when the p_H is relatively high and the dissociation greatest. Readings should be taken 4—7 min. after adding the (I), the potential remaining approx. const. during this interval. Pt electrodes are to be preferred as giving the most accurate results, though Au electrodes have some advantages. The buffering characters of wort show little change during fermentation. I. A. P.

Production of bright "quality-beer." E. Jalowetz (Brau- u. Malzind., **29**, Nos. 6—11; Woch. Brau., 1936, **53**, 412—414).—The influences of brewing liquor, malt, and hops, and of the brewing processes themselves are discussed. Special reference is made to Pilsen beer. I. A. P.

Stabilisation of beer with the "short-time plate-heater Astra" of the Bergedorfer Eisenwerk-A.-G. H. Schnegg and H. Kipphan (Z. ges. Brauw., 1935, **58**, 41—46; Chem. Zentr., 1935, ii, 2592).—The best temp. for sterilisation is 65°. H. N. R.

Influence of the sulphurous acid of concentrated must on its fermentation and on the quality of the wine produced. H. Astruc (Prog. agric. viticole, 1935, **104**, No. 52, 85—89; Chem. Zentr., 1935, ii, 2466).—SO_2 added to must as a preservative is mostly lost during the concn. process; the small residue is without influence on the product. H. N. R.

Determination of traces of arsenic in musts and wines. W. Diemair and J. Waibel (Z. Unters. Lebensm., 1936, **72**, 223—234).—Lockemann's method is valuable as a rapid approx. indication of small amounts ($\ngtr$2 mg. per litre) of As. That of Gangl and Sánchez (A., 1934, 1084) is to be recommended, provided that the residual As is separately determined. E. C. S.

Colorimetric determination of iron and copper in wine and other alcoholic beverages. O. Ant-Wuorinen (Z. Unters. Lebensm., 1936, **72**, 219—223).—Fe is determined colorimetrically with KCNS, org. matter being removed by combustion with H_2SO_4 and HNO_3. Cu is determined by a modification of Fischer and Leopoldi's dithizone method (cf. A., 1934, 381). E. C. S.

Clarification with lime and determination of the volatile acids of wine. P. Jaulmes (Bull. Pharm. Sud-Est, 1935, **39**, 235—241; Chem. Zentr., 1935, ii, 2751).—Clarification with $Ca(OH)_2$ may lead to formation of HCO_2H and AcOH, and should be avoided. H. N. R.

Determination of volatile acids in wine. I. M. V. Ionescu, L. Gaal, and O. Popescu. **II. Influence of lactic acid.** M. V. Ionescu and O. G. Popescu (Ann. Inst. Rech. agron. Roumanie, 1933, **5**, No. 4, 26 pp.; 1934, **6**, No. 5, 3—24; Chem. Zentr., 1935, ii, 2466—2467).—A distillation process and factors influencing its results are described. The volatility of lactic acid depends on the rate of distillation and the [AcOH]. H. N. R.

Spectrophotometric researches on the colour of wines. A. Boutaric, L. Ferré, and (Mme.) M. Roy (Compt. rend., 1936, **203**, 1142—1144).—Data for 6 wines in the range 4500—7000 A. are tabulated. All show an absorption max. at approx. 5200 A.

A. J. E. W.

Influence of calcium salts on spirits. E. Walter (Destillateur u. Likörfabr., 1935, **48**, 308—309; Chem. Zentr., 1935, ii, 2300).—Inorg. salts causing turbidity in spirits are derived not only from hard H_2O; Ca and Mg salts may be derived from the sugar.

H. N. R.

Possibility of minimising shrinkage loss in the spirit industry. K. R. Dietrich and H. Grassmann (Z. Spiritusind., 1936, **59**, 408, 410—411).—Calculation of EtOH losses which may occur in fermentation, distillation, storage, etc. during EtOH manufacture from potatoes is described, and methods for the reduction of such losses to a min. are discussed.

I. A. P.

Fundamentals of alcohol determination in spirituous liquors containing extract, using the test still. C. Luckow (Z. Spiritusind., 1936, **59**, 442).—The procedure and precautions in measuring the necessary vol. of the liquor are described in great detail.

I. A. P.

Composition of sherry. J. Kozák (Chem. Obzor, 1935, **10**, 49—50; Chem. Zentr., 1935, ii, 2145).—Sherry contains 11—21 vol.-% of EtOH and 4—6 g. of tartaric acid per litre. The content of sugar is variable and of glycerol very low.

H. N. R.

Retardation of cider fermentation by restricting nitrogenous nutriment. M. E. Dauthy and (Mlle.) G. Abadie (Bull. Assoc. Chim. Sucr., 1936, **53**, 523—532).—For the production of sweet cider the removal of the yeast when it has reduced the N content of the must to 0·025 or, better, 0·01—0·015 g./litre is recommended; practically no subsequent fermentation can take place under ordinary conditions of storage. The yeast can be conveniently separated by filtration through cloth (manches) with the aid of kieselguhr.

J. H. L.

Acetone-ethyl alcohol fermentation. S. Bakonyi (Chem.-Ztg., 1936, **60**, 1021—1023).—A review.

Freezing storage in relation to microbial destruction and retention of quality in sweet cider. J. A. Berry and H. C. Diehl (Proc. Amer. Soc. Hort. Sci., 1934, **32**, 157—159).—Freezing at −6·6° to −20·5° rapidly decreased viable micro-organisms in cider for a month, and less rapidly thereafter. Addition of CO_2 increased the death rate.

Ch. Abs. (*p*)

Denatured alcohol for the laboratory chemist. Anon. (Chem.-Ztg., 1936, **60**, 1026—1027).—German regulations for denaturing EtOH are reviewed, and a specification is given for petroleum spirit used as a denaturant at a concn. of 1%.

C. R. H.

Theory of alcoholic fermentation. H. Colin (Bull. Assoc. Chim. Sucr., 1936, **53**, 513—522).—An account of some recent views according to which glyceric acid is the percursor of pyruvic acid, and the co-enzyme is adenosinetriphosphoric acid.

J. H. L.

Making vinegar by the Frings process. A. E. Hansen (Food Ind., 1935, **7**, 277—312).—Recirculation of the acid-EtOH mixture through the Frings generator increases the yield of white vinegar 30-fold by comparison with a non-circulating generator. Working conditions are examined.

Ch. Abs. (*p*)

Action of alkaloids on the alcoholic fermentation of molasses. A. Amati and L. Sgarzi (G. Biol. ind. agrar. aliment., 1935, **5**, 52—62; Chem. Zentr., 1935, ii, 2465).—Strychnine favours fermentation even in low concn. 0·2—0·3% of caffeine hinders the process, but 0·05% is slightly stimulating. Quinine hinders fermentation in all concns.

H. N. R.

Liquor filtration from the biological viewpoint. E. Hausmann (Böhm. Bierbrauer, 1935, **62**, 289—296; Chem. Zentr., 1935, ii, 2592).—Suitable stabilisation processes are described and discussed.

H. N. R.

Separation of volatile liquids.—See I. **Hydrocarbons in fusel oil residues.**—See III. **Vigour of vines.**—See XVI. **Fermentation of hydrolysed-sawdust products.**—See XVII. **Cucumber salting.**—See XIX. **Trickle filters for effluents.**—See XXIII.

See also A., III, 31, **Prep. of *A*-protein of fermentation enzyme. Highly purified cozymase.**

PATENTS.

Manufacture of [bakers'] yeast. (A) G. W. Kirby and C. N. Frey, (B) A. Schulz, Assrs. to Standard Brands, Inc. (U.S.P. 2,029,572 and 2,029,592, 4.2.36. Appl., [A] 26.1.32, [B] 29.12.31).—(A) High-protein (>50% on dry wt.) stock yeast in amounts equiv. to ≮30% of the molasses used in wort is propagated with aëration in presence of inorg. nutrients (including PO_4'''), aq. NH_3 being added to maintain the p_H at 4·5—5·0; at the end of the process, a p_H of 6·0 is preferable. The amount of assimilable inorg. N added is 4—12% [as $(NH_4)_2SO_4$, calc. on the molasses]. (B) ≮20% of similar high-protein stock yeast is propagated with aëration in molasses wort containing 1·6% of $NH_4H_2PO_4$ and ≯8% of inorg. N [as $(NH_4)_2SO_4$], both calc. on the wt. of molasses. (A, B) The stock yeast may be added initially to part of the nutrient solution, and the remainder during propagation. A high yield of good-quality bakers' yeast is produced with <50% of protein.

I. A. P.

[Production of] ferments. W. A. Hall (B.P. 457,465, 28.5.35).—Repeated cultivation of certain semi-tropical (Indo-China) marine algæ on waste fruit material produces a mass of white globules (" gelose ") which apparently consist of an association of yeast-forms and lactic bacteria and can be propagated on solutions containing sugar. The almost colourless and tasteless gelose can be employed for the prep. of fermented beverages, and as a substitute for Kephir yeast, *Bac. bulgaricus*, etc. Dried at ≯40°, the gelose yields insol. grains which are of val. as liquid absorbents or as a commercial gum; it can also be used for brewing after swelling in conc. aq. $NaHCO_3$ and washing in H_2O.

I. A. P.

Apparatus for preparation of malt. A. E. Jonsson (U.S.P. 2,029,873, 4.2.36. Appl., 9.5.33. Swed., 24.2.33).—A malting drum, rotating about a horizontal axis, is provided with numerous air-inlet valves which are adjusted independently of one another by curved rails (themselves adjustable) as the drum rotates. Air is sucked through the growing malt and, the quantity of air entering the drum being reduced to a min. by the operation of the valves, excessive drying of the malting material is avoided. Stirring of the malting material is provided for. The malting temp. is regulated by means of cooling-H_2O. I. A. P.

Manufacturing high-quality beverage spirits. Ges. f. Linde's Eismaschinen A.-G., and G. A. Krause (B.P. 457,698, 29.4.36. Ger., 30.4.35).—The alcoholic liquid (wine, fermented grain mash, etc.) is conc. by freezing and, after separating the ice (*e.g.*, by centrifuging), is distilled, thereby obtaining a product of high aromatic content in a single distillation stage. Unfermented liquid may be similarly conc. and thereafter fermented or added to fermented liquor before distillation to increase the proportion of aromatic constituents, the unfermented sugar being later utilised. Again, conc. expressed fruit juices may be re-mixed with the marc for fermentation. To avoid losses, the H_2O obtained by melting the separated ice can be used in the mash process. I. A. P.

Ageing of alcoholic beverages. E. F. Spellmeyer (U.S.P. 2,031,232, 18.2.36. Appl., 10.7.34).—After addition of suitable small amounts of org. acid (AcOH), the raw liquor is placed in charred (whiskey etc.) or uncharred (wine etc.) barrels, into the ends of which project bushed electrodes. A.c. (amp. and volts being varied according to distance apart of electrodes and nature of liquor) is passed for 2 days—3 weeks. The temp. attained should be $\ngtr 65·5°$ ($<37·8°$). I. A. P.

Digesting industrial wastes.—See XXIII.

XIX.—FOODS.

Fat and phosphatide content of wheat germ. B. Rewald (Chem. and Ind., 1936, 1002—1003).—The phosphatides (I) usually removed in milling improve the baking quality of the flour. In the usual methods of determination, the (I) and fats are not completely extracted; extraction first with light petroleum and then with C_6H_6–EtOH is recommended. Wheat germ contains 0·611% of (I), 63% of which are "bound," 80% being of the lecithin and 20% of the kephalin type. Fat contents = 6·70% of the germ are removed in the first extraction and a further 0·85% in the second. E. A. F.

Application of high-frequency currents to flour-mite control. S. Andreev and B. Balkaschin (Plant Protection U.S.S.R., 1935, No. 1, 121—123).—Exposure of wheat to currents of λ 8—40 m. for 5 min. killed all mites. Exposures of 1—2 min. destroyed the germinating power of the grain, but those of 15—25 sec. had a beneficial effect. Ch. Abs. (*p*)

Flour-mill insects and their control. G. A. Dean, R. T. Cotton, and G. B. Wagner (U.S. Dept. Agric. Circ., 1936, No. 390, 33 pp.).—Fumigation with HCN and with chloropicrin is described. A. G. P.

Bread grain and flour in transport. H. Kühl (Chem.-Ztg., 1936, **63**, 1003—1005).—Conditions in transport, especially by H_2O, are very unfavourable for the storage of grain and still more of flour. Respiration in an ill-ventilated space causes a rise in temp. and moisture content, with consequent growth of moulds. Penetration of H_2O from outside is relatively unimportant, especially if the flour sacks used are smooth. Grain should be dried to $\ngtr 16\%$ H_2O content, flour to $\ngtr 15\%$. The compression of flour into tablets is recommended. E. A. F.

Breaking-down of flours by enzymic, physical, and chemical means. H. Kühl (Pharm. Ztg., 1936, **81**, 1377—1379).—For the production of food preps., the most important of the processes considered are the enzymic degradation of starch to sugars, the separation of germ stabilised by removal of fatty acids, and the production of soya-bean flour of agreeable flavour. Dextrin production by heat involves the destruction of vitamins and, if carried out on dry flour, the risk of formation of coloured by-products. Chemical hydrolysis is suitable only for the commercial manufacture of cryst. glucose. E. A. F.

Application of the Javillier and Djelatides technique for determination of proteins to some industrial flours. R. Geoffroy and G. Labour (Bull. Assoc. Chim. Sucr., 1936, **53**, 679—683).—Applied to about 30 samples of flour the method (B., 1935, 250) gave useful indications of baking quality. Amongst samples having the same N_2/N_3 ratio, those of highest total N content were the best. Storage of flour for 2—3 months scarcely affected the results. The N fractions underwent only moderate changes during panary fermentation, but the N_2/N_3 ratio increased by about 0·2—0·3 in 6 hr. J. H. L.

Influence of the lipin content on the baking qualities of wheat. P. Pelshenske and E. Schmidt (Z. ges. Getreide-, Mühlen-, u. Bäckereiw., 1935, **22**, 119—122; Chem. Zentr., 1935, ii, 2594).—Relative lipin (I) contents are determined as the difference between the EtOH–Et_2O and the Et_2O extracts. In any one variety (I) contents decline with increasing baking vals. The (I) contents of grain are paralleled by those of the flour in different species, but vals. are not characteristic of the species. A. G. P.

Fermentation balance sheet in bread-making. R. Geoffroy (Bull. Soc. Chim. Biol., 1936, **18**, 1569—1577).—No other fermentable sugars could be detected in wheat meal than those already shown (A., 1935, 1027; B., 1935, 121). 0·4% of gum remains intact during fermentation. The balance between sugars and CO_2 + EtOH formed shows that amylolysis increases on addition of yeast. The CO_2 : EtOH ratio is never far removed from 0·96, and the fermentation is anaërobic. The no. of yeast cells doubles in 6 hr. P. W. C.

Fermentable sugars, amylolytic activity, and effect on fermentation in bread-making of malted wheat meal and of bean meal. R. Guillemet and C. Schell (Bull. Soc. Chim. biol., 1936, **18**, 1527—1536).—Small amounts of malted wheat meal, and to a much less extent of bean meal, activate amylolysis in the dough. Incorporation of small amounts of bean meal is of little importance in respect to fermentation, but leads to improvement in the plastic properties of the dough. P. W. C.

Quality and composition of German (especially Silesian) bread, with special reference to the digestibility of the nitrogen constituents *in vitro*. W. Peyer and K. H. Gruschwitz (Z. ges. Getreide-, Mühlen-, u. Bäckereiw., 1935, **22**, 37—41, 54—60, 73—80, 96—98, 110—112; Chem. Zentr., 1935, ii, 2594).—Comparative data are recorded. In whole-meal bread the digestibility of the N constituents is closely related to the degree of decomp. of the bran. Detection of soya-bean flour in wheat and rye flours is described. A. G. P.

Stability of mixed shortenings in crackers. R. M. Bohn (Oil & Soap, 1936, **13**, 302—303; cf. B., 1935, 284).—Mixtures of two shortening fats of widely different stabilities to rancidification (*e.g.*, lard with refined coconut oil or hydrogenated cottonseed oil) show keeping properties between those of the components; this applies both to the fat mixture itself and to the crackers containing it. E. L.

Rapid determination of the egg content of [wheaten] macaroni etc. G. Nadai (Z. Unters. Lebensm., 1936, **72**, 157—171).—The yolk phosphatides are pptd. from the EtOH extract of the material by addition of a reagent containing $FeCl_3$ and $(NH_4)_2MoO_4$. The wheat phosphatides are not pptd. by this reagent. Pure egg-lecithin similarly treated is ≯80% pptd. E. C. S.

Outbreak of *Salmonella* food infection caused by filled bakery products. E. J. Staff and M. L. Grover (Food Res., 1936, **1**, 465—479).—208 cases (3 fatal) of food poisoning due to contamination of a cooked-cream filling with *S. enteritidis* are reported, in which rodents were suspected as the contaminating agents. P. G. M.

Chemical sterilisation of dairy equipment. F. E. A. Smith (Nat. Butter and Cheese J., 1936, **27**, No. 15, 34—37).—Properly cleaned equipment may be rinsed with solutions containing 50 p.p.m. of available Cl, or sprayed with those containing 250 p.p.m. Types of Cl sterilisers are described. W. L. D.

Tested cleaners for dairy plants. F. Grayson (Food Ind., 1935, **2**, 231—232, 281—282).—Solutions of soap and of $Na_2SiO_3,5H_2O$ were effective for milk-plant equipment and less corrosive to Sn than other alkaline cleaners. Ch. Abs. (*p*)

Food-sampling apparatus [for milk]. F. Kolbe (Z. Fleisch- Milch-Hyg., 1936, **47**, 45—50).—Milk plungers, sampling tubes and dippers, and various forms of sampling bottles are described. Apparatus for carrying out the bromothymol-blue–catalase test is described. The labelling of official samples is detailed. W. L. D.

Management of raw milk supplies for pasteurisation. L. J. Meanwell (Dairy Ind., 1936, **1**, 163—164).—A raw milk supply of high hygienic quality is necessary to give a high-grade pasteurised product. Methods of production on the farm are described, including the importance of sterilising appliances and thorough cooling of milk. W. L. D.

Milk processing and control. Dairy bacteriology. II. Sources of bacteria. J. G. Davis (Dairy Ind., 1936, **1**, 173—175).—The sources of bacteria likely to contaminate milk during production are enumerated. W. L. D.

[Milk processing and control.] Pasteurising processes and plants. II. A. W. Scott (Dairy Ind., 1936, **1**, 175—176, 178).—The efficient operation and factors used in the selection of milk-pasteurising plants are discussed. Metals used for manufacturing dairy plant are enumerated. W. L. D.

Rôle of oxygen in the decolorisation of methylene-blue by bacteria of the *Streptococcus lactis* group in sterilised milk. T. Matuszewski and E. Pijanowski (Rocz. Nauk. roln., 1935, **35**, 1—26; Chem. Zentr., 1935, ii, 2754).—The reductase action follows the exhaustion of O_2 in the milk by bacteria. Relations are established between the no. and reproduction of bacterial cells, the amounts of methylene-blue (I) and O_2, and the period of decolorisation. The oxidation–reduction potential decreases after the exhaustion of O_2. Replacement of O_2 by N_2 in the milk lowers the reduction time. A. G. P.

Source of flavour in milk exposed for prolonged periods to irradiation. K. G. Weckell and H. C. Jackson (Food Res., 1936, **1**, 419—426).—The " activated flavour " is associated, not with the fat, but with the protein and particularly the albumin fraction of irradiated milk. P. G. M.

Storage of fresh milk. Heine (Z. Fleisch-Milch-Hyg., 1935, **45**, 381—382; Chem. Zentr., 1935, ii, 2896).—The Hofius process (storage under regulated pressure of O_2 and at certain temp. ranges) is discussed. A. G. P.

Milk tests. J. Golding (Agric. Progress, 1934, **11**, 115—119).—The standard error of the difference between results of the Alfa-Laval and Gerber tests for fat is 0·05%. Determinations of total solids are improved by use of 1-g. samples and of Al milk-bottle caps instead of the customary dishes. Ch. Abs. (*p*)

Butyric acid content of milk. Ginieis and Corler (Compt. rend. Acad. Agric. France, 1935, **21**, 1236—1237).—Changes in the fat content of milk in the course of lactation are examined. The $PrCO_2H$ content increases in successive lactations with a max. in the third or fourth, subsequent vals. remaining at a steady level. A. G. P.

Titration of milk and whey for determining colloidal calcium phosphate in milk. E. R. Ling (J. Dairy Res., 1936, **7**, 145—155).—Colloidal $Ca_3(PO_4)_2$ (I) in milk is determined by titration of milk and whey, with and without addition of $K_2C_2O_4$. Vals. obtained agree with those ascertained from determinations of total inorg. P in milk and in whey. The increase in total P_2O_5 in wheys of souring samples agrees with that calc. from the disappearance of (I) shown by the titration method. The difference between the increase in whey-Ca and that calc. from titration vals. is attributed to the dissolution of

Ca from the Ca caseinogenate (II). Colloidal (I) dissolves more readily in milk than does the Ca of (II). A. G. P.

Determination of the hardness of milk curd. A. Lauder, J. McGillivray, and A. Comrie (Agric. Progress, 1934, **11**, 121—126).—Improvements in Hill's instrument are described. Hardness of curd from morning milk of Friesian cows was increased by storage of milk during the day. Ayrshire cows give a soft- and Jerseys a hard-curd milk. Ch. Abs. (*p*)

Comparative values of the plate count and the modified methylene-blue reduction test in milk grading. A. A. Nichols and S. J. Edwards (J. Dairy Res., 1936, **7**, 258—270).—For general purposes the methylene-blue test is preferred. A. G. P.

Density and viscosity of milk as an indication of adulteration. R. Ripan-Tilici and C. Drăgulescu (Z. Unters. Lebensm., 1936, **72**, 121—137).—The *d* of Rumanian milk varies from 1·029 to 1·033, the η from 1·580 to 2·000. Adulteration cannot be inferred from either of these vals. alone, but when both are $>$ or $<$ normal, dilution with H_2O can be inferred, and when *d* is high and η low removal of fat is indicated. A formula is given by means of which the % of fat can be calc. from *d* and η. It is applicable only to mixed milk. E. C. S.

Rapid test for artificial cream and for its detection in fresh milk. G. Sprumont (J. Pharm. Belg., 1935, **17**, 529—533; Chem. Zentr., 1935, ii, 1801).—Artificial cream (from whale oil) may be distinguished from real cream by the rapid breakdown of the emulsion on boiling. H. N. R.

Influence of freezing on the vitamin-*C* content of orange juice and milk. K. Lilleengen (Acta paediat., 1936, **18**, 392—418).—Scorbutic guinea-pigs receiving fresh orange juice or milk reached a given stage of healing in about two thirds of the time needed by those receiving juice or milk kept at —30° for 24—36 days. Nutr. Abs. (*m*)

Nutritive value of raw and pasteurised milk for calves; assimilation and retention of nitrogen, phosphorus, and calcium. J. H. Blackwood, S. Morris, and N. C. Wright (J. Dairy Res., 1936, **7**, 228–237).—No significant differences in the effects of the two types of milk were observed. As a sole food for calves milk is deficient in Ca and, to a smaller extent, in P. Addition of grass or hay to the diet improved the N/Ca balance. A. G. P.

Discoloration and corrosion in canned cream. C. J. Jackson, G. R. Howat, and T. P. Hoar (J. Dairy Res., 1936, **7**, 284—290).—" Purpling " of cans is due to Sn sulphide formed by active S compounds produced during use of excessive temp. or time of pasteurisation. Addition of $NaHCO_3$ has a slightly beneficial effect. Black coloration of cream was observed only when the steel of the cans was exposed. A. G. P.

Butter acidity. E. Pijanowski (Polish. Agr. & For. Ann., 1936, **36**, 189—204).—The serum obtained by centrifuging 20 g. of butter, melted at 40°, is titrated with 0·1*N*-NaOH to phenolphthalein. Allowing for the fat content, the acidity of the butter is then calc. and expressed as ml. of *N*-alkali per 100 g. of butter. Titration methods involving dilution of the plasma give results 15—20% too high. W. L. D.

Flavour and aroma of butter. W. L. Davies (Dairy Ind., 1936, **1**, 165—167).—The mechanism of the development of butter flavour and aroma is described and the management of cream starters is dealt with. The Ac_2/CHAcMe·OH ratio for different starters varies from 1/30 for cheese to 1/15 for *S. cremoris* cultures. The distribution of Ac_2 between butter and buttermilk is discussed. The development of max. aroma in butter, the deterioration in quality of full-flavoured butters, and the use of Ac_2 preps. are described. W. L. D.

Changes in acetylmethylcarbinol plus diacetyl content of butter. W. L. Slatter (Nat. Butter and Cheese J., 1936, **27**, No. 20, 20—24; No. 21, 18—26).—Varying amounts of Ac_2 (I) plus CHAcMe·OH (II) were produced in unsalted butter during storage, but not in salted butter. During the first days of storage, (I) + (II) decreased after the max. content had been reached. NaCl retarded the decrease of (I) + (II) on holding butter at various temp. The amount of (I) + (II) in butter varied directly with the amount of starter added to the cream. In some cases the addition of citric acid-fermenting streptococci in the cream culture increased (I) and (II) in the butter. W. L. D.

Oxidation of acetylmethylcarbinol to diacetyl in butter cultures. M. B. Michaelian and B. W. Hammer (Iowa Agric. Exp. Sta. Res. Bull., 1936, No. 205, 203—214).—The oxidation is caused by citric acid (I)-fermenting streptococci rather than by direct chemical processes. Passage of O_2 increased, and that of CO_2, H_2, and N_2 diminished, the production of Ac_2 in skim-milk cultures. In butter cultures all gases increased the production of CHAcMe·OH (II) + Ac_2 in presence of (I) + H_2SO_4 (III) to extents $>$ when (III) alone was used to acidify the substrate. When O_2 was bubbled through butter cultures containing (I), the production of (II) + Ac_2 was approx. $\propto$ the amount of (I) present. A. G. P.

Pigment-producing organism (*Pseudomonas* sp.) isolated from discoloured butter. E. R. Hiscox (J. Dairy Res., 1936, **7**, 238—243).—The organism produces a brown colour (resulting from NH_3 production) in butter and in culture media. A blue-black insol. pigment is formed only at low temp. The development of the pigment is influenced by the N source (proteose is inhibitory). Moderate amounts of NaCl are necessary for the growth of the organism. A. G. P.

New test eliminates excuse for filthy butter. W. S. Greene (Food Ind., 1935, **7**, 441—442).—The butter is boiled with aq. borax to dissolve casein. The residue after filtration (hot) is washed with light petroleum and examined microscopically for mould, insects, hair, débris, etc. Ch. Abs. (*p*)

Cold storage of butter. L. C. Thomsen (Nat. Butter and Cheese J., 1935, **26**, No. 15, 30—32).—

Butter may be kept in cold storage for 2 years without much deterioration. The effect of various wrapping materials on the development of oxidised flavours in butter is examined. Al foil or dark green, non-waterproof cellulose material prevented production of undesirable flavour. Ch. Abs. (*p*)

Differentiation of butter from pasteurised and unpasteurised cream. H. Patzsch (Z. Unters. Lebensm., 1936, 72, 138—139).—In Waters and Zürn's method for detecting pasteurisation, 0·3% aq. H_2O_2 should be substituted for the 3% solution specified. A negative result does not necessarily indicate pasteurisation, since peroxidase may be destroyed by keeping (see below). E. C. S.

Benzidine–peroxidase reaction with butter. L. Waters and A. Zürn (Z. Unters. Lebensm., 1936, 72, 140—143; cf. B., 1936, 168, and preceding abstract).—NaCl in butter manufactured from pasteurised cream will cause the production of a blue coloration in the benzidine reaction, but only when $\not<$5% is present. 20% aq. $MgSO_4$ should be substituted for the saturated solution previously specified. Et_2O, and not light petroleum, should be used, and the specified amount of H_2O_2 should not be exceeded. The failure of the reaction in butters of country origin cannot be accounted for by their increased acidity. E. C. S.

Volatile acids of butter fat of cows fed with rice bran. N. Monti (Lait, 1935, **15**, 609—612; Chem. Zentr., 1935, ii, 1798).—The sol., volatile acid content falls, whilst *n* rises. Defatted rice bran has the same action. H. N. R.

Vitamin-*A* content of sour-cream butter, sweet-cream butter, and margarines. I. L. Hathaway and H. P. Davis (Nebraska Agric. Exp. Sta. Res. Bull., 1935, No. 79, 8 pp.).—Various margarines examined were much poorer than the butters as sources of -*A*. A. G. P.

Enrichment of margarine with vitamins. II. Enrichment with vitamin-*A* by means of carotene preparations. S. N. Matzko (Z. Unters. Lebensm., 1936, 72, 143—148; cf. B., 1936, 1123).—A prep. containing 10,000—13,000 units of -*A* per g. was obtained by extraction of dried carrots with light petroleum. The carotene suffered no appreciable change when added to margarine and kept for 20 days. A similar prep. was made from nettles. E. C. S.

Ripening of cheeses made from raw and pasteurised milk. I. R. Sherwood (J. Dairy Res., 1936, 7, 271—283).—Differences in the proteolytic action of rennet, pepsin, and trypsin on milks pasteurised at different temp. (notably at 150—160°) are attributed to changes in the non-protein rather than in the protein constituents. Differences in the N partition of cheeses from raw and pasteurised milk are explicable on this basis. A. G. P.

Colouring of [Dutch] cheese rind. Reasons for authorising Sudan IV. J. Pien (Ann. Falsif., 1936, 29, 472—483).—The synthetic dyes authorised in France are insol. in fats and therefore unsuitable for the manufacture of Dutch cheese. The case for the authorisation of Sudan IV, commonly used elsewhere, is outlined. E. C. S.

Effect of various phases in the manufacture of casein by the natural sour method on its physical and chemical properties. D. R. Theophilus, H. C. Hansen, R. S. Snyder, R. E. Wood, and R. L. Olmstead (Idaho Agric. Exp. Sta. Bull., 1935, No. 212, 19 pp.).—Conditions conducive to the production of high-grade products are examined. A. G. P.

Determination of the p_H of rennet casein by the quinhydrone electrode. C. A. Cooper and P. G. T. Hand (J.S.C.I., 1936, 55, 341—344T).—The p_H of casein depends on the particular set of conditions under which is is measured. Temp., casein/H_2O ratio, wt. of quinhydrone, mesh-size of casein, and time of contact of quinhydrone with the casein–H_2O suspension are all material factors which have to be carefully controlled. Curves showing the effect of these variables on p_H are given and the conditions for reproducible p_H are stated. It is recommended that a standard time of 15—30 min. be allowed for the casein–H_2O suspension to come to equilibrium and that the relative proportions of quinhydrone be 0·5 g. for a 30 : 10 H_2O : casein ratio and 0·25 g. for a 30 : 5 ratio.

Dry matter, albumin, and sugar contents of eggs. S. Koroknay (Közl. össz. élet Kórt. Köréböl, 1935, 26, 232—238).—Vals. for several varieties of hen eggs are given. Ch. Abs. (*p*)

Dry matter and lipin content of eggs. I. Kari (Közl. össz. élet Kórt. Köréböl, 1935, 26, 224—231).—Vals. for dry matter, fats, lipins, and neutral fats in eggs of different varieties of hens are given. Ch. Abs. (*p*)

Inorganic phosphorus content of the protein of eggs of different ages. T. Radeff (Z. Fleisch-Milch-Hyg., 1935, **45**, 363—364; Chem. Zentr., 1935, ii, 2895).—The inorg. P of egg-white increases with age, whether eggs are stored in air, aq. $Ca(OH)_2$, or water-glass. A. G. P.

Hen eggs containing iodine. T. Chrzaszcz (Wiad. farm., 1935, 62, 481—483).—The I content of eggs may be increased by appropriate feeding, but eggs become smaller. I accumulates largely in the yolk. Ch. Abs. (*p*)

Effect of packing materials on flavour of storage eggs. P. F. Sharp, G. F. Stewart, J. C. Huttar (Cornell Univ. Agric. Exp. Sta. Mem., 1936, No. 189, 3—26).—Eggs of high p_H developed more undesirable flavour in storage than did those of low p_H, irrespective of the nature of the packing material. Effects of various packings and of humidity are examined. A. G. P.

Chemistry of storage and preparation of foods. M. A. Barmore (Food Res., 1936, 1, 383—398).—A review of recent work on the preservation of eggs, potatoes, and fats, and the relation of pectin to jelly-making. P. G. M.

Salt content of salt pork. A. Clarenburg (Tijds. Diergeneesk., 1936, **63**, 562—563).—The NaCl content of pork in 24% aq. NaCl varied inversely with the amount of fat present. After 8—12 days it was 0·6% for fat and after 7 days 1·1% for lean pork. Two samples of pork pickled with dry NaCl contained 1·1 and 3·1% of NaCl after about a month. In two samples of lean pork, after 4 days in 18% and 8 days in 19% aq. NaCl the muscle contained 4·9 and 7·9% of NaCl. NUTR. ABS. (*m*)

Relation between refractive index and moisture content of fat and muscle of the pig. E. H. HUGHES (Amer. Soc. Animal Prod. Rec. Proc. 27th Ann. Meet., 1934, 105—107). CH. ABS. (*p*)

Ox, hog, calf, and lamb livers as sources of vitamin-*A*. A. D. HOLMES, F. TRIPP, and G. H. SATTERFIELD (Food Res., 1936, **1**, 443—455).—Fresh ox, hog, calf, and lamb livers contain 252, 182, 533, and 235 blue units of -*A* per g., respectively. Storage for 1 week at 8° causes a loss of -*A*, whilst cooking produces a rise per unit wt. owing to loss of H_2O. P. G. M.

Evaluation of meat meals from their bone content. E. VAHLKAMPF (Z. Fleisch- Milch-Hyg., 1936, **47**, 28—34, 55—57, 73—76).—The merits of the Gröningen test (vol. of bone sediment from 10 g. of meal in CCl_4) for evaluating the bone-meal [and $Ca_3(PO_4)_2$ (I)] content of various meat and fish meals are discussed. The (I) contents of various organs of the animal body in health and disease are tabulated. The above test does not indicate proportional increases of bone since the bone-free meal contains 5% of (I) in the dry matter, whilst 0·5, 1·0, and 1·5 ml. of sediment are given by meals containing 7, 10, and 15% of (I), respectively. By weighing the bone sediment (10 g. of meal in 50 ml. of CCl_4) and multiplying by 10, a rough val. of the bone content of the meal is obtained. W. L. D.

Judgment of freshness of meat. A. ZWILLING (Z. Unters. Lebensm., 1936, **72**, 148—156).—Of numerous tests investigated, only the MgO and the benzidine tests indicate the early stages of decomp. The procedure to be followed comprises an examination of appearance and odour, a bacteriological test, and chemical tests. A modified MgO and the benzidine tests are applied, and if the former is positive and the latter negative a Nessler reaction is carried out. If this is positive the meat is totally unfit for use. E. C. S.

Ripening of meat. I. A. SMORODINCEV (Ukrain. Biochem. J., 1936, **9**, 791—803).—The proteins of the muscle plasma become coagulated. A ripened meat has 0·7—0·8% of lactic acid, 0·2% of reducing substances, p_H 5·6—5·7, and the ratios NH_2-N/reducing substances = 0·25—0·27, glycogen/lactic acid = 0·2, NH_3/total N = 0·008—0·009. The greatest changes in the total N and NH_2-N are observed at the end of 6 hr., but the full ripening takes 24—72 hr. F. A. A.

Chemical composition of the raw materials of the German fish industry. O. BÄHR (Deuts. Fischerei-Runds., 1935, 271—273, 295—297; Chem. Zentr., 1935, ii, 2752).—Analyses of a no. of German fish are given. H. N. R.

Pepper: its processing and sophistication, with a general note on spices. P. H. JONES (Food, 1937, **6**, 156—161).—The grading and processing of the various types of pepper, and the methods of adulteration and their microscopical detection, are described. The most frequent adulterants are rice, olive stones, and bleached black-pepper husks. E. C. S.

Spray-residue removal. F. L. OVERLEY and E. L. OVERHOLSER (Proc. Amer. Soc. Hort. Sci., 1934, **32**, 175—178).—Types of washing machines used in removing Pb arsenate residues are compared. Tandem washers using HCl and Na silicate gave good results. CH. ABS. (*p*)

Lead residues and their removal as influenced by spray programme. M. H. HALLER, J. H. BEAUMONT, C. W. MURRAY, and C. C. CASSIL (Proc. Amer. Soc. Hort. Sci., 1934, **32**, 179—182).—Fish or mineral oil may be added to the first two Pb arsenate sprays without influencing the amount of residue at harvest or the ease of its removal. With later cover sprays addition of casein–CaO spreader or mineral oil increases the amount of residue. Mineral oil (but not fish oil or casein spreader) increases the difficulty of washing. CH. ABS. (*p*)

Relative value of several wetting agents in removing lead residues from apples. J. H. BEAUMONT and M. H. HALLER (Proc. Amer. Soc. Hort. Sci., 1934, **32**, 183—189).—Use of 7 wetting agents is examined. Efficiency of washing was increased by raising the temp. from 21° to 37·7°. Addition of 1% of NaCl had no beneficial effect. CH. ABS. (*p*)

Relation of washing treatments to subsequent losses of moisture from apples. R. E. MARSHALL, F. L. OVERLEY, and K. GROVES (Wash. Agric. Exp. Sta. Bull., 1936, No. 330, 28 pp.).—All washing treatments increase the loss of H_2O from apples. The effects of HCl, Na silicate, Na_2CO_3, and $AlCl_3$ were small, but additions of mineral oil to the wash liquor (especially if containing HCl) markedly increased the loss. A. G. P.

Storage of Yellow Newtown apples in chambers supplied with artificial atmospheres. F. W. ALLEN and L. R. MCKINNON (Proc. Amer. Soc. Hort. Sci., 1934, **32**, 146—152).—In atm. containing various proportions of CO_2 and O_2, apples stored at 5·5° showed a decrease in acid content as the fruit ripened but no significant change in sugar content. CH. ABS. (*p*)

Effect of freezing on oranges. W. Y. GARY (Florida Dept. Agric., Chem. Div., 1935 [Mar.], 17—30).—Freezing and subsequent thawing causes formation of hesperidin crystals in pulp and segment tissues. Cell walls and segment tissues break down, and total acidity decreases. The I-reducing power of the juice is unchanged. The total sugar content is not altered, but some inversion of sucrose occurs. Freezing causes more rapid spoilage. CH. ABS. (*p*)

Determination of juiciness in grapefruit. L. LONGFIELD-SMITH (Florida Dept. Agric., Chem. Div., 1935 [Mar.], 1—15).—Methods of pressing-out the juice are examined. The total solids, acidity, vol., and *d* are recorded. First-run juice has higher % acid than the last-run. CH. ABS. (*p*)

Deciduous fruit. II. Effect of time of picking on chemical changes in Kelsey and Gaviola plums in store. I. Donen (Trans. Roy. Soc. S. Africa, 1935, 23, 177—203).—Sugar contents of plums increased slightly and acid content decreased rapidly during the first 10 days of storage. Subsequently sugar disappeared at an increasing rate and acid losses diminished. Glucose (I) and fructose (II) were lost in equal proportions from early pickings, but in later pickings (II) disappeared the more rapidly. (II) was probably converted into sucrose more rapidly than was (I). Ch. Abs. (*p*)

Improvements in the manufacture and preservation of grape juice. C. S. Pederson and D. K. Tressler (New York State Agric. Exp. Sta. Bull., 1936, No. 676, 29 pp.).—Methods of preventing deterioration of grape juice due to micro-organisms and enzymes by pasteurisation, and that due to air by suitable filling and storage or by carbonation, are described. Rapid methods of removing tartrates, *e.g.*, pectinol clarification, freezing and thawing, are discussed. A. G. P.

Technical preparation of potato protein. W. Kröner and H. Falta (Z. Spiritusind., 1936, 59, 409—410, 417—418, 425—426, 433).—Previous methods for the attempted separation of potato protein (I) are reviewed, and the conditions of pptn. have been investigated. The max. yield by heat coagulation represents some 50% of the total N of potato juice with a temp. optimum of 85—100°; boiling for a few min. of moderately dil. juice is, however, necessary to yield a coagulum capable of ready separation. Addition of acid before heating is unnecessary; although it may somewhat increase the yield, it hinders separation. The separated (I) may be freed from part of its H_2O by centrifuging of by special filtration; the optimum temp. (laboratory) for the final drying is 80°. Higher temp. may be used in vac., or, if mixed with pulp, the (I) may be drum-dried. The products have a high degree of digestibility (80—90%). The technical application of the process to the juice from starch manufacture, the yields, and costs are discussed. I. A. P.

Evaporation of plant juices in potato-meal and syrup factories. F. Beck (Z. Spiritusind., 1936, 59, 441).—Several possible evaporation schemes for use, *e.g.*, in connexion with the recovery of protein from potato juice are figured and briefly discussed. I. A. P.

Dimensions of Jerusalem-artichoke cossettes. M. J. Proffitt, J. A. Bogan, and R. F. Jackson (J. Res. Nat. Bur. Stand., 1936, 17, 615—624).—The size of cossette produced from the tubers with a beet slicer is small and would probably offer excessive resistance to the flow of food liquids when used in large-scale extraction of polysaccharides. Hence a different shape of slices may be necessary for the efficiency of this process. The mean surface per unit vol. and the thickness of the adherent films have been estimated. J. W. S.

Cucumber salting. H. W. Vahlteich, C. H. Haurand, and G. A. Perry (Food Ind., 1935, 7, 334—336, 364).—The influence of various organisms on the salting process in brines of varying p_H and [NaCl] is examined. Addition to brine of HCl sufficient to produce p_H 4·0 discourages the growth of inimical bacteria, accelerates salting, and ensures successful fermentation by the proper organisms. Ch. Abs. (*p*)

Preparation of fermented cucumbers. Serger (Braunschweig. Konserv.-Ztg., 1935, No. 29, 4—5; Chem. Zentr., 1935, ii, 2594—2595).—Highly manured cucumbers are watery and more difficult to ferment satisfactorily. The fermentation process should be prolonged by lowering the temp. and adding certain org. acids. A. G. P.

Acid content of some [Indian] vegetable foodstuffs. II. Amchur or *Mangifera indica*. R. K. Bountra and K. C. Pandya (Proc. Indian Acad. Sci., 1936, 4, B, 452—458).—The mean analysis for raw, sun-dried mango fruit is; H_2O 14·74, H_2O-sol. matter 13·65, total acid [as tartaric acid (I)] 15·215, (I) 6·099, citric acid 4·227, $H_2C_2O_4$ 1·075, glucose 3·0015, ash 5·44%. J. W. S.

Vitamin-*C* content of vegetables. V. Cabbage. S. Gould, D. K. Tressler, and C. G. King (Food Res., 1936, 1, 427—434).—Early summer cabbage has a higher -*C* content than autumn cabbage. Cut cabbage loses its ascorbic acid (I) less rapidly in cold store than at room temp. Part of the (I) content is lost in the H_2O in cooking. P. G. M.

Soya-bean proteins. W. J. O'Brien (Oil and Col. Tr. J., 1936, 90, 1434—1436, 1442).—The production and uses of soya-bean protein (consisting mostly of glycinin) in the paper, plastics, adhesive, paint, and food industries is reviewed. D. R. D.

Cacao shell. A. W. Knapp (Bull. off. Off. int. Cacao Chocolat, 1935, 5, 219—224; Chem. Zentr., 1935, ii, 2596).—The shell is best suited for cattle feeding. On account of the theobromine content the daily ration should be limited to 1—1·5 kg. per head. The shell contains 28 (international) units of vitamin-*D*. A. G. P.

Cacao shell and its use as an accessory fodder. A. W. Knapp and A. Churchman (Chem. and Ind., 1937, 29—33).—The % H_2O, ash, theobromine (I), and light petroleum extract of 5 commercial samples, and a detailed analysis of a sixth, are recorded. 2 lb. per head of representative shell were added to the ration of 2 herds of cows during the 7 winter months. The butter fat content of the milk was slightly > that of control herds and in other respects the results of ingestion were beneficial. The quantity of 2 lb. per head raises the vitamin-*D* in the milk and butter fat to a suitable level and should prevent shortage of -*D* in the animal while avoiding an excess of (I). E. C. S.

Injurious insects in cacao warehouses. A. W. Knapp (Bull. off. Off. int. Cacao Chocolat, 1935, 5, 265—277; Chem. Zentr., 1935, ii, 2724).—Fumigation with HCN, CS_2, CCl_4, SO_2, and CH_2O, and also heat, cold, and vac. treatments, are discussed. Heating to 71° kills insects without injury to cacao. A. G. P.

Determination of sucrose in chocolate pastes. F. T. van Voorst (Chem. Weekblad, 1936, 33, 743—

746).—Chocolate pastes containing molasses cannot be analysed by the Dutch Official methods depending on determinations of the polarisation and reducing power. Kruisheer's method (B., 1929, 533) is recommended. S. C.

Alterations in coffee fat with different intensities of roasting. C. Massatsch and E. Schneider (Deuts. Nahrungsmittel-Runds., 1935, 36; Chem. Zentr., 1935, ii, 1796).—Only the waxes in the outer part of the beans undergo alteration; the true coffee fat is merely set free by roasting. H. N. R.

Productivity and nutritive value of a maremma (fen) pasture cut monthly. T. M. Bettini (Riv. Zootec., 1936, 13, 135—153).—A fen pasture cut monthly gave a total production of about 40 quintals of hay per hectare in 6 cuttings, the largest yields being obtained in June and Dec. As a rule the % of org. substances was highest when yield was highest. Mineral content varied considerably, especially as regards Ca and P. In July drought caused large increase in the Ca and fall in P content. There appeared to be a correlation between protein and total S contents. The P val. was often very low, *e.g.*, in July, when P_2O_5 and CaO contents were 0·29% and 1·42% respectively, on the dry basis. Nutr. Abs. (*m*)

Factors affecting the chemical composition of pasture grasses. D. W. Edwards and R. A. Goff (Hawaii Agric. Exp. Stat. Bull. No. 76, Dec., 1935, 31 pp.).—Whilst location had a definite effect on the CaO and P_2O_5 content of five grasses grown at four centres in Hawaii, the average % of protein for each of the species was the same at all centres. Species differences were greatest for the protein and least for the P_2O_5 content. The % of CaO appeared to vary inversely with the % of protein. There was a distinct seasonal effect, the vals. for % of protein, CaO, and P_2O_5 tending to reach their highest levels during the cool winter months, all three constituents varying directly. Nutr. Abs. (*m*)

Variations in carotene content of farm feeds. L. A. Shinn, E. A. Kane, H. G. Wiseman, and C. A. Cary (Amer. Soc. Animal Prod. Rec. Proc. 27th Ann. Meet., 1934, 190—192).—Data for grass, lucerne (green and hayed), maize (green and silage), and timothy hay are given. Ch. Abs. (*p*)

Composition and nutrient value of grass. E. Vanstone (Fertiliser, Feeding-Stuffs, and Farm Supplies J., 1936, 21, 575—579).—A review of recent experimental work. A. G. P.

Uncommon feeding-stuffs. F. Hanley (Husbandry, 1936, 6, 6—9).—Chemical analyses are given of lentil seed, husks, and straw and of the empty pods of *Medicago lupulina* (trefoil cosh), clover, pea husks, and celery waste. Nutr. Abs. (*m*)

Soya-bean oil meals prepared at different temperatures as feed for pigs. J. W. Hayward, G. Bohstedt, and J. M. Fargo (Amer. Soc. Animal Prod. Rec. Proc. 27th Ann. Meet., 1934, 123—126).—Meals prepared by the expeller process (max. temp. 130—150°) and the hydraulic process (cooking temp. 105—121°) were equally efficient sources of protein for pigs. Those prepared by the solvent process (extracted at 45° and dried at 98°) and by the hydraulic process when cooked at 82° were somewhat less efficient. Ch. Abs. (*p*)

Composition and feeding value of some moorland plants. B. Thomas (Agric. Progress, 1935, 12, 82—89; cf. B., 1935, 922).—Vals. for scallions (leaf butts) of draw-moss at different periods of the year are recorded. The exceptional feeding val. of the plant is due principally to the high P content. Ch. Abs. (*p*)

Enrichment of fodders in biologically valuable compounds. K. G. Kratinova, O. I. Pochil, and A. S. Uschakova (Ukrain. Biochem. J., 1936, 9, 671—683).—Feeding-stuffs deficient in vitamins may be enriched by growing on them suitable yeasts. *Torula pulcherima* is more effective than the beer-yeast Saaz for adding *-B* to pumpkin silo fodder, and *-D* may be added by ultra-violet irradiation. F. A. A.

Mineral metabolism in the calf and the addition of inorganic minerals to the diet. E. J. Sheehy (J. Dept. Agric. Saorst. Éir., 1936, 34, 1—32).—Deficiency of NaCl in calf rations results in unthriftiness and low retention of Ca and P. Addition of Ca to a diet having $CaO : P_2O_5 < 1$ not only corrects the Ca deficiency but increases P retention. Addition of I to the ration had no beneficial result. Feeding cod-liver oil with a ration in which low-Ca hay was the principal source of Ca increased the retention of both Ca and P. A. G. P.

Effect of breed, size of cow, yield of milk, and stage of lactation on efficiency of milk production. J. Edwards (J. Dairy Res., 1936, 7, 211—221).—Data showing "gross efficiency," *i.e.*, ratio of energy of milk to energy of digestible nutrients consumed, are examined. The stage of lactation and the actual milk yield are important factors. A. G. P.

Nutritive value of proteins for milk production. IV. Comparison of proteins of (*a*) spring and autumn grass, (*b*) grass conserved as silage (A.I.V. acid-treated, molasses-treated, and ordinary untreated), and grass conserved by drying: notes on (i) effect of heat-treatment on nutritive value, and (ii) supplementary relations of food proteins. S. Morris, N. C. Wright, and A. B. Fowler (J. Dairy Res., 1936, 7, 97—121).—For milk production proteins of spring grass were superior to those of autumn grass. No marked differences in nutritive vals. of fresh and artificially dried grass, or between those of three forms of silage, were apparent. Biological vals. of fresh and dried autumn grass were the same; that for dried spring grass was somewhat $<$ that for fresh spring grass; those for silage made from summer grass were equiv. to that of fresh spring grass. Blood meal has a higher nutritive val. when prepared by low-temp. than when by high-temp. processes. A. G. P.

Comparison between blood meal and wheat gluten as supplement to a low-protein diet for dairy cows. S. Bartlett (J. Dairy Res., 1936, 7, 222—227).—When used as supplements to a low-lysine ration containing $<$ the recognised standard of protein, blood meal and wheat gluten did not affect milk yields or (appreciably) the live wts. of the cows. A. G. P.

Influence of milking machines on milk yield [and composition]. S. Bartlett and S. L. Huthnance (Agric. Progress, 1935, **12**, 144—147).—Use of machines did not affect the fat or solids-not-fat contents of milk. Ch. Abs. (*p*)

Effect of partial substitution of oats by waste products of the sugar industry on the alkali reserve and lactic acid of the blood and on the recovery from fatigue of horses. S. E. Borschkovski, A. K. Martinenko, and V. V. Michailova (Ukrain. Biochem. J., 1936, **9**, 553—572).—Substitution of a diet of 4 kg. of oats, 5 kg. of hay, 1·5 kg. of dry beet pulp, and 0·5 kg. of molasses for a normal diet of 5·5 kg. of oats and 5·8 kg. of hay in some cases diminishes blood-lactic acid normally and after work. The alkali reserve shows no significant change. F. A. A.

Ground soya beans as a protein supplement for laying birds. A. E. Tomhave and C. W. Mumford (Delaware Agric. Exp. Sta. Bull., 1936, No. 197, 37 pp.).—In pullet rations, replacement of meat scrap by the ground beans lowered egg production and increased food consumption per egg and the mortality due to prolapsed oviduct. These effects were specially marked if soya beans were $>6\cdot8\%$ of the ration; they were not attributable to the high fat content of the ration. Cold-storage qualities and shell strength of the eggs were not affected. The egg production of yearling hens was not affected by soya bean. A. G. P.

Protein requirements of laying hens. V. Heiman, J. S. Carver, and J. L. St. John (Wash. Agric. Exp. Sta. Bull., 1936, No. 331, 16 pp.).—For laying hens a level of 15% of protein from suitable sources is recommended. Rations containing 12—13% of plant protein only were insufficient to maintain body-wt. during laying and lowered the wt. and hatchability of eggs. When fed to growing chicks Alaska herring meal as a protein supplement showed a gross val. equiv. to that of the protein of dried skim milk. A. G. P.

Utilisation of nitrogen, calcium, and phosphorus by the growing chick. C. W. Ackerson, M. J. Blish, and F. E. Mussehl (Nebraska Agric. Exp. Sta. Res. Bull., 1935, No. 80, 16 pp.).—With a good mash feed the % retention was N 37·8, P 27·3, and Ca 43·4% of the amounts fed. No sex differences in the utilisation of nutrients were apparent. A. G. P.

Nutritive value of packing-house by-products prepared by the wet and dry rendering processes. C. L. Shrewsbury and C. M. Vestal (Amer. Soc. Annual Prod. Rec. Proc. 27th Ann. Meet., 1934, 115—120).—Nutrient vals. of wet-rendered tankage, atm. dry-rendered and pressure–vac. dry-rendered meat scraps were the same when fed to hogs or rats as supplements to maize. Ch. Abs. (*p*)

Butter boxes.—See IX. **Corrosion-resistant Ni alloys. Corrosion of tinplate by foods.**—See X. **Butter fat. Cacao butter.**—See XII. **Pasture.**—See XVI. **Determining betaine in [molassed] sugar-beet [pulp].**—See XVII. **Beer grain.**—See XVIII.

See also A., III, 8, **Proteins in bonito-meat. Meat of flat fish.** 34, **Taint in fish.** 36, **Food-poisoning *Staphylococcus*.** 43, **Identifying vitamins by mol. distillation.** 43—6, **Vitamins.** 45, **Antiscorbutic val. of preserved foods.** 50, **Ba in Brazil nuts.**

Patents.

Reduction of grain and bran and their subsequent conversion into bread or like product. T. W. Bonner, S. M. Salomon, and S. Busch (B.P. 456,845, 11.2. and 20.9.35).—The grain or bran is milled in the dry state to a powder, allowed to soak in H_2O for 2—3 hr., and the resulting dough passed through refining rolls under high pressure. Yeast, salt, etc. (and white flour in the case of bran) are then added and the normal breadmaking process is followed. E. B. H.

Production of creamery products. H. D. Wendt, Assr. to Milk Processes, Inc. (U.S.P. 2,031,443, 18.2.36. Appl., 24.9.34).—Plastic cream of $>65\%$ fat content can be used mixed with the other necessary ingredients for the manufacture of ice cream. To avoid churning of the cream during mixing, with separation of butter oil, the cream must be maintained at $<10°$ (approx. 4°) until the butter fat concn. of the mixture is reduced to $\ngtr 40\%$. The temp. is subsequently raised to 18—32° to ensure thorough mixing of the ingredients. E. B. H.

(A) **Egg product and emulsifier therefor.** (B) **Emulsifier.** F. H. Clickner, Assr. to Kraft–Phenix Cheese Corp. (U.S.P. 2,030,964—5, 18.2.36. Appl., [A] 16.4.34, [B] 13.5.35).—(A) Egg products produced by addition to egg of a lipin-free whey powder, obtained by extracting the product described in, *e.g.*, U.S.P. 1,923,427 (B., 1934, 554) with a fat solvent, are claimed. (B) The prep., and use as emulsifier, of this powder are claimed. Its addition to whole egg increases the val. of the product by making it as valuable an emulsifier as egg-yolk. It may also be used as an emulsifier in inedible emulsions, *e.g.*, soapless shaving creams. E. B. H.

Reduction of potatoes and other starch-containing vegetables to the form of a dry powder. M. Bunimovitch and A. Faitelowitz (B.P. 457,088, 10.6.36).—The vegetables are cooked at $\ngtr 100°$, in steam if desired, then cut into small pieces, about 50—60% of the original H_2O is removed at $\ngtr 100°$, and the product reduced to moist powder and dried with agitation at $\ngtr 80°$ to 10—15% of H_2O. B. M. V.

Soya-bean phosphatides. W. W. Ginn, Assr. to Chem. Novelties Corp. (U.S.P. 2,029,261, 28.1.36. Appl., 30.1.35).—Phosphatides, differing from commercial soya-bean lecithin, are recovered from soya-bean oil settlement sludge by specified centrifugal treatment. E. B. H.

Recovery of pure germinal substance from seed kernels. M. Bienenstock (U.S.P. 2,028,132, 21.1.36. Appl., 6.4.34. Hung., 11.5.33).—A flotation-separation method is employed to obtain the germinal substance of seed kernels, *e.g.*, *Ceratonia siliqua* (carob bean), without impairing gluten-forming proteins. E. B. H.

Treatment of organic [animal or vegetable] cellular materials. E. J. Wolf (U.S.P. 2,031,243, 18.2.36. Appl., 21.7.33. Ger., 27.12.30).—The use is claimed of a mixture of salts, the cations of which are present in specified proportions, as dressings in the preservation and cooking of such materials as meat, fish, and vegetables. The various salt mixtures described contain NaCl as the chief ingredient and sol. salts of K, Mg, and an alkaline-earth metal, including at least one salt of an org. acid (tartrate, lactate). The ratio of NaCl to the sum of the other salts should be between 100 : 5 and 100 : 20. E. B. H.

Preservation of fruits and vegetables. T. A. Robertson (B.P. 457,888, 3.7.35. Austral., 4.7.34).—A sterilised atm. containing 2—15% of O_2, remainder N_2, is used, the R.H. being 85—95% and the temp. 2—21°. Optimum conditions for different fruits are given. E. B. H.

Preservation of food materials and particularly of fresh fish. E. A. H. Kjörstad (B.P. 456,994, 7.6.35. Fr., 8.6.34).—Fish is cooled to a temp. just above that at which it becomes rigid, by immersion in sea-H_2O cooled to about $-2{\cdot}5°$, and subsequently kept at $-2°$ to $-10°$ depending on the period of storage. E. B. H.

Treatment of whale meat. D. A. Hansen (B.P. 457,348, 2.7.35. Norw., 5.7.34).—Finely-divided whale meat is heated for 1 hr. at 35—65° (40—55°), with stirring. The oil which is released is pressed out and the residues are dried. E. B. H.

Preservation of animal tissues. S. Musher (U.S.P. 2,029,248, 28.1.36. Appl., 16.7.35).—Animal tissue subject to oxidative change is coated with vegetative antioxidative material such as oat flour. E. B. H.

Production of a flavouring and seasoning preparation. A. Stäger (B.P. 456,944, 6.12.35).—The following ingredients are heated and mixed together: meat extract 1·2, vegetable extract (prepared by concentrating the pressed juices of kitchen vegetables) 0·7, calf fat 1·3, beef fat 2·0, cooking salt 4·0, roasted finely-chopped onions 0·7, ground nutmeg 0·05, and ground pepper, 0·05 kg. The mixture is stirred mechanically to yield a thick mush and filled hot into cellulose skins. E. B. H.

Treatment of grass. C. Goodall (B.P. 457,789, 5.6.35).—Grass is cut, lacerated, squeezed by passage between ridged rollers, and subsequently dried for cattle food by a current of hot air; the juices produced are dried or conc. to give a product suitable for nutritive or medicinal purposes. E. B. H.

Treatment of oil-bearing edible materials [for animal feed]. J. L. Fairrie (B.P. 457,603, 26.2.35).—Oil-bearing seeds are sliced and scraped between a plate (*e.g.*, in the form of a cylinder) having (grater-like) openings with punched-up walls and a co-operating (plane) surface before mixing with ground dried beet pulp and further grinding if desired. E. L.

Production from whale blood of blood meal suitable for use as a feeding-stuff for animals. Soc. Anon. des Brevets Fauth (B.P. 456,882, 26.5.36. Ger., 28.5.35).—When the head, throat, and appendant viscera are removed from an unopened whale carcase, the blood, which collects in the thorax, is sucked into a receiver. This partly coagulated blood is comminuted and then coagulated by intimate admixture with H_2O at 75°. The serum is filtered off and the residual material dried. E. B. H.

Manufacture of dry animal-protein substances. S. Morris and W. Acton (B.P. 457,831, 11.6.35).—The proteins from whole blood or serum are pptd. with $COMe_2$ or EtOH and the ppt. is extracted with Et_2O and air-dried. A 15—20% solution of gelatin (from hide or decalcified bone) is fed on to a cooled, rotating drum where it sets to a film of gel, which is dehydrated by passage through EtOH ($>60\%$) and then Et_2O. E. B. H.

Mixing grain etc.—See I. **Germicidal compositions.**—See VII. **Casein dispersion.**—See XIII. **Ferments.**—See XVII. **Vitamin preps.**—See XX. **Digesting industrial wastes.**—See XXIII.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Hydrogenated castor oil as an ointment base. G. W. Fiero (J. Amer. Pharm. Assoc., 1936, **25**, 862—863).—The use of "soft" (m.p. 40°, I val. 70·8) and "hard" hydrogenated castor oil (m.p. 82°, I val. 16·6) is described. F. O. H.

Calcium silicates in medicinal use. V. Larsen, J. Hald, and F. Eriksen (Dansk Tidsskr. Farm., 1936, **10**, 304).—An addendum (cf. B., 1936, 1177). M. H. M. A.

Evaluation of calcium gluconate. S. Hermann and P. Neuschul (Chem.-Ztg., 1936, **60**, 1036—1037).—The usual methods for the examination of org. Ca salts are adapted to the identification, examination, and determination of Ca *d*-gluconate. E. H. S.

Relation between properties and methods of preparing tinctures. M. Covello (Annali Chim. Appl., 1936, **26**, 409—414).—The properties and stability of tinctures of some common drugs, prepared under varying conditions, and with different grades of EtOH, have been determined. In general, abs. EtOH gives inferior tinctures to aq. EtOH. Prolonging the time of contact gives a higher content of active principle. Lower-grade types of EtOH yield more active but less stable tinctures of the cardiotonic drugs. The determination of the Cl index is discussed. L. A. O'N.

Iodide determination (Richard's method) in iodine tincture and in sodium and potassium iodides. P. Karsten (Pharm. Weekblad, 1936, **73**, 1658—1668).—Errors arising in this determination are due to addition of insufficient $Na_2HPO_4,2H_2O$ (30 c.c. of 5% solution are required) and to carrying out the titration too soon after addition of the reagents. The reaction should take place for 10 min. and 0·5 g. of KI should be added. S. C.

New methods of preparation of alcoholic plant extracts. H. Schrader (Pharm. Ztg., 1936, **81**, 1359—1365).—A laboratory percolator is described and the results obtained in the prep. of extracts of five drugs and of cinchona-bark extract with menstrua containing varying quantities of HCl are given. Extracts prepared with 43% aq. EtOH (wt./wt.) were of high activity and remained unchanged, after keeping for six months, in their clarity and freedom from sediment. The relationships of the p_H of the extract to its stability and activity are discussed. E. H. S.

Necessity for the biological evaluation of saponin-containing drugs and the procedure for pharmaceutical laboratories. K. Hering (Pharm. Zentr., 1936, **77**, 777—780).—The val. and details of the hæmolysis method are discussed. E. H. S.

Investigation of drugs by ash patterns. W. Haas (Wiss. Mitt. österr. Heilmittelstelle Folge, 1935, **13**, 6—7; Chem. Zentr., 1935, ii, 2545—2546).—The ash is examined microscopically. H. N. R.

Occurrence of sorbitol in tobacco. C. Neuberg and M. Kobel (Z. Unters. Lebensm., 1936, **72**, 116—121).—Pipe and cigarette tobaccos contained 0·3—0·4% of their dry wt. of sorbitol. Mannitol, dulcitol, and inositol could not be detected. E. C. S.

Isolation of rutin from tobacco. C. Neuberg and M. Kobel (Z. Unters. Lebensm., 1936, **72**, 113—116; cf. A., 1935, 1040).—Rutin equiv. to 1·43% and 0·68% of the dry wt. was isolated from fresh pipe and cigarette tobacco, respectively. During the commercial drying process the former lost 50% of its rutin. E. C. S.

Gaseous exchange in aqueous suspensions of oriental tobacco. I. A. I. Smirnov [with M. G. Moroz-Morozenko] (Z. Unters. Lebensm., 1936, **72**, 172—188).—Micro-respiration apparatus of the Barcroft type is described in which the error of determination of CO_2 evolution is $\ngtr 1\cdot7\%$. O_2 uptake diminishes as fermentation proceeds until, towards the end, the uptake is $\ngtr 0\cdot07$ c.c. per g. of tobacco per hr. This val. can serve as an index of the completion of fermentation. CO_2 production does not diminish so regularly. In unfermented tobacco 75%, in fermented 100%, of the CO_2 is produced anaërobically. In yellow tobaccos completion of fermentation can also be recognised by this criterion. E. C. S.

Determination of ammonia in presence of pyridine bases in tobacco and tobacco smoke. W. Preiss (Z. Unters. Lebensm., 1936, **72**, 189—196).—In absence of CO_2, NH_3 behaves as a strong base and can be titrated directly to phenolphthalein, so long as the latter is present in quantity. This principle is used in the method described. For removal of CO_2 the bases are acidified with HCl and boiled. If H_2SO_4 is used, C_5H_5N is lost. E. C. S.

Nicotine content of the main smoke stream of thick and thin cigarettes. A. Wenusch (Z. Unters. Lebensm., 1936, **72**, 213—218).—Under conditions closely similar to those of normal smoking, the shape of the cigarette has little effect on the nicotine in the main smoke stream. E. C. S.

Determination of nicotine in tobacco smoke. A. Heiduschka (Pharm. Zentr., 1936, **77**, 780—782).—Pfyl's method (B., 1934, 171) is recommended as being the nearest approach to the natural smoking process. E. H. S.

[Chemistry of] smoking. W. Preiss (Z. Unters. Lebensm., 1936, **72**, 196—212).—During intermittent smoking, 30% of the nicotine (I) of cigarettes appears in the main smoke stream, 40% in the secondary smoke, 2—5% in the stump, and 25—30% is decomposed, for the most part in the intervals between puffs. In cigars, 50% is decomposed, a more variable amount (7—20%) appearing in the main smoke stream. The tar is important in its effect on the adsorption of (I). E. C. S.

Testing of lemon- and orange-peel oils. III. Oxidative change of the oils. Y. R. Naves (Parfums de France, 1934, **12**, 314—326; Chem. Zentr., 1935, ii, 1793—1794; cf. B., 1933, 525).—The influence of ageing on physical properties and ultra-violet fluorescence is described. Changes in acid val. and in the citral and decanal content are recorded. Determination of peroxides (described) is the best quant. measure of the degree of ageing. H. N. R.

Constituents of the essential oil of *Mentha pulegium*, L. K. Sakurai (J. Pharm. Soc. Japan, 1935, **55**, 86—96).—The isolation of pulegone is described. Ch. Abs. (*r*)

Essential oil from the leaf of the Padang cinnamon tree. P. A. Rowaan (Chem. Weekblad, 1936, **33**, 698—699).—Dried leaves of *Cassia vera* (*Cinnamomum Burmanni*) afford 0·4% of essential oil containing 45—62% of cinnamaldehyde and about 10% of eugenol and resembling Chinese cassia oil in properties. S. C.

Petitgrain oil of Sicilian mandarins. F. Sorgès (Riv. ital. Ess. Prof. Piante off., 1935, **17**, No. 4, xxv—xxvii; Chem. Zentr., 1935, ii, 2142).—The properties of the oil are described in detail. H. N. R.

Perfuming soaps.—See XII. **Alkaloids in hops, and in fermentation.**—See XVIII. **Disinfection by impregnation.**—See XXIII.

See also A., II, 3, **Explosions arising from ethers. Oil of asafœtida.** 14, **Thymol derivatives.** 20, 24, **Synthesis of phenanthrene and hydrophenanthrene derivatives.** 25, **Substance in adrenal cortex, resembling cortin. Constituent of *Drosera rotundifolia*.** 26, **Lanceol from oil of *Santalum lanceolatum*.** 33, **Antimalarials.** 38—9, **Alkaloids.** A., III, 38, **Extracts containing adrenal cortical hormone. Inactive compounds in adrenal cortex.** 43, **Identifying vitamins by mol. distillation.** 43—6, **Vitamins.** 45, **Antiscorbutic val. of preserved foods. Purification of ascorbutic acid.**

Patents.

Oligodynamically-acting germicidal products. Deuts. Gold- u. Silber-Scheideanstalt vorm.

Roessler (B.P. 457,783 and 457,785, 4.6.35. Ger., 2.6.34).—(a) Materials of large surface area, *e.g.*, SiO_2 gel, cellulose, bolus, are impregnated with a combination of Ag_2O and Mn oxides, preferably $Ag_2O,2MnO_2$, which may be formed *in situ*, *e.g.*, by impregnation with $AgMnO_4$ followed by reduction. The product may be ground (wet or dry) with optional addition of protective substances; other suitable powders or pastes may be incorporated. (b) The Ag–Mn compound is mixed with aq. salve or cream bases, SiO_2 gel having a high H_2O content may be used as a carrier, and the gel before or after impregnation may be converted into an alcogel or a hydrocarbon gel. E. H. S.

Production of a cleansing composition for [living] mucous membranes. M. Hardtmann and E. Franz (B.P. 457,385, 21.3.35. Ger., 21.3.34).—Paraffin, cod-liver oil, or similar intestinal lubricant is emulsified in H_2O containing an alkali salt of an aliphatic sulphuric or sulphonic acid (C_{12-22}) in presence of a higher, straight-chain, aliphatic alcohol (*e.g.*, hexa- or do-decanol). [Stat. ref.] E. H. S.

Production of phytosterin products. J. E. Pollak. From Hansa-Mühle A.-G. (B.P. 457,859, 4.6.35).—Materials (*e.g.*, soya oil) containing phytosterol (I) are steam-distilled, preferably in vac. and at $>$ 200°, and the (I) is isolated from the distillate by cooling after addition of EtOH. E. H. S.

Production of derivatives of androstenols. A. Carpmael. From Schering–Kahlbaum A.-G. (B.P. 455,020, 6.2.35).—Androstenolones in which the OH is protected by a hydrolysable group, *e.g.*, acyl, alkyl, aryl, are reduced under such conditions that the double linking is unaffected (Al–Hg, Ni–H_2). *E.g.*, dehydroandosterone acetate is reduced by Al–Hg in aq. EtOH at the b.p. or Raney Ni and H_2 in EtOH at room temp. to androstenediol 3-acetate, m.p. 144°. (Cf. B.P. 451,509; B., 1936, 1130.) H. A. P.

Production of morphine and codeine. F. Hoffmann–La Roche & Co. A.-G. (B.P. 457,433, 9.4.36. Switz., 7.6.35).—Aq. extracts of poppy plants are extracted at p_H 9 with org. solvents. E. H. S.

Water-miscible vitamin preparations containing vitamin-*D*. C. W. Hooper, Assr. to Winthrop Chem. Co., Inc. (U.S.P. 2,030,792, 11.2.36. Appl., 4.12.35. Can., 25.2.35).—Stable, H_2O-miscible vitamin-*D* or -*A* solutions are obtained by dissolution in butane-αβ-, -αγ-, -βγ-, or -αδ-diol, *iso*butane-αα'-(not -αβ-)diol, or propane-αβ- (not -αγ-)diol (cf. B.P. 436,713; B., 1935, 1166). R. S. C.

Product of irradiation of vitamin-*D*. O. Linsert, Assr. to Winthrop Chem. Co., Inc. (U.S.P. 2,030,377, 11.2.36. Appl., 30.10.33. Ger., 5.11.32).—Pure vitamin-*D* is irradiated (ultra-violet) in a lower alcohol, ether, or ligroin in absence of O_2 until the band at 265 mμ disappears. The product is converted in a *tert.* base into its 3 : 5-dinitrobenzoate; the first fraction thereof obtained by crystallisation from Et_2O or ligroin, when recryst., gives a 3 : 5-*dinitrobenzoate*, m.p. 138°, $[\alpha]_D^{22}$ +33° in $COMe_2$, hydrolysed to a *substance*, $C_{28}H_{44}O$, m.p. about 50°, $[\alpha]_D^{22}$ −16° in $CHCl_3$, which has no antirachitic activity, but increases the level of blood-Ca. R. S. C.

Obtaining therapeutically valuable metal compounds of keratinic acids. R. von Wülfing and E. Moller (J. A. Wülfing) (B.P. 454,813, 16.9.35. Ger., 15.9.34).—Au compounds containing 20—30% Au are prepared by adding to weakly basic solutions of alkali keratinates Au^{III} salts (*e.g.*, $AuCl_3$) until the ppt. at first formed is redissolved, making alkaline, and repeating the cycle until sufficient Au has been introduced; the complex compound is eventually pptd. with EtOH. Similar conditions are used to obtain compounds containing $\nless$20% of Bi and $\nless$12% of Ag, Hg, Zn, Sb, and Cu, but in the case of Bi and Sb it is preferred to add the metal in the form of a complex org. salt, *e.g.*, tartar emetic, Bi NH_4 citrate. H. A. P.

Cumylphenol.—See III. **Oil–metal dispersions.**—See X. **Phenolic and medicated soaps.**—See XII. **[Product from] grass.**—See XIX.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Photographic emulsions for rapid [printing] papers. A. Charriou and S. Valette (Chim. et Ind., 1936, **36**, 888—895).—Methods of preparing emulsions of Ag chlorobromide, AgBr, and of Ag bromoiodide, with varying proportions of the halides, are described. Methods of obtaining fine grain and high sensitivity are examined, and the effects of ripening, washing, and secondary ripening detailed. Stabilisation of emulsions by addition of sol. halides and hardening of the gelatin by alum or CH_2O are also discussed. J. L.

Significance of proteins for [photographic] emulsions. E. Sedlaczek (Phot. Ind., 1936, **34**, 1281—1282, 1284).—The use of synthetically prepared derivatives of proteins for rendering inert gelatin suitable for photographic purposes is reviewed, with special reference to the patent literature. The active fission products of the proteins, which are all α-NH_2-acids, are also reviewed, and their origin and formulæ listed. J. L.

Photographic plates sensitised by sodium salicylate. T. Kiu (Compt. rend., 1936, **203**, 1144—1146).—The sensitivity of the plates in the visible spectrum is increased 60% or more by treatment with 10% Na salicylate solution. A. J. E. W.

Resolving power of photographic layers. H. Frieser (Kinotech., 1935, **17**, 167—172; Chem. Zentr., 1935, ii, 1816).—Theoretical. The true relationship of blackening to exposure is discussed. J. S. A.

Destruction of ripening nuclei by desensitisers. Lüppo-Cramer (Phot. Ind., 1936, **34**, 1280—1281).—Previous work (B., 1935, 750) is extended, and it is found that emulsions which have been artificially (chemically) fogged with H_2O_2 + KBr solutions can be restored more or less to the original clarity by subsequent treatment with a solution of a desensitising dye (*e.g.*, phenosafranine) and KBr. Characteristic curves are given for subsequent exposures under a step-wedge and primary-colour filters; exposures of equal *i.t.*, with high and low intensities, were compared. Low-intensity exposure always produced the greater bleaching effect. The greatest effect was produced by red light, decreasing progressively to the blue; with red light, however, further exposure does not again give increased densities. J. L.

Measurement of the velocity of development of individual silver bromide grains. W. Meidinger (Phot. Ind., 1936, **34**, 1305—1310).—The development of single grains in a large-grained, but slow, AgBr emulsion in inactive gelatin has been followed under the microscope. Several photomicrographs are given, showing the appearance of the grains with varying exposure, treatment with $NaNO_2$, chemical or physical development. Graphs are given to show the effects of development time, $[Na_2CO_3]$ or [KBr] in the developer, etc. Development time appears to depend on (*a*) the probability of development of a grain, which is dependent on exposure conditions, and (*b*) the speed of penetration of development through the whole grain, which depends mainly on the developer, and is independent of the exposure. Various other observations are described. J. L.

[Production of] direct [photographic] positives by reversal. G. Schweitzer (Photo-Rev., 1935, **47**, 259—262; Chem. Zentr., 1935, ii, 2771).—A method of reversal is described involving a long (30-min.) controllable development and giving good positives on normal emulsions. J. S. A.

Influence of the bleaching bath on the colour obtained in the indirect sulphide-toning process. H. Bäckström and A. Boström (Phot. J., 1936, **76**, 607—612).—Nitze's results (Brit. J. Phot., 1932, **79**, 486) have been confirmed by more comprehensive experiments. On bleaching with KBr (I) and $K_3Fe(CN)_6$ (II) solution, and toning with $1\frac{1}{2}\%$ Na_2S solution, yellower tones were in general obtained when bleaching with $7\frac{1}{2}$ pts. of (I) and $\frac{1}{2}$ pt. of (II), than with 3 pts. of (I) and 5 pts. of (II). Bromide papers showed the greatest differences, gaslight papers only small differences, and "art" gaslight showed little or no differences. If KI or KCl was used in place of KBr the effects were reversed, the second bleaching bath giving the yellower final tones. Other concns. of the bleaching bath were tested, with 40 different makes of paper, and the results are shown graphically; whilst the scale of colours was only approx., some general tendencies are observed in these graphs. J. L.

Photo-thermometry. K. Hencky and P. Neubert (Arch. Tech. Messen, 1936, No. 62, 100—101T).—A photographic method for measuring surface temp. over the range 350—750° is described. Darkening of a photographic plate is made possible by employing special lenses and filters, and the temp. is deduced from the ratio of the transparency of the body of the plate to that of the exposed portion. Curves and tables show the relation between this ratio and the exposures necessary for recording various temp. R. B. C.

Applications of photo-thermometry. P. Neubert (Arch. Tech. Messen, 1936, No. 63, 114—115T).—Practical applications of the method for measuring surface temp. (cf. preceding abstract) are discussed. Natural and infra-red photographs of three pieces of apparatus at 350—400° are given, and a method is described for measuring the emission coeff. of the material the temp. of which is to be measured. R. B. C.

See also A., I, 38, **Temp. coeff. of sensitivity.** 39, **Theory of the latent image.** A., II, 38, **Dicarbocyanines with substituents in the chromophore.**

Patents.

Development of silver halide emulsions in colour. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 457,326, 25.4.35).—The developer claimed comprises o-$NH_2{\cdot}C_6H_4{\cdot}OH$ (I) in a solution rendered alkaline with alkali carbonate or caustic alkali. Alkyl, halogen, OMe, or NH_2 substituents of (I) may also be employed for the production of other colours. J. L.

Colour photography. E. H. Winter (B.P. 456,818, 13.5.35. Ger., 20.4.35).—In photographing, printing, or enlarging with plates, films, or papers incorporating printed regular or irregular multicoloured point screens between the emulsion and the support, an additional similar colour screen is placed in front of the emulsion layer, in contact, registration of the colour points being effected by suitable mechanical means. The material is arranged so that the light passes first through the additional screen. J. L.

Printing from a lenticular film on to another lenticular film. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 457,278, 24.5.35).—To avoid streakiness in the print, the focal length of the elements is made 1—20% > the distance of the surface of the elements from the photographic emulsion layer. J. L.

Obtaining fingerprints. J. J. McCarthy (U.S.P. 2,028,619, 21.1.36. Appl., 14.3.35).—The method claimed is applicable where, owing to poor light, inaccessibility, etc., the fingerprints cannot be photographed directly. The fingerprints are dusted over with a powder of 8 pts. of quinol and 1 pt. of gum arabic, and the lines brushed out in known manner. A sheet of photographic paper or film is soaked for a few min. in a solution of 25 g. of NaOH and 25 g. of Na_2SO_3 in 1 litre of H_2O, and is then pressed over the fingerprint; after lifting off, development proceeds until a clear image is obtained, and the paper is then placed in an acid fixing bath for 3 min., rinsed, and dried. J. L.

Light filters. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 457,708, 30.5.35).—Ultra-violet filters are obtained by dissolving pyrene or certain derivatives thereof (I), having absorption commencing abruptly at 390—405 mμ, in a suitable medium, *e.g.*, a liquid solvent, lanoline, gelatin, cellulose, Cellophane, etc. Examples of (I) are Na_4 pyrene-3 : 5 : 8 : 10-tetrasulphonate, 3 : 5-dimethoxypyrene, Na_2 3-benzamidopyrenedisulphonate, and the urea from Na_2 p-aminobenzoyl-3-aminopyrenedisulphonate. R. S. C.

[Three-colour system of] reproduction of colour photographs or kinematographic films. P. Nespor (B.P. 457,476, 29.5.35. Austr., 29.5.34).

Ag from photographic baths.—See X. **Explosive cartridges.**—See XXII.

XXII.—EXPLOSIVES; MATCHES.

[Explosive] compounds of thallium with aromatic nitro-compounds. Langhans (Z. ges. Schiess- u. Sprengstoffw., 1936, **31**, 359—362, 402—404).—Reactions of various NO_2-compounds with Tl_2CO_3 were studied and some properties of the products are described. They are more sol. in H_2O than the corresponding Pb salts, but less so than the alkali-metal salts. The m.p. are $>$ the decomp. points, and explosion points are $>250°$. No basic salts are formed. Only traces of salts are produced with $Tl(OH)_3$. The Tl salts are more analogous to the alkali-metal salts than to the Pb salts. The contention that the dangerous nature of NO_2-compounds increases with rising at. wt. is therefore not universally true. W. J. W.

Manometric bomb and its application to the investigation of the explosive properties of picrates. M. Sasiadek and T. Tucholski (Acta phys. polon., 1934, **3**, 197—211; Chem. Zentr., 1935, ii, 1813).—The decomp. of Na, Rb, Co, Ag, Tl, Pb, and Cu picrates has been studied in a manometric bomb; various characteristics are described and discussed. With the exception of Tl and Pb picrates, the decomp. is a detonation rather than an explosion. H. N. R.

Hydrodynamic theory of detonation. A. Majrich (Z. ges. Schiess- u. Sprengstoffw., 1936, **31**, 357—359, 399—402).—Becker's formula shows that explosion pressure is greater in the direction of the detonation wave than in one at right-angles to it, whereas Abel's formula shows it to be the same in all directions. Brisance tests with a rectangular block of a mixture of pentaerythritol tetranitrate and trinitrotoluene confirmed Becker's formula. Also when a melinite fuse was laid along an Fe-plate cylinder, coated with Fe_3O_4, and fired, the splinters of the Sn coating showed a component of motion in the direction of detonation. The velocities of splinters from exploded detonators were determined from the distances at which they ignited Hess' fulminate fuse. Ignition could be effected at a distance of 2 m. as compared with 1 cm. by propagation alone. The velocities were higher with recessed- than with flat-base detonators. Bickel's formula remains valid when the velocity of the explosion gases is substituted for the detonation velocity. W. J. W.

War gases. L. Blas (Génie civil, 1935, **106**, No. 55, 8—11; Chem. Zentr., 1935, ii, 2322).—The relations between toxicity and chemical constitution are discussed. It is concluded that symmetrical compounds are more active than unsymmetrical, and that F compounds could be more extensively employed. H. N. R.

Decontamination of buildings impregnated with mustard gas. G. Renwanz (Gasmaske, 1935, **7**, 1—3; Chem. Zentr., 1935, ii, 3043).—Known methods are described. H. N. R.

Patents.

Making propellent powder. F. Olsen, Assr. to Western Cartridge Co. (U.S.P. 2,028,990, 28.1.36. Appl., 8.12.30).—Ungelatinised nitrocellulose (I) powder grains, preferably of fibrous structure, are treated with a gelatiniser, *e.g.*, $C_6H_3Me(NO_2)_2$, the penetration of which may be facilitated by previously wetting the grains with a solvent for the gelatiniser, which is a non-solvent for (I), *e.g.*, EtOH. W. J. W.

Black powder composition. C. W. Brooks, jun., Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,030,096, 11.2.36. Appl., 18.5.33).—Powders in which part of the $NaNO_3$ is replaced by NH_4NO_3 are stabilised by the inclusion of a solid aliphatic basic compound, such as urea. A suitable composition is $NaNO_3$ 60, S 10, C 17·9, NH_4NO_3 10, $CaCO_3$ 1·2, and urea 1·0%. W. J. W.

Antiparasitic agent [for gun cartridges]. O. V. Huffman (U.S.P. 2,028,217, 21.1.36. Appl., 11.7.33).—The powdered antiparasitic compound is compressed and loaded with a binder into a shotgun cartridge shell so as to be in contact with the explosive. Alternatively, wads of the same compound and binder may be inserted at either end of the compressed charge. Good dissemination is obtained when the cartridge is fired. W. J. W.

Explosive cartridges [for starting internal-combustion engines]. L. E. Nottelle and N. Herzmark (B.P. 457,423, 20.1.36).—Waste kinematograph film with a nitrocellulose base is formed into a cylinder with an axial channel to hold an igniting agent. The rate of combustion at certain layers may be accelerated by interspersing nitrated paper impregnated with feebly alkaline salts to stabilise it and with solutions of nitrates or chlorates to render it more combustible. Other layers may be impregnated with a solution of a non-explosive ester, *e.g.*, cellulose acetate, to reduce their rate of combustion. W. J. W.

Nitrocellulose.—See V.

XXIII.—SANITATION; WATER PURIFICATION.

Toxic dusts and fumes. L. T. Fairhall (J. Ind. Hyg., 1936, **18**, 668—680).—General considerations of the dangers arising from toxic dusts and fumes in various industries such as those associated with the processing of As, Hg, Pb, P, Mn, Co, Cr, compounds, dyestuff intermediates, and tar. A. L.

Toxic organic vapours and gases. J. H. Foulger (J. Ind. Hyg., 1936, **18**, 604—608).—General considerations. A. L.

Design of exhaust hoods for dust-control systems. T. Hatch (J. Ind. Hyg., 1936, **18**, 595—603).—The efficient action of the hoods depends on their capture of the dust-laden air rather than the removal of the dust from the air. A. L.

Electrorotor dust and smoke meter. S. C. Blacktin (J. Ind. Hyg., 1936, **18**, 583—594).—The apparatus is portable and consists of a suction pump fitted with graded nozzles through which any desired vol. of air may be drawn, the dust particles being collected on a disc automatically electrified by the action of the pump. Up to 10^6 particles per c.c. of air may be dealt with, and a choice of record areas from 0·1 to 75 sq. mm. is possible. A. L.

Optical aids in dust analysis. E. Stach (Z. Ver. deuts. Ing., 1935, **79**, 513—516; Chem. Zentr., 1935, ii, 2554).—The procedure of microscopical investigation is discussed. J. S. A.

Carbon monoxide in the [air of] Prokopevsk mines. P. Sudarev and P. Andreeva (Ugol Vostoka, 1935, **5**, No. 4, 12—13).—Apparatus is described by means of which 0·001% of CO in mine air may be detected. Data for various mines are given. Ch. Abs. (*p*)

Rapid determination of carbon dioxide in air. N. Ivanov (Ann. Falsif., 1936, **29**, 488—490).—The vol. of air required to produce a standard degree of opalescence in a tube of aq. $BaOH_2$ is determined. E. L. S.

p_H of certain dentifrices under varying conditions. H. L. Hansen and L. S. Fosdick (J. Amer. Dental Assoc., 1935, **22**, 999—1005). Ch. Abs. (*r*)

Constant disinfection by impregnation. Funck-Hellet (Ann. Hyg. Publ., 1935, 342—352; Chem. Zentr., 1935, ii, 2401).—The periods of protection afforded by a no. of essential oils etc. are given; various possible applications are enumerated. H. N. R.

Clarification stage of the activated [sewage-] sludge process. H. Heukelekian (Sewage Works J., 1936, **8**, 873—887).—Infusorial earth or kaolin as a standard index for clarification of sewage by activated sludge showed no correlation with its clarifying power for sewage, nor to the sludge index. Experiments to study the mechanism of the initial clarification stage showed that removal of org. substances could not be ascribed to adsorption, and the removal of NH_3 was negative. *B. coli* were removed by activated sludge, but increased by mixing and aëration. O. M.

[Sewage-]sludge filtration at Springfield, Ohio. A. B. Cameron (Sewage Works J., 1936, **8**, 966—978).—Addition of CaO to the $FeCl_3$, high solid content of the digested sludges, and complete digestion improve the filterability of digested sludge. O. M.

Sewer-flushing prevents bulking of activated sludge at Flora, Illinois. P. F. Morgan, A. C. Durdin, III, and M. Spiegel (Sewage Works J., 1936, **8**, 933—942).—Bulking of activated sludge with filamentous growths in summer was caused by sludge deposits in an alkaline stage of digestion collecting in the sewer, due to inadequate H_2O consumption, and has been cured by thorough flushing. O. M.

Comparison of sewage purification by compressed air and mechanically-aërated activated sludge. G. M. Ridenour and C. N. Henderson (Sewage Works J., 1936, **8**, 924—932).—Under running conditions, mechanical aëration with brushes proved more economical than spiral-flow compressed air. Whilst capital costs and attendance were approx. equal, mechanical aëration consumed 18—22% less power, distributed dissolved O_2 more uniformly, and gave higher surface and bottom velocities. O. M.

Use of anthracite in sewage-sludge beds. R. R. Cleland and G. S. Scott (Publ. Works, 1935, **66**, No. 9, 13—14).—Digested Imhoff sludge is coagulated with $Al_2(SO_4)_3$ and drawn on to dewatering beds. Effluents from anthracite beds contain less total solids, higher total and anaërobic bacterial counts, but smaller acid counts than those from sand beds. Drying rates were approx. equal. Ch. Abs. (*p*)

Spray drying of [sewage] sludge. J. R. Downes (Water Works and Sewerage, 1935, **82**, 323—325).—Practical details are given and costs shown. Ch. Abs. (*p*)

Progress in sanitation. E. Bartow (Science, 1936, **84**, 317—322).—An address on H_2O purification. L. S. T.

Filtering materials for rapid sand filters. VI. Mudball formation and measurement. J. R. Baylis (Water Works and Sewerage, 1935, **82**, 326—330).—Factors affecting the formation of mudballs during washing of filters are examined (cf. B., 1936, 526). Ch. Abs. (*p*)

Anthrafilt gives longer filter runs than sand. H. G. Turner and G. S. Scott (Water Works and Sewerage, 1935, **82**, 308—310).—The superiority of Anthrafilt (washed, screened, anthracite coal) is demonstrated. Ch. Abs. (*p*)

[Water purification] filter design as related to operation. H. N. Jenks (J. Amer. Water Works Assoc., 1936, **28**, 1541—1550).—Filter design has trended towards simplification in the details and arrangements of component parts. Current H_2O-purification practice is in favour of producing the best possible H_2O before it reaches the filters, the main task of which is thus a subordinate polishing one. There are exceptions, *e.g.*, the Kempton Park plant of the Metropolitan Water Board in which the filters accomplish the entire work of purification. C. J.

Maintenance of [water] filter-plant equipment. J. L. Perhab (J. Amer. Water Works Assoc., 1936, **28**, 1571—1576).—All equipment at the $10\frac{1}{2} \times 10^6$ gals.-a-day plant at Beverley Hills is completely overhauled once a year. Advice is given on the general maintenance of mechanical, electrical, and chemical equipment, including meters and flow controllers. C. J.

Application of mathematics to a technical problem [water filtration]. G. S. Scott (Min. Ind. Penna. State Coll., 1935, **5**, No. 1, 3—4).—Anthracite absorbs small amounts of Cl from dil. aq. solutions. Passage of an electric current through the filter bed in presence of NaOH revivified the anthracite. Ch. Abs. (*p*)

Coagulation [in water purification]. K. W. Brown (J. Amer. Water Works Assoc., 1936, **28**, 1533—1540).—A general description of chemical feeding plant, sedimentation basins, and methods of coagulation control is given. C. J.

Mixing [of coagulant with water supply]. C. M. Hoskinson (J. Amer. Water Works Assoc., 1936, **28**, 1522—1532).—Results of experiment and operation at Sacramento indicate that for best results a fairly rapid initial mix should be followed by a gradually decelerated mechanical agitation at velocities which will build up the floc but prevent deposition in the mixing basins. Slow-moving, variable-speed paddles are recommended for flexible operation at all ranges of flow and turbidity. C. J.

Developments in raw water preparation and use of chlorinated copperas at Richmond, Va. M. C. Smith (J. Amer. Water Works Assoc., 1936, **28**, 1591—1603).—The raw H_2O is obtained from the James river and varies widely in composition, turbidity, and temp. The coagulated but unfiltered H_2O at present is better than the filtered product obtained some years ago owing partly to a reduction in trade waste entering the river and partly to improvements in mechanical treatment and the use of chlorinated $FeSO_4$. The latter has proved to be an excellent low-temp. coagulant and has considerably reduced costs. Addition of a little bleaching powder seems to aid oxidation of the $FeSO_4$. C. J.

Water purification at Perth: chloroamine treatment. C. Walmesley (Surveyor, 1935, **87**, 517—518).—Superiority of NH_2Cl over Cl_2 as a sterilising agent depends on its lower oxidation rate, on its being less affected by variations in the Cl requirement of the H_2O, and on the smaller risk of taste trouble. Ch. Abs. (*p*)

Residual chlorination on the Los Angeles [water] system. R. F. Goudey (J. Amer. Water Works Assoc., 1936, **28**, 1742—1755).—Residual-chlorination control permits a const. residual to be maintained regardless of variations in vol. of H_2O treated and in Cl demand. This is effected by a control unit which continuously at 3-min. intervals measures colorimetrically the amount of residual Cl by electrical differences in a standard and a test cell by use of a "photoglow" tube. These electrical differences are utilised automatically to adjust the Cl_2 dose. (A full description is given with suggested improvements.) By maintaining a const. residual, adequate disinfection is assured without overdosing, thereby effecting a saving in Cl_2. O. M.

Iron and manganese removal [from water] by zeolites and manganese-zeolite processes. E. Nordell (J. Amer. Water Works Assoc., 1936, **28**, 1480—1487).—Fe and Mn may be removed by zeolite base exchange simultaneously with the hardness and also after the Na–Ca exchange has ceased, or by using a bed of Mn-zeolite to oxidise the bicarbonates to insol. higher oxides and retain them in the filter. The latter type of bed is back-washed and regenerated with $NaMnO_4$. It has no softening action, so part of the supply is rendered free from hardness, Fe, and Mn by the first method and the remainder Fe- and Mn-free by the second. C. J.

Use of beds of manganese ore in iron and manganese removal [from water]. W. G. Kirchoffer (J. Amer. Water Works Assoc., 1936, **28**, 1488—1499).—Fe and Mn may be removed by passage through an aërated bed of pyrolusite and a sand filter, or by a combination in which the filtering medium, *e.g.*, anthracite, is coated with MnO_2. C. J.

Iron removal [from water] without aëration—precipitation of ferrous carbonate in a closed system. F. E. Hale (J. Amer. Water Works Assoc., 1936, **28**, 1577—1590).—A very soft H_2O from deep wells was found to contain 3—5 p.p.m. of Fe and approx. 35 p.p.m. of CO_2, but no dissolved O_2. Treatment in a pilot plant with sufficient $Ca(OH)_2$ to neutralise the CO_2 followed by sand filtration in a closed system showed that all the Fe could be removed with or without aëration. The full-scale plant is operated without aëration, and the final H_2O is free from Fe, CO_2, and O_2 and is non-corrosive. C. J.

Dependence of *B. coli* spore content of drinking-water samples on amount of local precipitation. H. Grossmann (Z. Gesundheitstech., 1935, **27**, 114—120; Chem. Zentr., 1935, ii, 1760).—More favourable *B. coli* counts follow low rainfall than are found after heavy pptn. J. S. A.

Emanation formation in radium drinking-vessels. J. M. A. Hoeflake and A. E. Korvezee (Nederl. Tijds. Geneesk., 1935, **79**, 3632—3636; Chem. Zentr., 1935, ii, 2401).—Methods for securing a regular production of emanation are described. H. N. R.

Water analysis. F. T. Jewson (Chem. and Ind., 1936, 983; cf. Barber, B., 1937, 92).—Hehner's method for the determination of Ca and Mg in H_2O, modified by neutralising before addition of equal vols. of $0{\cdot}1M$-NaOH and -Na_2CO_3, gives the total Ca + Mg; omitting the Na_2CO_3 and removing the $Mg(OH)_2$ gives the Mg, the Ca being found by difference. F. A. A.

"Blacher method" for determining hardness in waters. F. C. Saville (J.S.C.I., 1936, **55**, 346T; cf. B., 1937, 92).—The method is discussed particularly with reference to the determination of Mg hardness after removal of Ca with $Na_2C_2O_4$. Filtration to remove CaC_2O_4 is recommended. The results are given of titrations with $0{\cdot}1N$-K palmitate (Blacher's solution), using *o*-cresolphthalein indicator, of $0{\cdot}2N$-$CaCl_2$ and $0{\cdot}02N$-$MgSO_4$, separately and mixed. It is concluded that the method is accurate for determination of total hardness, but not for determination of Mg hardness after removing Ca with $Na_2C_2O_4$.

Water analysis. E. G. Barber (Chem. & Ind., 1936, 1052).—The final end-point in the Blacher method of determining hardness is permanent. Reaction in presence of $Na_2C_2O_4$ is slow. R. S. C.

Phosphate–alkali method of determining hardness of natural waters. S. Dratschev and T. Karelskaja (J. Appl. Chem. Russ., 1936, **9**, 1499—1504).—Me-orange (3—4 drops) is added to 50 ml. of the H_2O, and $0{\cdot}05N$-HCl added, with aspiration of air through the solution to expel CO_2, until a permanent red coloration forms. 20 ml. of aq. $CaCl_2$ (1 ml. ≡ 0·625 mg. of CaO) are added, followed by 10 ml. of aq. Na_3PO_4 [a solution of 20 g. of

$Na_2HPO_4,7H_2O$ in 500 ml. of H_2O is titrated with 0·05N-HCl (Me-orange), and 110 ml. of 0·1N-NaOH are added per 100 ml. of solution], with const. shaking, and H_2O is added to 100 ml. 30 min. later the solution is warmed to 40—50°, filtered, and 50 ml. of filtrate are titrated with 0·05N-HCl. The hardness of the H_2O, in German degrees, is given by $4{\cdot}2(A - 2B) - 25$, where A and B are the no. of ml. of 0·05N-HCl used for titrating 10 ml. of phosphate mixture and 50 ml. of filtrate, respectively. R. T.

Methods of testing and significance of boron in water. R. L. Derby (J. Amer. Water Works Assoc., 1936, **28**, 1449—1455).—The range between a deficiency and injurious amounts of B is often narrow and varies with practically every plant. Citrus plants are the most sensitive, 0·5 p.p.m. of B in the irrigation H_2O being the max. safe content, whilst 3·0 p.p.m. will kill the plant. Carrots, onions, and beet are not severely injured with <25 p.p.m. and date palms will withstand 100 p.p.m. and appear to require 5 p.p.m. for satisfactory growth. The source of B in irrigation H_2O is usually in volcanic or post-volcanic regions, and the principal pollution occurs when spring floods remove accumulated deposits. In the Los Angeles district, the H_2O during this period is by-passed and the B content of the river is thus maintained at $<0{\cdot}7$ p.p.m. C. J.

Rapid volumetric determination of iodine in mineral water. H. Iveković and L. Dančević (Arh. Hemiju, 1936, **10**, 51—53).—Insol. carbonates are removed by addition of 2—3 g. of Na_2CO_3 to the sample, which is then evaporated to 200—300 c.c., the filtrate is acidified with dil. HCl, and 0·2—0·3 g. of KNO_2 is added, followed by slow addition of $NaHCO_3$ to render alkaline. 25 c.c. of 0·02N-$NaAsO_2$ are added and the mixture is titrated with 0·02N-I. The I content is given by the difference between this and a blank. F. R.

Methods of testing and significance of fluorine in water supplies. J. M. Sanchis (J. Amer. Water Works Assoc., 1936, **28**, 1456—1468).—The Zr–alizarin method is suitable for determination of small amounts of F in drinking-H_2O, but in presence of interfering substances it is advisable first to separate the F as H_2SiF_6. (Details of the method are given in the appendix.) The toxicity of equiv. amounts of F compounds $\propto$ their solubility in H_2O, and hence the F content of the drinking-H_2O is a major factor in the production of mottled dental enamel. C. J.

Analytical control of anticorrosion water treatment. W. F. Langelier (J. Amer. Water Works Assoc., 1936, **28**, 1500—1521).—An equation is derived for the p_H at which a given H_2O will be in equilibrium with solid $CaCO_3$. The difference between the actual p_H and this val. is termed the "saturation index," and, if positive, this indicates that $CaCO_3$ will be deposited, and *vice versa*. C. J.

Chemical and bacteriological examination of London waters. C. H. H. Harold (Metropolitan Water Bd., 30th Ann. Rept., 1935, 101 pp.; cf. B., 1935, 1168).—The usual high quality of an average daily output of $280{\cdot}7 \times 10^6$ gals. of drinking-H_2O improved considerably in spite of drought conditions. Stratification caused a unique complaint in Queen Mary reservoir; deoxygenation of the lower, cooler layer by anaërobic fermentation resulted in taste and odour. Minute, green, Cu-resistant, flagellated algæ, capable of penetrating sand filters, were effectively combated by cuprichloroamine treatment. Reduction of available N, phosphates, nitrates, and silicates caused by seasonal variation in abundance of plankton life was checked by Cu treatment; deficiency in silicates caused deterioration of costly base-exchange media of softeners. With one exception, the H_2O was well below the limit of 0·7—1·0 p.p.m. of F (associated with mottled teeth). O. M.

Micro-organisms in the Washington, D.C., water supply. G. E. Harrington (Water Works Eng., 1935, **88**, 855—856).—The no. of *Synedia ulna* in the H_2O was materially decreased by increasing the alum dosage to 2·4 grains/gal., adding acid to make the alum solution to 3% with respect to free acid, and adding 1 grain of $CuSO_4$ per gal. Ch. Abs. (*p*)

Plankton and insect-larvæ control in California waters. G. E. Arnold (J. Amer. Water Works Assoc., 1936, **28**, 1469—1479).—The plankton are usually controlled by $CuSO_4$ sprayed over the surface as a dry powder or in suspension or dissolution in H_2O. The habits and breeding conditions of various H_2O-loving insects are described and means of control suggested. C. J.

Bactericidal properties of silver: application to water disinfection. J. Just and A. Szniolis (Gaz i Woda, 1935, **15**, 201—211).—Ag ions are toxic to micro-organisms whether introduced as Ag salts, Ag metal, or electrochemically. Practical applications to H_2O purification are considered. Ch. Abs. (*p*)

Practical methods for condensation of water from the atmosphere. W. Klaphake (J. Soc. Chem. Ind. Victoria, 1936, **36**, 1093—1103).—The principles underlying the large-scale condensation of atm. H_2O in dry climatic conditions are outlined, and a plant is described. J. S. A.

Operation of trickle filters [for effluents]. H. O. Halvorson, G. M. Savage, and E. L. Piret (Sewage Works J., 1936, **8**, 889—903).—Trickle filters work more efficiently at high-rate dosage, which carries away accumulated org. matter, preventing "ponding." Aëration as an upward or downward air current depends on the temp. difference between the air and H_2O, and on the humidity difference inside and outside the filter. A danger of insufficient aëration exists when the temp. difference is small, and forced draught should be used. Certain wastes (*e.g.*, malt) stimulate mould growths (*Fusoria*) causing clogging, especially in winter, but are controlled by inoculating the sewage with soil. O. M.

Purification of effluent water of salicylic acid and β-naphthol factories. J. I. Tschulkov, V. P. Parini, and C. A. Tschartova (J. Appl. Chem. Russ., 1936, 9, 1482—1488).—The H_2O is treated with 5 g. of CaO and 19—21 g. of Cl_2 per litre, as a result of which the oxidisability falls from 12 to 1·3 g. of O_2 per litre. The ppt. forming contains 70% of tetrachloroquinone, whilst the filtrate contains dichlorosalicylic acid, which is recovered by adsorption on active C. SO_3'' and β-$C_{10}H_7$·OH are eliminated from effluent H_2O by treatment with $CaCl_2$ 75, CaO 20, and Cl_2 9—11 g. per litre of H_2O. R. T.

Laboratory studies of sulphite[-cellulose] waste liquor. H. K. Benson (Pacific Pulp and Paper Ind., 1936, **10**, No. 11, 23—25).—An outline of recent work on the properties and uses of sulphite waste liquor. Its effects on the plasticity and workability of clay, on the workability of Portland cement, and on graded soil mixtures with special reference to its use as a road binder have been studied. Its fermentative and stream-pollutional characteristics are also discussed. H. A. H.

Tannery waste disposal at Rockford, Mich. G. E. Hubbell (Water Works and Sewerage, 1935, **82**, 331—332).—Wastes have p_H 9 and high O_2 requirement. CaO–$FeCl_3$ treatment and sedimentation are followed by vac. filtration. The sludge cake is sold as a fertiliser. Ch. Abs. (*p*)

Mixing of liquids in continuous-flow tanks.—See I. **Sewage gas as fuel.**—See II. **CO indicators. Determining atm. CO_2.**—See VII.

See also A., I, 33, **Determining hardness in natural waters.** 43, **Determining free Cl_2 in H_2O.**

Patents.

Air filters. G. H. Alexander (B.P. 456,468, 31.7.35).—A conical mat of tangled wire or the like and a perforated conical support are placed in a pipe. A no. of mats may be used in series and kept impregnated with dust-catching liquid by means of a spray. B. M. V.

Purification of air. C. de cal Sueiro (B.P. 457,115, 21.5.35. Spain, 29.5.34).—Foul air is drawn into a vessel by the action of H_2O exhausting from it, and the air is sprayed or otherwise scrubbed with new H_2O which gives up O_2 "in suspension" and removes vitiation. B. M. V.

Incinerating furnace [for garbage]. J. E. Greenawalt (U.S.P. 2,032,412, 3.3.36. Appl., 28.10.33. Renewed 9.8.35).—On a chain-grate, finer (and wetter) garbage is dried in a preheating chamber (*P*) by means of downflow of gases from a combustion chamber (*C*). At a point where the one chain-grate passes from *P* into *C* the coarser material is added and combustion takes place in updraught. Ignition by liquid fuel is described. B. M. V.

System for sludge disposal. H. S. Colby and R. F. O'Mara, Assrs. to Raymond Bros. Impact Pulveriser Co. (U.S.P. 2,032,402, 3.3.36. Appl., 14.6.34).—The sludge is dried and ground in hot gases from a main furnace (*F*); after passing through a separator (*S*), most of the dried solid is burned in *F* with air preheated in a heat exchanger, the gases from *F* passing first through an ash separator and thence as above. The foul, moist gases from *S* are deodorised by burning with the remainder of dried solid in a secondary furnace, and thence are exhausted to atm. through the heat exchanger. B. M. V.

Sedimentation apparatus. W. C. Weber, Assr. to Dorr Co., Inc. (U.S.P. 2,033,213, 10.3.36. Appl., 2.9.32).—A thickener used as a hydroseparator for sewage is provided with a substantially flat bottom and the discharge of grit is effected at a point on the circumference. In addition to the rakes rotating in circular paths and inclined to propel the material to the circumference, there are others attached to the traction motor which travels on a track of the same shape as the tank, *e.g.*, rectangular with rounded corners. The flow of liquid and suspended solids is straight across. B. M. V.

Purification of potable and polluted waters. O. M. Urbain and W. R. Stemen, Assrs. to C. H. Lewis (U.S.P. [a—c] 2,029,962–4, 4.2.36. Appl., [a] 27.10.34, [b] 27.10.34, [c] 1.4.35).—(a) Elimination of taste and odour from potable H_2O and removal of sol. org. compounds from polluted H_2O are effected by "chlorinated coal and coal derivatives" being employed either as a filter or agitated with the H_2O prior to coagulation. The reagent is produced by chlorination of powdered coal with Cl_2 at $\ngtr 125°$, with or without a catalyst. It is particularly active in removing org. acids, alcohols, aldehydes, amines, ketones, mercaptans, nitriles, phenols, sulphides, etc. (b) The reagent used is produced by hydroxylating "chlorinated coal" [as (a)] by means of an alkali or steam. (c) The "etherated" product in (a), produced by the action of alcohols etc. on "chlorinated coal," is employed. O. M.

Production of reagent for water purification. O. M. Urbain and W. R. Stemen, Assrs. to C. H. Lewis (U.S.P. 2,029,966, 4.2.36. Appl., 18.5.35).—Elimination of taste and odour from potable H_2O and removal of sol. org. compounds and dyes from polluted H_2O are effected by a nitrated oxidised carbonaceous material produced by nitration of coals, peat, or coke. O. M.

Digestion of industrial wastes. A. M. Buswell and C. S. Boruff (U.S.P. 2,029,702, 4.2.36. Appl., 23.1.32).—Strong org. wastes from distilleries, breweries, starch works, creameries, canneries, etc., which in the undiluted form are difficult to purify, can be treated by anaërobic digestion, using suitable CH_4-producing bacteria (especially thermophilically), if the rate of feeding of fresh waste and the detention period are regulated so as to ensure suitable $[H^{\cdot}]$ and a total free and combined volatile org. acidity $<0{\cdot}3\%$ as AcOH. Suitable inoculum of anaërobic organisms is added as pure cultures or built up from sewage sludge. O. M.

Air-conditioning apparatus.—See I. **Germicidal compositions.**—See VII. **Fertiliser from sewage. Parasiticides.**—See XVI. **Germicidal products. Cleaning mucous membranes.**—See XX.