BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

APRIL 10 and 17, 1936.*

I.—GENERAL ; PLANT ; MACHINERY.

Chemistry of high temperatures. O. Ruff (Chim· et Ind., 1936, **35**, 255—266).—A review. E. S. H.

Roasting and sintering powders and pulverised minerals in the Saint-Jacques turbulent furnace. C. Saint-Jacques and L. Poupet (Rev. Mét., 1936, **32**, 581—588).—A furnace is described in which powdered minerals, blast-furnace dust, cement, etc. are roasted or sintered by suspension in a current of hot gases or flames moving through the furnace at a high velocity. W. P. R.

Drum dryers. Equipment for chemical process industries. C. R. Harte, jun. (Ind. Eng. Chem., 1936, **28**, 7—10).—Drum dryers including the vac. and double-drum type are described and illustrated, and the factors bearing on their use are discussed. D. K. M.

Drying gel zeolites. Effect on base-exchange capacity and hydration. M. G. Larian and C. A. Mann (Ind. Eng. Chem., 1936, **28**, 196—200).—The influence of conditions of drying has been studied with zeolites (I) used as water softeners. Rapid drying produces case-hardening and on hydration a greater % of fine particles than is desirable. For a given dry-bulb temp. on drying, the capacity of (I) to soften H_2O is increased with increasing R.H., and for low R.H. the capacity decreases with increasing rates of drying. Over-drying decreases, and increase in % of aluminate increases (up to a max.), the base-exchange capacity. Structural H_2O is unaffected by the conditions of drying, but total H_2O decreases for a given dry-bulb temp. on drying as R.H. increases. Change of composition does not influence hydration. R. S. B.

Structure and structure alteration [in relation to grinding]. W. Gründer (Chem. Fabr., 1936, **9**, 89—95).—The use of a dynamometer to measure the work required to grind a given raw material to a given degree of fineness in an experimental mill is described. Force is measured by the deflexion of a needle recorded on a chart, and the work performed is thus represented by an area. With rice the work required decreases with H_2O content up to 27% in a linear relation and the fineness of the product increases. With rye work decreases with H_2O content, but the product becomes coarser and the limiting H_2O content is 20%, above which smearing occurs. Hard wheat behaves similarly to rye. Soft wheat requires much less work than do the other grains, and the fineness–H_2O relations are complicated by structural changes. Effect of mechanical pretreatment (in a roller mill) and of heat-treatment is also studied quantitatively. C. I.

Classification trends in America. J. V. N. Dorr (J. Chem. Met. Soc. S. Afr., 1935, **36**, 66—79).—Recent practice is to use large bowl-type classifiers in a closed circuit with the grinding mill, the circuit carrying a circulating load of 4—20 times the new feed. Several circuits operating on ratios of 4—9 : 1 are described and screen analyses of the products given. A. R. P.

Difficulties in filtering off dyes and pigments. H. Rumpelt (Farben-Chem., 1936, **7**, 57—60).—Difficulties in the use of drum filters and presses are discussed, and some recent improvements described. S. M.

Reflux ratio apparatus for fractionating columns. I. C. P. Smith (Chem. & Ind., 1936, 93—94).—Replaceable graduated jets enable the reflux/distillate ratio and the rate of distillation to be varied at will. C. W. G.

Gaskets. F. C. Thorn (Ind. Eng. Chem., 1936, **28**, 164—170).—A discussion, with illustrations, of different kinds of joints and gaskets. Chemical and mechanical considerations in the use of the latter and load–compression curves for different gasket materials are given. D. K. M.

Modulus of elasticity of materials for small stresses. R. H. Evans and R. H. Wood (Phil. Mag., 1936, [vii], **21**, 65—80). A. J. M.

Removing SiO_2 from solution. Analcite.—See VII. **Wood tanks.**—See IX. **Measuring high temp.**—See X. **Charging Cottrell precipitators.**—See XI. **[Mills for] paint production.**—See XIII.

Patents.

Rotary tubular furnaces. Coutts & Co., and F. Johnson. From I. G. Farbenind. A.-G. (B.P. 442,030, 8.8.34).—The heat transmission through the shell may be varied by devices outside the shell adjustable to vary the heat transmission to the air. B. M. V.

Operation of coal-dust furnaces. B. Graemiger, and Hephaest A.-G. f. motorische Krafterzeugung (B.P. 441,940, 14.8.34).—On the same shaft are : (1) an axial blower, (2) a centrifugal compressor, (3) a back-pressure engine. (1) blows all the combustion air needed by a furnace (5), but part of it is further compressed by (2) and utilised in a pneumatic pulveriser (4) directly feeding to (5). (3) may, if desired, provide additional power to that taken by (1) and (2) ; the base-plate of the whole unit contains a heat exchanger in which exhaust steam heats feed-H_2O and combustion air. B. M. V.

Construction of water-cooled furnace walls. B. H. Schieldrop (B.P. 441,649, 3.11.34).—Between vertical water-tubes are placed firebricks alternately as the arms of an X, and in the dove-tail spaces thus

---

* The remainder of this set of Abstracts will appear in next week's issue.

formed plastic refractory material is applied on the fire side. B. M. V.

Apparatus for heating bulk material. F. Krupp A.-G. (B.P. 441,517, 21.2.35. Ger., 19.1.35).—Low-temp. carbonisation or a like process is conducted in vertical coal chambers (*C*) alternating with heating gas chambers (*G*), a continuous circulation of mixed gases being produced by the kinetic energy produced by explosive combustion of fresh gas introduced at one or more points in the circuit. Means for increasing the width of *C* at the expense of *G* are described. B. M. V.

(A) **Mercury boilers.** (B) **Mercury power plants.** Brit. Thomson-Houston Co., Ltd. (B.P. 441,759 and 441,910, [A] 20.9.35, [B] 23.3.35. U.S., [A] 21.9.34, [B] 23.3.34).—(A) A vapour drum having provision for causing longitudinal flow of liquid and thus causing a mixture of Hg and other substance to remain uniform is described. (B) A boiler, turbine, and condenser in one unit are described, the last-named being at the top to avoid pumping Hg. B. M. V.

Removal of incrustation from boilers. D. M. Livesey. From Comp. Nat. de Mat. Col. et Manuf. de Prod. Chim. du Nord Réunies Établ. Kuhlmann (B.P. 442,052, 4.3.35).—During or after use, HCl is added to the H_2O together with a compound of As, Sb, Bi, or Sn, and a viscous org. compound, *e.g.*, glycerin. Optional additions are a rhodamine colouring agent and a neutral or active filler to minimise the rate of corrosion, *e.g.*, alkali phosphate or chloride. B. M. V.

Arrangement for measurement of temperature. W. T. Henley's Telegraph Works Co., Ltd., and P. Dunsheath (B.P. 441,766, 23.7.34).—A method of leading pyrometer wires to the remote interior of a long or deep hollow body is described. B. M. V.

Heat-exchange devices. L. Heuser (B.P. 441,674, 14.8.35. Ger., 14.8.34).—Each pipe, or each group of 3 or other suitable no. of pipes, is provided with triangular fins which are assembled edge to edge. B. M. V.

Heat-exchange surface. H. C. Amme (B.P. 441,462, 13.4.34. Switz., 13.4.33).—Ribs or other projections in rows are provided transverse to the flow of fluid, their distance apart being $\ngtr$ 100 mm. and their height $\ngtr$ 40 mm. Supposing that the fluid makes contact with projecting parts over a distance v and does not do so with the sunk parts over a distance u, then u/v = 0·3—0·4. [Stat. ref.] B. M. V.

Crushing and breaking apparatus for stone and like materials. W. A. Hiscox (B.P. 441,906, 10.1.35).—A pair of jaws are pivoted in such a manner that a rolling action is produced, the upper (coarse-crushing) zone closing and the lower (fine-crushing) opening on the down stroke. B. M. V.

Ore-reducing [milling] machines. Hardinge Co., Inc., Assees. of H. Hardinge (B.P. 441,972, 3.5.35. U.S., 16.5.34).—The material is lifted by a drum of large diam. having internal buckets; the pulp first spilled out of the buckets falls on to a screen or grizzly, whence the undersize material is discharged out of the mill. The remainder of the lifted material is dropped on impact plates within the drum. A chain drive is described in which the chain does not embrace the drum and makes contact only with the lower, rising part of the circumference. B. M. V.

Grinding, pulverising, and like treatment of materials. G. and W. Clark (B.P. 441,650, 5.11.34).—A toothed drum or pulley rotates in close proximity to a toothed stator casing which is cut away at one or more points to permit free exit of ground material and at an equal no. of adjacent places for admission of feed. The material is prevented from escaping sideways by currents of air passing through hollow spokes or the like to the sides (axially, the ends) of the rotor rim. B. M. V.

Electromagnetic driving means for concentrating, sifting, conveying, moulding, pulverising, crushing, and similar apparatus. Gen. Electric Co., Ltd., and J. W. Sherwen (B.P. 441,733, 26.11.34).—A solenoid-operated reciprocating device, in which the solenoid is supplied by half-wave current rectified in a dry rectifier, is controlled by adjusting the no. of pairs of elements in the rectifier. B. M. V.

Gas-tight seal for rotating and tippable apparatus. W. Schuster (B.P. 441,909, 6.3.35. Austr., 21.3.34).—The rotating part of the seal is plane and perpendicular to the axis of, and firmly secured to, the rotating kiln or the like. The non-rotating part is embodied in a hood which is free to move and suspended near its centre of gravity, so that the lower part of the annular seal is pressed together with more force than the upper. Connexion between the hood and fixed conduits is by bell seals, and lubricant is supplied under pressure to the annular seal. B. M. V.

Drum filters or thickeners. Blomfield Eng. Co., Ltd., and H. T. Durant (B.P. 441,641, 31.8.34).—The stationary part of the rotary manifold valve is connected to separate vac. pumps for formation of cake and dewatering it, to the wash-H_2O supply, and to the outlet for air displaced by wash H_2O. Separate connexions from the moving part of the valve to the leaves, cells, or the like are provided for the air displaced by the wash H_2O. B. M. V.

Centrifuges. R. A. Lister & Co., Ltd., and H. F. Vasseur (B.P. 441,803, 8.3.35).—A drive embodying an adjustable friction clutch is described. B. M. V.

Apparatus for mixing liquids. J. Eisner (B.P. 441,815, 21.6.35. Ger., 6.2.35).—For addition of milk-of-lime to sugar juices (*e.g.*) in strict proportion without local excess, the main liquid is filled into a storage or treatment tank from below and simultaneously rises in an auxiliary tank alongside, the air displaced from the latter causing displacement of the reagent fluid down a pipe to a point near the entrance of the main tank. B. M. V.

Manufacture of emulsions. Lancaster Processes, Inc., Assees. of T. Robinson (B.P. 441,537, 12.10.34. U.S., 12.10.33. Cf. B.P. 438,680; B., 1936, 129).—A continuous circulation of mother-liquor containing previously made emulsion, H_2O, and an emulsifying agent is sheared hydraulically in absence of air, and then fresh material is introduced by a mechanical shearing action to one point in the circulation or a by-pass thereof and H_2O and emulsifier are supplied to another point by a similar action. B. M. V.

Apparatus for separating solids from gases. H. Waring, and Goodlass Wall & Lead Industries, Ltd. (B.P. 441,900, 10.11.34).—The gas is passed through a no. of inverted conical separating chambers in series, but with diminishing quantity flow, the top (base) of each cone being occupied by bag-filters. B. M. V.

Presses for granular, semi-plastic, and like materials [*e.g.*, bricks]. T. C. Fawcett, Ltd., D. L. Fawcett, and A. E. Bottomley (B.P. 441,790, 2.10.34).

Fibrous, heat-insulating material.—See V.

II.—FUEL; GAS; TAR; MINERAL OILS.

Coal of the Pikes Peak region. Evolution of gases during low-temperature carbonisation. F. W. Douglas (Ind. Eng. Chem., 1936, **28**, 219—222).—This coal is sub-bituminous and cannot be used for ordinary gas-making because of its lack of coking properties. Experiments at low temp. show that it can be almost completely carbonised at 500—600°, producing a marketable solid fuel. Only H_2O comes over below 100°, and gas up to 250° is 80—90% CO_2 and = 4—5% of the total gas. Rapid evolution of CH_4 begins at 300° and increases rapidly with temp. H_2 is given off appreciably only above 400°, increasing rapidly with temp. The heating power of the gas would probably be 550—700 B.Th.U. if CO_2 were removed. Carbonisation is complete at 600° and rapid carbonisation with collection of all gas above 250° is suggested as satisfactory; alternatively, carbonisation at 500° giving a coke with more volatile matter might be more profitable. D. M. M.

Recovery of fine coal from washery effluents. R. J. Venn (Mech. World, 1936, **99**, 183—184).—A flocculating agent is used and the sludge dewatered in two stages. G. H. C.

Thermal diffusion of moisture in peat. A. V. Likov (J. Appl. Chem. Russ., 1935, **8**, 1354—1360).—The variation in moisture content of peat over a temp. gradient is given by $dU/dr = -0{\cdot}46dT/dr$, where dU is the increment in H_2O content, r the distance from the source of heat, and T the temp. R. T.

Estimating the properties of solid industrial fuel. P. O. Roberts (Fuel Econ., 1936, **11**, 181—185).—The burning characteristics of coals may be deduced from the H content or C : H ratio, as determined by ultimate analysis, or, alternatively, from the ratio of calorific val. to C equiv. or the hygroscopic moisture content, as given by the proximate analysis. Of the four methods, the last-named is to be preferred. The use of each method is illustrated. C. E. H.

Preparation and catalytic oxidation of pure amorphous carbon. J. E. Day *et al.* (Ind. Eng. Chem., 1936, **28**, 234—237).—Various sources and methods of C production are investigated in trying to improve the production rate of amorphous C suitable for use in oxidation-rate studies. Ash content is a vital factor and was the same for C prepared from sucrose and lactose by either H_2SO_4 or heat as the non-volatile ash of disaccharides themselves, from which phosphates and silicates cannot be removed. C prepared in Pyrex glass and glazed porcelain had 2—10 times the amount of ash present in C prepared in Pt vessels. C from liquid hydrocarbons had 0·02—0·13% of ash, but also a large amount of tarry matter. Unpurified gas, both natural and C_2H_2, gave C with high ash content, but C from specially purified C_2H_2 gave only 0·01—0·05% of ash. Oxidation tests were carried out on prepared samples of C and the effect of the presence of certain admixed metallic oxides was studied, some being found to be inhibitors whilst others increase the oxidation rate by as much as 100—200 times. D. M. M.

Producer gas for heating coke ovens. C. Dinsdale and E. A. Curtis (Gas World, 1936, **104**, Coking Sect., 16—21).—Details are given of the construction and of the results obtained in the operation of a Koppers producer (*P*), employed at Blackwell Colliery, for firing a battery of combination ovens with cooled, cleaned producer gas; this being the first plant at a colliery in this country to be so heated. *P* is both self-steaming and self-clinkering, and operates with a coke mixture containing 30% of screened breeze. The dust content of the gas is reduced to about 2 grains per 100 cu. ft. by passage through a cyclone extractor and washing with atomised sprays of H_2O. It is stated that producer gas gives a more even heat in the flues, but that the consumption per lb. of wet coal carbonised is some 5% $>$ that of coke-oven gas. H. C. M.

"Flame performance" of technical gases as a characteristic of their combustion properties. H. Brückner and H. Löhr (Gas- u. Wasserfach, 1936, **79**, 17—20).—The sp. flame performance (*F*) of a gas, which gives a measure of its suitability for domestic gas appliances, is the rate of heat production from the flame of a standard Bunsen burner (cross-section of tube 1 sq. cm., area of flame-cone surface 2 sq. cm.) supplied with the gas. *F* passes through a max. as the gas : air ratio is increased. It is recommended that a town's gas be specified by its composition, *d*, and *F* (max.), and that the val. of *F* (max.) should lie within the limits 1400×10^4 kg.-cal./sq. cm. sec. ± 10%. A. B. M.

Determination of formic acid in pyroligneous liquors. H. D. Weihe and P. B. Jacobs (Ind. Eng. Chem. [Anal.], 1936, **8**, 44—47).—The liquor is distilled in steam, the distillate neutralised with $Ba(OH)_2$ and evaporated to dryness at 100° to remove substances which oxidise to CO_2, and the residue oxidised in a special apparatus with $Hg(OAc)_2$ in $0{\cdot}5N$-AcOH in such a way that the gases in the apparatus can be automatically circulated through $0{\cdot}2N$-$Ba(OH)_2$ to absorb CO_2 generated from the HCO_2H. The method is rapid and the accuracy 97% for small amounts of HCO_2H in pyroligneous liquors. A preliminary hydrolysis with dil. NaOH is advisable if esters are present. S. C.

Action of hydrogen on coal. II. Early experiments with the Bergius process. L. Horton, F. A. Williams, and J. G. King (Dept. Sci. Ind. Res., Fuel Tech. Paper 42, 1935, 58 pp.).—The results of experiments carried out in a small converter at the Fuel Research Station in 1924, of investigations on the hydrogenation of British coals in a continuous plant at the Bergius Research Institute at Mannheim-Rheinau in 1925—7, and of investigations in small converters and in a continuously operated Bergius plant at the Fuel Research Station in 1926—30 are recorded. They show, in general, that the process is applicable to suitable British coals and that tarry liquid products amounting to 50—75% of the coal are produced. The H_2 consumption is 4—6% of the coal, depending on the particular coal under treatment. A. B. M.

Analytical examination of gas-purifying materials. H. Brückner (Brennstoff-Chem., 1936, **17**, 21—23; cf. B., 1933, 1041).—A laboratory apparatus for determining the rate of absorption of H_2S, and the total amount absorbed, by gas-purifying materials consists of a 500-c.c. reaction vessel into which 0·5—1 g. of the material and a measured vol. of H_2S are introduced; the vessel, which is immersed in a thermostat at 20°, is connected to a manometer and the fall of pressure with time is recorded. The rate of absorption is higher with artificial gas-purifying masses than with natural bog-Fe ore. The total amount absorbed varies with the H_2O content of the material, passing through a max. at 45—55% of H_2O. Boot and Ward's method (B., 1935, 535) of determining the S content of the exhausted material is recommended. A. B. M.

Coal bitumens and humic acids. G. Stadnikov and N. Visirischvili (Brennstoff-Chem., 1936, **17**, 29—30).—A study of certain Irkutsk coals leads to the conclusion that some brown coals of mixed origin contain substances resembling humic acids which, however, contain no phenolic OH groups. Such coals give higher yields of "bitumen" (*e.g.*, about 30%) on extraction with C_6H_6–EtOH and relatively low yields of low-temp. tar (*e.g.*, about 8%). Moreover, in spite of the high humic acid content of the coals, the tar contains little PhOH. A. B. M.

Hydrogenation of semi-coke tar from Alexandrijsk lignite. F. E. Schtraler, G. M. Mach, and F. G. Gachtel (J. Appl. Chem. Russ., 1935, **8**, 1388—1401).—The tar at 80° is forced, together with H_2 at 200 atm. pressure, at the rate of 400 g. per 5·3 min. per litre, over 1 : 1 MoS_3–kaolin catalyst in a Mo-steel cylinder at 475°, the liquid products are condensed, and the gases passed through aq. NaOH to eliminate H_2S and returned to the reaction. 50% of the wt. of the tar taken is obtained as a mixture of aromatic 16, naphthenic 12, and aliphatic hydrocarbons 72%, boiling at 40—220°; olefines, phenols, and S are absent. A further 11·4% of liquid products is obtained by repeating the process on the residue from the first treatment. Pumice, $CoMoO_4$, MoS_2, and MoS_3 are less suitable catalysts than the above. R. T.

Oxygen absorption tests on asphalt constituents. R. R. Thurston and E. C. Knowles (Ind. Eng. Chem., 1936, **28**, 88—91).—Soft Mexican asphalt was separated into its constituents—asphaltous acids, asphaltenes, petroleum resins, asphaltic resins, and oils—by Marcusson's method. The original asphalt and its constituents were individually treated with O_2 at 200°/1 atm. The solid constituents (asphaltenes) oxidise more readily than does any other constituent or the original asphalt, whilst the oils are most resistant to oxidation. Asphaltenes from gilsonite oxidise less readily than those from Mexican asphalt. The O_2 used bears a general relation to the I val. and S content, and a definite relation to the C/H ratio. The higher is this ratio, the more O_2 is absorbed. It is concluded that the oxidation of asphaltic material occurs by polymerisation following (1) addition of O_2, which forms unstable compounds from which H_2O is eliminated, giving unsaturated compounds, (2) oxidation with the formation of carboxyl derivatives from which CO_2 is eliminated, (3) elimination of volatile oxidation products other than H_2O and CO_2 from unstable O compounds. C. C.

Different types of asphalt bitumen emulsions in relation to their uses. H. Eilers (Verfkroniek, 1936, **9**, 12—16).—A review. D. R. D.

Increasing the yield of liquid products by carrying out the Fischer–Tropsch benzine synthesis in stages. F. Fischer and H. Pichler (Brennstoff-Chem., 1936, **17**, 24—29; cf. B., 1935, 885).—By carrying out the benzine synthesis in stages and removing the more readily condensible products after each stage, the yield of liquid products, for the same wt. of catalyst per vol. of gas treated, has been increased by 10—20%. It is advantageous to arrange the rates of passage in successive stages to compensate for the gas contraction in such a manner that approx. the same vol. of gas passes over the same quantity of catalyst. If the different stages are all operated at the same temp. a series of catalysts of successively diminishing activity should be used; if a uniformly active catalyst is used it is preferable to operate the first stage at a somewhat lower temp. than the others. By using a 3-stage system a yield of 141 g. of benzine and oil has been obtained from a gas containing 29·5% of CO and 60% of H_2 (max. theoretical yield 185 g.). A. B. M.

Thermal polymerisation and condensation of gaseous hydrocarbons. A. E. Dunstan (Trans. Faraday Soc., 1936, **32**, 227—234; cf. B., 1934, 486).—In experiments on the polymerisation of cracked gases in semi-commercial units the yields of liquid were 3·0—8·4 gals. per 1000 cu. ft., with olefine polymerisations of 71—99%. Operating conditions varied as follows: 0·05—11·4 cu. ft. per hr. per lb. of catalyst, 450—500° F., and 100—175 lb. pressure per sq. in. The chemical mechanism of the reactions involved is discussed. F. L. U.

Acetylenes. I. Cracked gasoline as source of α-olefines for preparation of acetylenes. H. J. Hall and G. B. Bachman (Ind. Eng. Chem., 1936, **28**, 57—59; cf. A., 1936, 188).—Δ^{α}-Hexene (I) (4% yield), Δ^{α}-pentene (II) (5% yield), together with Δ^{α}- and Δ^{β}-butene, butadiene, isoprene, n-C_5H_{12}, and n-C_6H_{14} are obtained by the fractionation of Gyro vapour-phase cracked gasoline. Addition of Br to (I) and (II) followed by dehalogenation (KOH in mineral oil) yields Δ^{α}-hexinene (57% yield) and Δ^{α}-pentinene (55% yield). F. N. W.

Oil possibilities in Northwest District, Western Australia. D. D. Condit (Econ. Geol., 1935, **30**, 860—878). L. S. T.

Phase equilibria in hydrocarbon systems. X. Thermodynamic behaviour of liquid mixtures of *n*-butane and crystal oil. B. H. Sage and W. N. Lacey (Ind. Eng. Chem., 1936, **28**, 106—111; cf. A., 1935, 149).—A table gives the bubble-point pressure, sp. vol., heat content, and entropy for varying temp. and pressures for n-C_4H_{10}–crystal oil mixtures of varying composition. Properties of the bubble-point liquid are also given. From these tables numerous diagrams have been constructed showing the variation of thermodynamic properties with pressure, temp., and composition. C. C.

Phase equilibria in hydrocarbon systems. XI. Thermodynamic properties of mixtures of a crude oil and a natural gas. B. H. Sage and W. N. Lacey (Ind. Eng. Chem., 1936, **28**, 249—255; cf. preceding abstract).—The sp. vol., c_p, and c_v of mixtures of crude oil and natural gas from the Dominguez Field, California, have been determined. The isothermal variation of sp. vol. with pressure (p), and the change of c_p with T were calc. The heat content and entropy of mixtures containing $<$ 18·75 wt.-% of gas were derived for various p and T. The compressibility factor of natural gas, and the Joule–Thomson coeffs. for the gas, oil, and some mixtures were calc. from the thermodynamic data. A. J. M.

Oxidation of white oils. R. W. Dornte (Ind. Eng. Chem., 1936, **28**, 26—30).—The rate of oxidation can be represented by $V^{1/2} = kt + n$, where V is the total vol. of O_2 absorbed, t the time, and k a const. characterising this rate. Analyses were made of the proportion of O-containing radicals, *i.e.*, ·OH, ·CHO, ·C:O, ·CO_2H, and peroxide, and of H_2O and CO_2 formed. It was found that the formation of acid, H_2O, and CO_2 conforms to the equation given above for O_2 absorption. The val. of k can be represented by the Arrhenius equation, and figures are tabulated for k and the consts. of the latter equation for 7 oils of varying η. Treatment of the oil with fuller's earth increased k and gave a negative val. of n. The n val. appears to be related to inhibition effects, since addition of minute amounts of α-$C_{10}H_7$·NHPh gave large negative vals. of n. Absorption experiments demonstrate the autocatalytic character of the oxidation, and the effect of inhibitors indicates a chain mechanism of considerable length. C. C.

Potentiometric determination of mercaptans [in petroleum]. M. W. Tamele and L. B. Ryland (Ind. Eng. Chem. [Anal.], 1936, **8**, 16—19).—The sample containing mercaptans is dissolved in 0·1N-NaOAc in 96% EtOH and titrated with 0·01N-$AgNO_3$ in $Pr^{\beta}OH$ containing about 9% of H_2O, a Ag electrode being used as indicator against a Hg electrode in the same solution (e.m.f. —0·070 volt). H_2S and S are deleterious and must be removed by first shaking the sample with $CdSO_4$ solution and Hg before titration. The presence of Et_2S, Et_2S_2, CS_2, thiophen, sulphones, sulphonates, aldehydes, phenols, C_5H_5N, petroleum bases, naphthenic acids, or mineral salts, including Cl′, does not interfere. Peroxides are also without effect, but they slowly oxidise mercaptans. The method is capable of a high degree of accuracy. The solubility of Ag mercaptides is of the same order as that of AgI. S. C.

Composition of straight-run Pennsylvania gasoline. IV. Fractionation of straight-run gasoline. C. O. Tongberg, D. Quiggle, and M. R. Fenske (Ind. Eng. Chem., 1936, **28**, 201—204; cf. B., 1932, 826).—Straight-run gasolines from Pennsylvanian and Michigan crudes, and natural gasoline from W. Virginian crude, were carefully fractionated into close fractions and the physical properties and C_8H_{18} no. of each fraction determined. The Michigan gasoline contained a greater proportion of n-paraffins and aromatics than the Pennsylvanian gasoline, but a smaller amount of branched-chain paraffins. Fractions corresponding mainly to *iso*- and n-C_5H_{12} and n-C_6H_{14} were obtained from the natural gasoline, the fraction having high C_8H_{18} no. apparently containing branched heptanes in addition to C_6H_6. Fuels of high C_8H_{18} no. can be obtained by separating the fractions of high C_8H_{18} no. and also those of a high blending C_8H_{18} no. The latter can be blended with fractions of lower C_8H_{18} no. Fractions with high susceptibility to $PbEt_4$ can also be separated. In addition to gasoline, special solvents and fractions suitable for Diesel fuels may also be obtained. C. C.

Phosphorus pentoxide as a refining agent for gasoline. B. W. Malishev (Ind. Eng. Chem., 1936, **28**, 190—193).—Gasoline is treated with P_2O_5 dispersed in heavy (unrefined) lubricating oil, or the vapours are passed in contact with P_2O_5 deposited on coke. The refining action of this reagent is due primarily to condensation and not polymerisation. It is claimed that gasoline treated by this method gives increased C_8H_{18} no., an increase of as much as 12 C_8H_{18} nos. being claimed in one case with $<$ 1% of P_2O_5. C. C.

Sulphur dioxide and fresh sulphuric acid from [petroleum] refinery acid sludge. B. A. Stagner (Ind. Eng. Chem., 1936, **28**, 171—175).—SO_2 is obtained by heating acid sludge to 280° in contact with hot combustion gases or with coke from the acid sludge, heated to red heat in a separate kiln. The SO_2 is purified, mixed with air, and converted by catalysts into H_2SO_4. Viscous lubricating oil sludges are mixed with gasoline or kerosene sludges before decomp. The coke obtained is porous and friable, free from acid and elementary S, but contains a relatively high proportion of combined S. Experiment showed that 93—94% of the acid used in treating light oil could be expelled from the acid sludge. A table gives the rate at which SO_2 is formed in acid sludge from cracked gasoline at room temp. C. C.

Vapour-phase gum. W. F. Thorne (Gas J., 1935, **212**, 905—906).—Details are given of the ultimate and chemical analyses of a sample of vapour-phase gum. N did not appear to play any important part in the composition, being present as NH_4Cl and as the NH_4 salt of an org. acid. It consisted of two parts, one sol. and the other insol. in C_6H_6. On oxidation with conc. aq. NaOBr, this sol. fraction was rendered insol. In its reaction with conc. HNO_3 to give nitrophthalic acid, and with conc. H_2SO_4 and resorcinol to give fluorescein, the gum resembled the coumarone–indene resins. H. C. M.

Stability of gasoline to light. Photochemical formation of colour, haze, gum, and reaction products. J. C. Morrell, W. L. Benedict, and G.

Egloff (Ind. Eng. Chem., 1936, **28**, 122—128).—By exposing gasolines [straight-run, cracked, and blends thereof, with and without addition of S and/or $Pr^{a}{}_2S_2$ (I)] to the C-arc lamp continuously for 1 hr. in quartz vessels in air, O_2, N_2, CO_2, or H_2 it was found that all gasolines in air or O_2 darkened in colour irrespective of the addition of S. Peroxides, acids, and gums were also formed in these cases, together with haze in the case of straight-run and blended gasolines. In N_2, CO_2, and H_2 none of the gasolines was appreciably affected. The reactions did not occur in the dark, and it is concluded therefore that a photochemical oxidation occurs. S and (I) each had a deleterious action on gasolines in both oxidising and non-oxidising conditions. There seems to be no fixed relation between colour and gum formation in the gasolines tested. The haze, which contained SO_2 and SO_3, could be removed by filtration and the colour improved, but the gum content was unaffected. C. C.

Power and storage properties and storage losses of petrol. N. Mayer (Chem.-Ztg., 1935, **59**, 843—845).—Natural petrol is not such a suitable motor fuel as cracked petrol, but the latter tends to deteriorate on storage owing to resin formation by polymerisation. The tendency to knock and its prevention, and the use of inhibitors to prevent gum formation, are discussed. A. R. P.

Solvent-extraction processes. W. R. Wiggins and F. C. Hall (J. Inst. Petroleum Tech., 1936, **22**, 78—98).—A survey is made of the use of SO_2, PhOH, $PhNO_2$, Chlorex, furfur- or croton-aldehyde, and liquid C_3H_8 as solvents in refining lubricating oil, and the Duosol process is described. C. C.

Computations for countercurrent solvent-extraction processes. T. G. Hunter and A. W. Nash (J. Inst. Petroleum Tech., 1936, **22**, 49—56).—Equilibrium relations of an oil–solvent system are represented by triangular graphs relating the amount of solvent in each phase at equilibrium to the η–d const. (or some other physical property) of the oil in each phase. These diagrams are used as a basis for computations in countercurrent extraction of lubricating oil stock with a solvent. C. C.

Characteristics of solvent-refined motor oils. S. J. M. Auld (J. Inst. Petroleum Tech., 1936, **22**, 57—77).—The significance of pour point, C-formation tendency, η index, and oxidation and thermal stability of lubricating oils is outlined and a comparison made of the results obtained for these tests on solvent-refined oils and oils refined by other methods. The Air Ministry test is preferred for measuring oxidation and thermal stability, but it is found that this test is much more discriminating if the temp. is raised to 250°. C. C.

Apparatus and methods for investigating the chemical constitution of lubricating oil, and preliminary fractionation of the lubricating oil fraction of a Midcontinent petroleum. B. J. Mair, S. T. Schicktanz, and F. W. Rose, jun. (J. Res. Nat. Bur. Stand., 1935, **15**, 557—574).—The lubricating oil was freed from asphaltic and resinous material by extraction with liquid SO_2 at 45° and dewaxed with $(CH_2Cl)_2$. S compounds were removed by fractional adsorption on SiO_2 gel. The residue was fractionally distilled using vac.-jacketed columns and mol. stills of types described. No individual hydrocarbon was isolated. J. S. A.

Effect of temperature on viscosity of lubricating oils. S. Erk and H. Eck (Physikal. Z., 1936, **37**, 113—119).—The formulæ of Vogel, Andrade, and of Walther expressing the variation of η with temp. have been tested by applying them to 12 lubricating oils of known η. Deviations from Andrade's formula are usually $> 10\%$, but it is doubtful whether the formula may be applied to this type of liquid. Deviations from Vogel's formula are $< 1\%$, and are usually within the limits of experimental error. Walther's formula gives an error of $< 2\%$. A. J. M.

Fractionating columns.—See I. **Acid-resistant linings of C.**—See VII. **Heat-resisting glassware.**—See VIII. **Utilising wood waste.**—See IX. **Graphitisation of electrodes.**—See XI. **Paint solvents. Dakota lignite. Wood-tar plastics.**—See XIII.

PATENTS.

Coal-cleaning plant. Internat. Combustion, Ltd., and G. W. Davidson (B.P. 442,036, 19.9.34).—In a jig, floats resting on the bed of shale actuate detents for pawls of opposite hand, and one of the pair of ratchets adjusts the discharge gate in the necessary direction. B. M. V.

(a) **Coke oven.** (b) **Regenerative coke oven.** F. Totzek, Assr. to Koppers Co. of Delaware (U.S.P. 1,993,573—4, 5.3.35. Appl., [a] 5.3.31, [b] 25.3.32. Ger., [a] 25.1.29, [b] 1.4.31).—(a) The walls between the regenerators are covered with plates, held to the wall, *e.g.*, by slot and key connexions, and so dimensioned that the joints between adjoining plates do not register with the joints between adjoining bricks in the walls. Leakage between adjacent regenerators is prevented. (b) In a battery in which the vertical flues are connected together in pairs at the top and the bottom so that a portion of the waste gases may be recirculated, the duct conveying rich gas to the burners is provided with an injector apparatus for admitting a regulated supply of air into the heating gas. The apparatus is placed outside the oven so that the air admitted to the rich gas, and thereby the length of the heating flames in the flues, can be readily controlled. A. B. M.

(a) **Thermal pretreatment of volatile coals for carbonising and coking processes.** (b) **Carbonising apparatus.** C. B. Wisner, Assr. to Coal Process Corp. (U.S.P. 1,993,198—9, 5.3.35. Appl., [a] 25.4.30, [b] 24.11.30. Cf. U.S.P. 1,835,128 ; B., 1932, 827).—(a) The coal is passed through an externally-heated, horizontal, rotary chamber wherein it is first dried at $\nless$ 175° and then subjected to the action of jets of a gaseous oxidising medium, *e.g.*, air, for $\ngtr$ 45 min., while at 175—230°. (b) Coal, pretreated as above, is carbonised in a rotary retort and the carbonised fuel is passed successively through a screening conveyor (*A*), in which the "fuel balls" are freed from the fines, and a cooling container (*B*), before it is discharged. Steam or other scavenging or ageing medium is passed through *A* and *B*. The fines are continuously removed from *A* and returned to the pretreating chamber. A. B. M.

Manufacture of activated carbon. R. G. W. Farnell (B.P. 435,345, 1.9.34).—The black-ash residue obtained in the digestion of esparto grass with alkali is dried, leached with H_2O until the p_H is reduced to 9—10, heated at 700—1000° with stirring, preferably in an atm. of steam, sprayed with dil. HCl or H_3PO_4, cooled, washed with H_2O, and heated in air at 400—500°. A. R. P.

Preparation of asphalt. F. J. Skowronski, Assr. to Universal Oil Products Co. (U.S.P. 1,993,532, 5.3.35. Appl., 25.8.30).—Asphaltic residuum formed in the flash distillation of residues from the cracking of hydrocarbon oils is blended with the tar obtained by neutralising acid sludge. The mixture may be reduced with steam, or air-blown while hot to give it the desired physical properties for paving, roofing, or other purposes. A. B. M.

Extruded bituminous product. E. V. Harlow, Assr. to Koppers Co. of Delaware (U.S.P. 1,993,343, 5.3.35. Appl., 17.10.31).—A product suitable for filling or packing purposes is formed by extruding a rope-like core of plastic bituminous material and coating this as it is formed with a powdered similar material of higher m.p. The material may be a composition formed by dispersing coal in oil (cf. U.S.P. 1,925,005 ; B., 1934, 613). A. B. M.

Treatment of hydrocarbons [tar acids]. J. C. Morrell, Assr. to Universal Oil Products Co. (U.S.P. 1,993,520, 5.3.35. Appl., 3.12.31).—Tar acids are heated in presence of steam to 450—480°/50—250 lb. per sq. in., and the products boiling within the motor-fuel range are treated with a reducing gas, *e.g.*, H_2, CO, or CH_4, at 350—450° in presence of a catalyst, *e.g.*, tinned Fe. On refining the product a motor spirit of high aromatic content is obtained. A. B. M.

Improvement of hydrocarbons. H. Kaehler and H. Klein, Assrs. to Standard–I. G. Co. (U.S.P. 1,996,008, 26.3.35. Appl., 23.6.31. Ger., 30.6.30).—Hydrocarbon mixtures, *e.g.*, petroleum and its distillates, paraffin wax, tar, are desulphurised by treatment with H_2 at 200—475° (300—410°)/30—300 (100) atm. in presence of metallic Fe mixed with $\not>$ 10% of Ni or Co (prep. of catalyst described). C. C.

Improvement of mineral oils. Aktieb. Separator–Nobel (B.P. 442,039, 17.10.34. Fr., 18.10.33).—Mineral oil and a solvent liquid at room temp., *e.g.*, PhOH, $PhNO_2$ $(C_2H_4Cl)_2O$, C_6H_6, are intimately mixed, using centrifugal pumps or turbo-mixers, and the solvent containing non-paraffinic hydrocarbons is subsequently separated by a centrifuge. C. C.

Lubricant. J. F. Werder, Assr. to E. Rogers (U.S.P. 1,995,371, 26.3.35. Appl., 11.2.31).—A lubricating compound consists of a complete solution of a heavy lubricant (*e.g.*, petrolatum, wax tailings, grease, or blown fatty oils) and a volatile solvent, *e.g.*, light paraffin hydrocarbons, gasoline, CCl_4, C_6H_6. An inert gas, *e.g.*, CO_2, N_2, is added under pressure, and 2—3% of rubber cement. C. C.

Separation of contamination from [used] lubricating oil. Stream-Line Filter Co., Ltd., and T. E. Beacham (B.P. 442,081, 28.7.34).—Oil which has been used in presence of petrol or light petroleum vapour is filtered and distilled under vac., the condensed vapour passing to the fuel tank and the still residue to a clean oil tank. A small, electrically heated apparatus is described. B. M. V.

[Plug-valve] lubricants [for steam lines]. (A—C) L. C. Brunstrum and (A) M. R. Schmidt, (C) W. P. Hilliker, Assrs. to Standard Oil Co. (U.S.P. 1,982,198—200, 27.11.34. Appl., [A] 5.1.32, [B] 11.1.32, [C] 26.4.32).—Claim is made for mixtures of (A) glycerin 45—80 (62), soap made from hydrogenated C_{20}- or C_{22}-fatty acids 10—30 (20), and Na rosinate soap 10—25 (18)% ; (B) graphite 2, petroleum residue (m.p. 30—38°) 2, and anhyd. Ca soap 1 pt. ; and (C) graphite 35—65 (60), anhyd. Ca soap 2—15 (5), and Pb mahogany soap (containing 3·5% Pb) 15—45 (30)%. A. R. P.

Heating bulk material.—See I. **$(NH_4)_2SO_4$. Treating Fe_2O_3.**—See VII. **C electrodes.**—See XI. **Asphaltic coating composition. Expansion joint.**—See XIII.

III.—ORGANIC INTERMEDIATES.

Properties of zinc–chromium catalyst for methyl alcohol synthesis. K. N. Ivanov and V. I. Gusev (J. Chem. Ind. Russ., 1935, **12**, 1143—1146).—The activity of the fresh catalyst (8 ZnO, 1·5 Cr_2O_3) (I) is greatest at 370°, and above a certain crit. rate of flow the % conversion of CO–H_2 into MeOH is const. At smaller velocities parasitic reactions (chiefly CH_4 formation) become increasingly important. (I) undergoes gradual inactivation, which man be compensated for by progressively raising the reaction temp. R. T.

Determination of water in glycerol. C. P. Spaeth and G. F. Hutchison (Ind. Eng. Chem. [Anal.], 1936, **8**, 29—32).—The Rojahn method (B., 1920, 314 A) gives varying results, due to inadequate temp. control, the volatility of glycerol and more especially trimethylene glycol, and loss of efficiency of the desiccant. An accurate method is described based on the removal of H_2O by distillation at 100°/2—3 mm. and absorption in $Mg(ClO_4)_2$. S. C.

Accuracy of refractometric glycerol determination. A. Tschetaev (Maslob. Shir. Delo, 1935, 18—19).—Aq. glycerol can be determined to 0·25—0·5% with the Abbé refractometer. Ch. Abs. (*e*)

Hydrometric nomographs for acetic acid solutions. D. S. Davis (Chem. Met. Eng., 1936, **43**, 27).—Charts are given for the determination of the concn. of aq. AcOH when temp. and *d* are known. D. K. M.

Applications of colloid chemistry. Emulsifiers and wetting agents. R. Dubrisay (Chim. et Ind., 1936, **35**, 267—273).—A review. E. S. H.

Phosphoric acid as catalyst for alkylation of aromatic hydrocarbons. V. N. Ipatiev, H. Pines, and V. I. Komarevsky (Ind. Eng. Chem., 1936, **28**, 222—223).—Aromatic hydrocarbons are readily alkylated when heated with olefines under pressure in presence of 85—89% H_3PO_4. The following are obtained from C_2H_4 and the appropriate hydrocarbon at 300° : PhEt, b.p. 136—137° ; *m*-$C_6H_4Et_2$, b.p. 178—180° (Br_4-derivative, m.p. 72°) ; *s*-$C_6H_3Et_3$, b.p. 210—217° (Br_3-derivative, m.p. 104°) ; $C_6H_2Et_4$, b.p. 109—117°/5 mm. ;

$C_{10}H_6Et_2$, b.p. 280—305°; mono-, b.p. 245—260°, and di-ethyltetrahydronaphthalene, b.p. 275—285°. At 200° C_3H_6 gives $C_{10}H_7Pr^a$, b.p. 260—265°, and propylfluorene, b.p. 340—350°. S. C.

Preparation of camphor from turpentine. B. N. Rutovski, V. N. Karitscheva, T. P. Andreeva, O. M. Klepikova, and L. N. Mogilevkina (J. Chem. Ind. Russ., 1935, **12**, 1177—1183).—Oven turpentine (pinene fraction 40%) gives only 50% yields of camphor when treated by the pinene hydrochloride or the tetrachlorophthalic acid procedure; isomerisation by Tischtschenko's method (B., 1933, 953), using the prepared clay as catalyst, gives a product containing 33—35% of camphene (I), indicating that fractions other than the pinene one take part in formation of (I). (I) is converted into *iso*borneol, and this into camphor, by the action of basic Cu carbonate at 170—204°. A scheme for the industrial prep. of camphor, based on this process, is outlined. R. T.

Purification of dimethylaniline. F. O. Ritter (Ind. Eng. Chem., 1936, **28**, 33—35).—NH_2Ph and NHPhMe ($\ngtr$ 18%) can be removed from $NPhMe_2$ by refluxing with aq. HCO_2H (1·3 mol.; 3 hr.) followed by distillation. F. N. W.

Group method for detection of organic solvents and organic compounds with Magdala-red. H. Eichler (Z. anal. Chem., 1935, **103**, 425—427).—Classification is proposed into (*a*) solvents giving fluorescent solutions of Magdala-red (I): hydroxylic, phenolic, or ketonic substances and fatty acids, (*b*) solvents dissolving (I) without fluorescence: aromatic amines and heterocyclic bases, (*c*) solvents in which (I) is insol. and not fluorescent: hydrocarbons, ethers, fats, etc. J. S. A.

Thermal polymerisation etc. of gaseous hydrocarbons. Acetylenes from gasoline. Determining mercaptans. Determining HCO_2H in pyroligneous liquors.—See II. **Esterification of pectin substances.**—See V. **Reclaiming dry-cleaning solvents.**—See VI. **Tetryl.**—See XXII.

Patents.

Manufacture of olefine oxides. E. C. Britton, H. S. Nutting, and P. S. Petrie, Assrs. to Dow Chem. Co. (U.S.P. 1,996,638, 2.4.35. Appl., 27.6.34).—An alkylene chlorohydrin is heated at 70—250° (90—150°)/$>$ 1 atm. for $<$ 10 min. (5 sec.—1 min.) with approx. 1 equiv. of an alkali hydroxide, carbonate, or bicarbonate and H_2O. The mixture is then quickly cooled to $<$ 70° and the olefine oxide removed, *e.g.*, by distillation. Side reactions are thus inhibited. A continuous process is preferred. E. J. B.

Stabilisation of halogenated hydrocarbons [trichloroethylene]. P. J. Carlisle, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,996,717, 2.4.35. Appl., 30.12.32).—The material extracted from green or roasted coffee by C_2HCl_3, or caffeine, is added (0·0001—0·2%) to chlorinated hydrocarbons to inhibit formation of acidic material. The stabilised products are sufficiently pure to be used in the extraction of foodstuffs. E. J. B.

Azeotropic drying of alcohols or ketones. L. Mellersh-Jackson. From Standard Oil Co. of California (B.P. 442,051, 4.2.35).—An apparatus for use with a H_2O-insol. solvent is described and claimed. A. W. B.

Removal of objectionable organic sulphur from *iso*propyl and higher *sec.*-alcohols. F. M. Archibald and C. M. Beamer, Assrs. to Standard Alcohol Co. (U.S.P. 1,995,597, 26.3.35. Appl., 29.7.32).—Mercaptans etc., which impart colour and odour, are removed by washing with aq. Na plumbite. Apparatus is described. A. W. B.

Froth production and froth-producing agent. M. S. Hansen, Assr. to P. C. Reilly (U.S.P. 1,981,506, 20.11.34. Appl., 26.10.32).—The use is claimed as a frother of a xylenol having m.p. $>$ 40°, *e.g.*, the fraction of coal-tar acids having b.p. 218—228° and containing chiefly 2 : 3- and 3 : 5-$C_6H_3Me_2$·OH. A. R. P.

Acetic acid recovery. F. W. Koster, Assr. to Viscose Co. (U.S.P. 1,996,706, 2.4.35. Appl., 22.11.33).—Dil. aq. AcOH (I) obtained during the acetylation of cellulose is treated with (15% of) the anhyd. waste salts (NaCl and Na_2SO_4) from the above process which still contain Ac_2O. The (I) is extracted, preferably by EtOAc, and the latter then distilled off to yield practically anhyd. (I). E. J. B.

Manufacture of acetic anhydride. Consort. f. Elektrochem. Ind. G.m.b.H. (B.P. 441,956, 3.11.34. Ger., 28.11.33).—Pyrogenic decomp. of AcOH to Ac_2O is facilitated by using small amounts (0·05—0·3%) of volatile P compounds, *e.g.*, Et_3PO_4, P, but excluding H_3PO_4. These are preferable to solid or liquid catalysts. Addition of volatile N-containing bases (NH_3, C_5H_5N, etc.), before or after the reaction zone, stabilises the Ac_2O. Better yields are obtained and side-reactions inhibited. E. J. B.

Wetting agents for use in alkaline baths. Soc. Chem. Ind. in Basle (B.P. 442,047, 7.12.34. Switz., 9.12.33).—Mixtures of a terpene alcohol (I) or a natural material containing a high proportion of (I), a substance sol. in both H_2O and (I), preferably a neutral org. substance with $\nless$ 1 OH group and of b.p. $>$ 110°, an alkali-resistant non-oxidising compound of an aliphatic hydrocarbon (C_{12-18}) and a mineral acid containing O, and (preferably) an anti-foaming material are claimed. *E.g.*, a 70% sulphonated castor oil 200, pine oil 22, OH·$[CH_2]_2$·OBu 45, and H_2O 280 pts. The mixtures are neutralised before use. E. J. B.

Manufacture of wetting, washing, dispersing, and the like agents. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 441,878, 27.7.34).—That fraction of a dehydrogenated coal-hydrogenation product (cf. B.P. 435,254; B., 1936, 8) of b.p. $>$ 200°, and particularly the pitch of b.p. $>$ 400°, is sulphonated (at 10—200°) by H_2SO_4, SO_3, or $ClSO_3H$ until partly or wholly sol. in H_2O. Sulphonating and unsulphonated materials are removed, the residue is bleached (animal C, NaOCl, etc.) if necessary, neutralised with alkalis or (substituted) NH_3, and conc. by evaporation. E. J. B.

Manufacture of [hydr]oxyalkylated βγ-di[hydr]oxypropylaminobenzenes and the corresponding γ-alkyl ethers. I. G. Farbenind. A.-G. (B.P. 442,024, 30.7.34. Ger., 15.11.33. Addn. to B.P. 409,237—8; B., 1934, 535).—The $(CH_2)_2O$ employed in the prior specification is replaced by other alkylene oxides. *E.g.*, interaction of βγ-dihydroxypropyl-*m*-toluidine with a technical mixture of αβ- and αγ-propylene oxides at 170—180° gives a mixture of hydroxypropyl derivatives, b.p. 239—240°/10 mm., from which a *product*, m.p. 105—106°, may be isolated. The corresponding hydroxybutyl derivative (mixed butylene oxides) of β-hydroxy-γ-methoxypropylaniline has b.p. 205—208°/10 mm. H. A. P.

Purification of naphthalene. J. D. TODD and J. C. OWENS, Assrs. to SHERWIN–WILLIAMS Co. (U.S.P. 1,996,262, 2.4.35. Appl., 17.12.31).—Crude $C_{10}H_8$ at $>$ its m.p. and $< 100°$ (85—90°) is washed by agitation for approx. 15 min. with (*a*) $\not>$ 5% of an acid (I) preferably with 3 wt.-% of conc. H_2SO_4, and (*b*) hot H_2O, and then (steam-)distilled at $p_H < 7$ after addition of further (I) or an acid salt ($KHSO_4$) in amount insufficient to react extensively with the $C_{10}H_8$ at the temp. of distillation. The $C_{10}H_8$ may be washed with alkali before the acid distillation, to remove phenols etc. E. J. B.

Manufacture of stable preparations of compounds containing active halogen. CHEM. FABR. VON HEYDEN A.-G. (B.P. 436,054, 19.1.35. Ger., 19.1. and 19.2.34).—Org. compounds containing active halogen, *e.g.*, arylsulphondichloroamides, are dissolved in Cl_{1-5}-derivatives of Ph_2O. A. R. P.

Solvents.—See XVIII.

IV.—DYESTUFFS.

Sources of natural dyes. C. D. MELL (Text. Colorist, 1936, **58**, 128—130).—The prep. and properties of dyes from the bark of princewood trees (yellow), various species of licania (black), and mistletoe (black) are described. A. J. H.

Decomposition of azo compounds by mineral acids. F. M. ROWE and W. G. DANGERFIELD (J. Soc. Dyers Col., 1936, **52**, 48—57).—Azo dyes undergo hydrolysis at the ·N:N· group when heated with dil. H_2SO_4 under appropriate conditions. Sol. dyestuffs are decomposed most readily, monoazo dyestuffs giving the first-component base and decomp. products of the second component, whilst disazo dyestuffs break down initially into the first component and a monoazo compound. This decomp. occurs also on the fibre in the dye bath and is promoted by alkalis, but is prevented by 5% of $(NH_4)_2SO_4$ on the wt. of wool. Insol. monoazo dyes are more difficult to break down, especially those derived from β-hydroxynaphthoic acid and its arylamides, but in all cases good yields of the first-component base can be obtained, although the conditions for hydrolysis are so stringent that neither the second component nor its derivatives can be isolated. Very little reduction takes place, and NO_2-groups in the first component remain unaffected. Under some conditions sulphonation takes place, benzeneazo-β-naphthol giving the 4 : 6′-disulphonic acid with 98% H_2SO_4. S. C.

Methods of dye analysis. I. Analysis of quinonoid dyes by the titanium method. V. V. KOZLOV (J. Appl. Chem. Russ., 1935, **8**, 1478—1493).—Standard $TiCl_3$ or $Ti_2(SO_4)_3$ solutions change their titre by 0·000064*N* per day; the oxidised solutions can be periodically regenerated by adding Zn. The dyes are best titrated in 2 : 1 H_2O–EtOH containing 10 g. of Na K tartrate and approx. 1% of dye; the results tend to be high, by $\not>$ 2·5%. Titration with $CrCl_2$ in place of $TiCl_3$ does not give satisfactory results, owing to the indefinite end-point and to the slowness of the reaction with certain dyes (Me-violet, auramines, rhodamines); the most readily reduced are oxazine and thiazine dyes. R. T.

Filtering dyes.—See I. **Staybrite steel and the dyeing industry.**—See VI. **Active MnO_2.**—See VII.

PATENTS.

Manufacture of nitrodibenzanthrones. I. G. FARBENIND. A.-G. (B.P. 441,886 and Addn. B.P. 441,919, [A] 30.7.34. Ger., 4.8.33, [B] 30.7.34 and 30.4.35).—(A) Pure dinitrodibenzanthrones, free from OH-compounds, are obtained by treatment of dibenzanthrone (I) or its derivatives with 10—75 (35—60)% aq. HNO_3; *e.g.*, with 60% HNO_3 at 80° a $(NO_2)_2$-compound is obtained that dyes cotton ($Na_2S_2O_4$ vat) in green shades, converted into grey or black by NaOCl. The grey-black dye may be made in substance by treating the corresponding $(NH_2)_2$-compound with $NaClO_3$ in aq. H_2SO_4. Similar compounds from the Br- and NH_2-derivatives of (I) are described. (B) Nitration is carried out with 10—75% aq. HNO_3 containing other H_2O-sol. acids which are stable to HNO_3 (*e.g.*, H_2SO_4, H_3PO_4) and $\not<$ 25% of H_2O; the products are the same. H. A. P.

Separating NaOH–KOH mixtures.—See VII.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Cellulose resources. IV. Cotton stalk. K. SHIMBO (J. Agric. Chem. Soc. Japan, 1935, **11**, 1075—1076).—Analytical data are given. F. O. H.

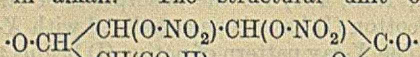
***X*-Ray spectrography of alkali-celluloses.** J. B. CALKIN (J. Physical Chem., 1936, **40**, 27—35).—Previous data (B., 1935, 401) for the adsorption of NaOH and H_2O by cotton (I) have been correlated with *X*-ray data for (I). The *X*-ray pattern of native (I) begins to change at 12·8% of adsorbed NaOH and the change is complete at 14·3—14·4%, which practically coincides with max. adsorption of H_2O. Mercerised (I) changes to Na-cellulose I at a lower concn. of NaOH than native (I), but no Na-cellulose III has been obtained under the experimental conditions employed. In the adsorption process Na cellulosate is probably first formed and then adsorbed. The adsorption of NaOH from an EtOH solution by (I) does not result in mercerisation. M. S. B.

Coagulation of sulphite-cellulose lyes by certain electrolytes. I. I. SCHTAKELBERG and A. A. LIFSCHITZ (J. Appl. Chem. Russ., 1935, **8**, 1421—1430).—50—80% of the org. constituents of sulphite lyes separates as a voluminous, non-sedimenting ppt. at p_H 5·5, or in presence of $Al^{\cdot\cdot\cdot}$ at p_H 7·6, and of $Zn^{\cdot\cdot}$ at 8·0. R. T.

Preparation of cellulose phthalates. N. I. NIKITIN and I. M. ORLOVA (J. Appl. Chem. Russ., 1935, **8**, 1410—1414).—Cellulose and starch yield phthalates in which $\not>$ 0·25 OH group per $C_6H_{10}O_5$ unit is substituted by the

Schotten–Baumann reaction with $C_6H_4(COCl)_2$, whilst under analogous conditions galactoaraban gives 50% esterification. In org. solvents (C_5H_5N and $PhNO_2$ at 125—135°) $\not>$ 1 OH is esterified. The esters are distinguished by their low solubility, and the low degree of esterification is ascribed to formation of an insol. layer on the surface of the fibres, which prevents penetration of the reagents. R. T.

Esterification of pectin substances. F. A. Henglein and G. Schneider (Ber., 1936, **69**, [*B*], 309—324).—Ehrlich's pectic acid dissolves in HNO_3 (*d* 1·510—1·523) and the solution when poured into H_2O gives *pectic acid dinitrate* (I), containing 2 NO_2 per galacturonic unit. (I) closely resembles cellulose nitrate ; it is sol. in $COMe_2$, less readily in Bu^{a}OAc and amyl acetate, and the solutions when evaporated leave resistant films. The röntgenographic similarity of pectin (II) and cellulose (III) thus finds its chemical counterpart. Nitration of hydratopectin with H_2SO_4–HNO_3 is accompanied by much degradation unless the $[H_2SO_4]$ is $>$ 25%, when esters are obtained. Further, the concn. of the mixed acids must be kept high as the presence of H_2O is more harmful with (I) than with (III). The presence of nitrous fumes considerably restricts degradation. The influence of temp. and duration is described. When the N content of the esters is $>$ 7% they are sol. in org. media, such as $COMe_2$. The nitration of (II) and starch is similar in that the products are sol. in HNO_3. (I) can be obtained directly from pectin by-products provided the latter contain about 30% of isolable (II). They are treated directly with nitrating acid in which the $[HNO_3]$ is kept const. by the introduction of HNO_3 vapour. (I) dissolves in the acid, which is filtered from the residue (? cellulose nitrates) and poured into H_2O. The η of solutions of (I) is similar to that of medium viscous cellulose nitrates. Protracted nitration causes diminished η, also caused by use of steam under pressure. Films of (I) are unaffected by dil. acid and moderately resistant towards conc. acid, but swell and ultimately dissolve in alkali. The structural unit of (I) is



$$\cdot O\cdot CH\begin{matrix}\diagup CH(O\cdot NO_2)\cdot CH(O\cdot NO_2)\diagdown \\ \diagdown CH(CO_2H)\text{———————}O\diagup\end{matrix}C\cdot O\cdot$$

and the mol. has an extended, thread-like form. Determinations of η indicate that the mol. wt. of (I) is 20,000—50,000, according to origin and mode of treatment. The figure is reconcilable with difficulty with mol. wt. 1300 of tetragalacturonic acid. Repetition of Ehrlich's experiments shows, however, that this product does not dissolve in H_2O in the usual form, but, at best, gives highly colloidal solutions in which the cryoscopic determination of mol. wt. is impossible. H. W.

Nitrogen oxides in nitration mixtures, and their effect on the properties of cellulose nitrate. S. S. Mindlin and L. I. Kuzmina (J. Appl. Chem. Russ., 1935, **8**, 1415—1420).—The degree of esterification and yield of cellulose nitrate fall with increasing $[N_2O_4]$, to a greater extent at high than at low reaction temp. ; the effect is less marked for solutions of low $[HNO_3]$. The presence of N_2O_4 in the nitration mixtures does not affect the photosensitivity or solubility of the products, but greater disintegration of the fibres is observed. N_2O_4 is determined from the difference between the no. of c.c. of standard $KMnO_4$ used for titration before and after boiling with excess of $(NH_4)_2SO_4$. R. T.

Standard method for determining xanthate viscosity. Memo. No. 11, Faserstoff-Analysenkomm. des Vereins der Zellstoff- u. Papier-Chem. u. -Ing. (Papier-Fabr., 1936, **34**, 57—59).—5 g. of the dry-disintegrated pulp are allowed to remain with 25 c.c. of 17·5% NaOH solution for 1 hr. at 20°, and the product filtered and ripened in a stoppered bottle at 30° for 22 hr. The pulp is then kept at room temp. for 5 min. and allowed to react at 15° with 3·6 c.c. of CS_2 for 4·75 hr., with frequent shaking. Excess CS_2 is removed and the pulp dissolved in 17·5% NaOH at 15° (2 c.c. $>$ the vol. of the first NaOH filtrate). The solution is made up to 500 c.c. with H_2O and its η at 15° determined in the Ost viscosimeter. The method is said to be accurate to 3% provided that it is strictly followed in detail. D. A. C.

Lignin in Douglas fir. Composition of the middle lamella. A. J. Bailey (Ind. Eng. Chem. [Anal.], 1936, **8**, 52—55).—The middle lamella in Douglas fir (method of isolation described) contains 71·38% of lignin. The wood rays, spring and summer woods contain 41·09, 35·24, and 31·56%, respectively. S. C.

Cotton bark as a source of rayon pulp. Anon. (Bull. Imp. Inst., 1935, **33**, 446—449).—On digesting with NaOH, cotton bark yields 20·5% of bleached pulp containing only 81·6% of α-cellulose (I) and 1·4% of ash. Increasing the severity of the treatment reduced appreciably the yield and (I) content. Cotton bark is therefore unsuitable for use as rayon pulp. D. A. C.

New materials for paper and board manufacture. Anon. (Bull. Imp. Inst., 1935, **33**, 421—446).—A no. of reeds, grasses, and trees from Great Britain and the Colonies were investigated for their paper- and board-making qualities by subjecting them to various conditions of NaOH digestion and bleaching. Norfolk reeds, the fibre of which resembles esparto, although giving a reasonable yield and paper quality, are unsuitable both for economic reasons and because they are not satisfactory substitutes for esparto. Jarrah bark (W. Australia) furnishes a good yield of a satisfactorily strong but coarse-fibred and " free " pulp, and would therefore be suitable for boards. It is best disintegrated by heating under pressure with H_2O. The grasses *Hyparrhenia filipendula* (N. Rhodesia) and *Typha latifolia* (Australia) gave low yields and were not readily bleached, and the woods *Melaleuca leucodendron* (Malaya) and mangrove (Gambia) both gave short-fibred pulps which were unsatisfactory both as substitutes for similar materials in common use and because they required severe treatments. Sisal refuse (Tanganyika) gave low yields and a very " wet " pulp which shrinks excessively on drying, producing cockling. D. A. C.

The sulphite[-pulp] process. C. R. Bergson (Papier-Fabr., 1936, **34**, 41—45, 50—53, 59—63).—Some of the author's experiences in the control of, and opinions on, the various stages in the process are discussed, and factors requiring strict control are given. The ratio of piled to solid vol. of wood is given as 100 : 67 for half-barked and 100 : 74 for barked wood. D. A. C.

Thorsen–Héry beater [for paper]. G. W. Dodge (Paper Trade J., 1936, **102**, TAPPI Sect., 60—62).—This beater is favourably compared with the normal hollander beater as regards power consumption, rate of beating, and ability to fibrillate pulp fibres. H. A. H.

Disintegration of filter paper by calcium nitrate solution. A. P. Weber (Chem. Weekblad, 1936, **33**, 125—126).—Filter paper and cotton threads are very rapidly disintegrated to a mass of very short cellulose fibres by warming with conc. aq. $Ca(NO_3)_2$. The action is practically instantaneous at 150°. Solutions of the following had no action on filter paper (temp. given in parentheses): NH_4NO_3 (200°), NH_4CNS (145°), $CaCl_2$ (160°), $Ca(CNS)_2$ (180°), KCNS (150°), NH_4Cl (150°), KNO_3, $NaNO_3$, $Ba(NO_3)_2$, $Mg(NO_3)_2$, $ZnSO_4$, Fe NH_4 alum, Na_2SO_4 (b.p. of saturated solutions), glycerin (200°). The disintegrated material gave the normal *X*-ray diagram for pure cellulose. S. C.

Invert sugar as a plasticiser in paper. N. R. Pike (Paper Trade J., 1936, **102**, TAPPI Sect., 63—66).—The various methods of applying sugar (I) solutions to paper in web form are discussed. Beater addition is not practicable, as owing to its high solubility retention of (I) is very low. The addition of 5% of hygroscopic plasticiser [either (I) or glycerin (II)] reduces the amount of moisture absorbed by greaseproof paper when conditioned to equilibrium below 60% R.H., but above this limit the expected increase in moisture absorption is obtained, especially in the case of (II). Admixture of (I) with (II) prevents the paper from becoming too flabby at high humidity. The effect on paper strength (burst, tensile, tear, fold, etc.) of using (I) or (II) is that usually obtained when the moisture content is somewhat increased. General printing properties, including flatness, are improved. The uses of plasticisers in the manufacture of coated papers are also discussed. H. A. H.

Cast ferrous alloys in the paper industry. F. L. LaQue (Paper Trade J., 1936, **102**, TAPPI Sect., 58—60). —The various uses are reviewed. H. A. H.

Acid-resistant linings of C. New sources of K.—See VII. **Flax.**—See XII. **Wrapping material for coffee. Pampas grass for paper.**—See XIX.

Patents.

Treatment of coir fibre [for production of artificial horsehair]. O. Tudor-Hart (B.P. 442,048, 17.12.34).—Unspun coir fibre is boiled in alkali under pressure, dried, and curled in a teasing machine. F. R. E.

Production of bast fibres for papermaking and other purposes. G. A. Richter, Assr. to Brown Co. (U.S.P. 1,995,900, 26.3.35. Appl., 28.12.32).—Ramie, hemp, flax, etc. stalks are cut, across their longitudinal axes, into chips about ½ in. long. They are then digested by any usual acid or alkaline process and the longer bast fibres suitably separated from the short-fibred portions. D. A. C.

Production of cellulose. H. Dreyfus (B.P. 442,020, 30.7.34).—Wood chips are treated with HNO_3 (2—10%) at $<$ the b.p. (65—90°) and under pressure ($>$ 10 atm.), washed, heated with 1—5% aq. NaOH at 100—130° under pressure, and finally, if desired, further treated with cold 15% NaOH. F. R. E.

Treatment of cellulose nitrate. R. K. Eskew, Assr. to Dupont Viscoloid Co. (U.S.P. 1,995,117, 19.3.35. Appl., 16.12.33).—After stabilisation with dil. acid, cellulose nitrate is suspended in an aq. liquor of p_H 3·5—6·5 and, when the long fibres have settled, the supernatent liquor containing the " fines " is removed by decantation. The fibres are then treated with H_2O and the settling and decantation processes repeated 3 times or until the liquid is clear. F. R. E.

Changing the solubility of cellulose acetate. C. S. Webber and C. J. Staud, Assrs. to Eastman Kodak Co. (U.S.P. 1,994,599, 19.3.35. Appl., 26.9.29).—The ester is hydrolysed by means of an AcOH solution containing C_2H_4, SO_2, H_2SO_3, or SO_3''. F. R. E.

Cellulose acetate composition containing ethylene chloride and a hydroxyl plasticiser. C. J. Staud and L. M. Minsk, Assrs. to Eastman Kodak Co. (U.S.P. 1,994,597, 19.3.35. Appl., 4.5.32).—Transparent flexible sheets are formed from a solution of cellulose acetate, $C_2H_4Cl_2$, and a plasticiser containing one OH, *e.g.*, *p*-$C_6H_4Bu^{\gamma}\cdot OH$, *tert.*-$C_4H_6Cl_3\cdot OH$. F. R. E.

Moisture-resistant filaments of cellulose acetate. P. C. Seel, Assr. to Eastman Kodak Co. (U.S.P. 1,997,316, 9.4.35. Appl., 24.12.29).—Filaments are spun from $COMe_2$-sol. cellulose acetate which has been hydrolysed so as to have a pptn. val., as determined by the method described, of 90—97%, together with a plasticiser if desired, *e.g.*, Ph_3PO_4. F. R. E.

Production of purified viscose solutions. E. Freund (U.S.P. 1,996,197, 2.4.35. Appl., 31.7.34. Austr., 21.11.32).—Cellulose xanthate is ripened while immersed in a liquid in which it is insol., but which dissolves the S impurities formed on ripening (aq. NaCl, EtOH–H_2O). It is then dissolved in alkali and further purified by addition of peroxides or persalts. F. R. E.

Production of seamless cellulose tubes. W. Schwalbe and O. Schnecko, Assrs. to Visking Corp. (U.S.P. 1,997,349, 9.4.35. Appl., 5.12.33. Ger., 22.12.32).—A cellulose solution is extruded in the form of an inflated tube into coagulating and regenerating baths and then dried, the gases generated within the tube being allowed to escape through the extrusion device, whereby slitting of the tube at intervals is unnecessary. F. R. E.

Saponification of organic esters of cellulose. H. Dreyfus (B.P. 441,544, 16.6.34).—The materials are treated with aq. NH_3 ($\nless$ 30%) together with, or followed by, aq. NaOH (1—5%) at $>$ 90° under pressure. F. R. E.

Production of crimped filaments, yarns, or fibres. Brit. Celanese, Ltd., D. Finlayson, and F. Happey (B.P. 442,073, 30.6.34. Addn. to B.P. 424,880; B., 1935, 447).—A travelling, continuous or staple-fibre yarn composed of org. derivatives of cellulose is twisted, treated with a setting medium (steam or a softening agent in liquid or vapour form) over part of its length actually receiving twist, and subsequently twisted in the reverse direction; the continuous filaments may then be cut into staple fibre, if desired. F. R. E.

Manufacture of crêpe threads and fabrics. H. Dreyfus (B.P. 441,573, 21.4.34).—Threads of cellulose acetate are crêpe-twisted while softened, during at least the last part of the twist, by treatment with an org. liquid or vapour which has a mild softening action or is a softening agent only at elevated temp., *e.g.*, C_6H_6, EtOH, $C_2H_4(OH)_2$. [Stat. ref.] F. R. E.

Production of rubber or elastic-yarn filaments or threads. T. L. Shepherd (B.P. 441,465, 18.4.34).—In the production of a thread by squirting a fine stream of coagulant into a bath of rubber latex or other suitable aq. dispersion, a textile "feel" is imparted to the filament by incorporating comminuted fibrous material in the latex bath, and also, if desired, dye and/or synthetic resins; before complete coagulation the thread may be dipped in additional fibrous material. B. M. V.

Production of fibrous material in layer form, suitable for heat-insulation or packing purposes. F. B. Dehn. From Cellufoam Corp. (B.P. 442,045, 23.5.34).—Cellulose or other fibres are hydrated to gelatinise the surface, and prior to or during this treatment moisture- and fire-proofing agents (dispersed wax and H_3BO_3) are incorporated; after such treatment a foam-producing agent (saponin) is added. The mass is then spread as a layer and the H_2O removed by suction of sufficient intensity to compact only the surface fibres. B. M. V.

Manufacture of paper. A. Schopper, B. Possanner von Ehrenthal, and E. Unger, Assrs. to L. Schopper (U.S.P. 1,995,586, 26.3.35. Appl., 11.10.33. Ger., 1.2.33).—A laboratory sheet-machine and a vac. drying apparatus employing hot H_2O are claimed. D. A. C.

Paper manufacture. H. R. Harrigan and J. M. Krauss, Assrs. to District of Columbia Paper Manufg. Co. (U.S.P. 1,997,487, 9.4.35. Appl., 1.3.32).—Absorbent paper is impregnated with a dil. aq. glue–CH_2O solution. It is claimed that the wet strength of the paper is greatly increased without affecting its absorbency. D. A. C.

Manufacture of sized paper. R. Kern, Assr. to Chem. Fabr. R. Baumheier A.-G. (U.S.P. 1,997,366, 9.4.35. Appl., 4.8.31. Ger., 6.8.30).—Paper stock is sized with a resin emulsion, resin or casein soaps being used as emulsifying agents. Fatty oils, high-boiling alcohols, etc. are added to the resin to reduce its m.p. The emulsion is made homogeneous by mechanical means. D. A. C.

Fibrous composition [for electrical insulation]. G. E. Wightman (U.S.P. 1,996,314, 2.4.35. Appl., 20.3.31. Can., 5.12.29).—Sheets of wood pulp (90—94% of α-cellulose) are bonded with an artificial resin, *e.g.*, cresol–CH_2O, so that the laminated product has a dielectric strength of $>$ 850 volts per mil, a power factor $<$ 3·4, tensile strength $>$ 17,000 lb./sq. in., and H_2O absorption $<$ 3% in 24 hr. F. R. E.

Production of saturated fibrous sheet material. A. H. Stevens. From Raybestos Co. (B.P. 442,002, 28.4.34).—The continuous fibrous web (paper or board etc.), immediately after formation on the paper machine, is saturated with rubber latex by passing through a bath of the solution. Means for preserving it against disintegration are claimed. D. A. C.

Production of cellulose masses. Brit. Thomson-Houston Co., Ltd. (B.P. 442,012, 26.7.34. Ger., 26.7.33).—Air-dried cellulose is treated with an aq. dispersion of a polymerised acrylic acid compound to bring it to the "swollen" condition, which is maintained on drying; the product has also reduced hygroscopicity. [Stat. ref.] F. R. E.

(A) **Vegetable parchment.** (B) **Translucent paper.** P. B. Davidson (U.S.P. 1,996,857—8, 9.4.35. Appl., [A] 30.4.32, [B] 2.11.33).—(A) Paper is impregnated with a solution, in $C_2H_4Cl_2$, of Me or Et abietate, with or without rosin oil, to which is added rosin, ester gum, or sucrose octa-acetate. A fatty acid (*e.g.*, stearic) may also be added as a softener. (B) Paper is impregnated with sucrose octa-acetate, with, if desired, the addition of 5% of a fatty acid. The paper is then immersed in H_2O and dried. D. A. C.

Manufacture of impregnated articles. G. A. Richter, Assr. to Brown Co. (U.S.P. 1,995,623, 26.3.35. Appl., 20.1.32).—Paper, board, etc., after impregnating with a wetting agent, is passed through a bath of sizing, water- or fire-proofing material and dried. The wetting agent is then destroyed either by heat or by leaching out with H_2O. D. A. C.

Protecting spun cakes of artificial threads [during washing etc.]. North Brit. Rayon, Ltd., E. Walls, A. V. Pitter, and P. A. Stenger (B.P. 442,217, 16.7.35).

Activated C.—See II. **AcOH recovery.**—See III. **Fillers.**—See VII. **Soaps.**—See XII. **Adhesive for waxed etc. paper.**—See XV. **Wound plaster.**—See XX.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Bleaching, dyeing, and finishing of [fabrics containing] viscose-film yarns. Anon. (Silk & Rayon, 1936, **10**, 138—140, 202—204).—Viscose-film strip has low wet-shearing resistance but high extensibility, and readily responds to impression in embossing and schreinering processes. Mangling is avoided in wet-processing so as to minimise cutting by pressure against harder cotton or wool yarns which may be present. Calendering in finishing processes is undesirable. A. J. H.

Factors which influence the stability of [hydrogen] peroxide bleach baths. D. J. Campbell (Amer. Dyestuff Rep., 1936, **25**, 67—70 P).—The stability of aq. H_2O_2 decreases with increase of p_H, and 1-vol. solutions having p_H (obtained by addition of H_2SO_4 or NaOH) 6·8, 7·1, 7·9, 8·9, and 9·9 suffered 50% decomp. at 82° in 3·2, 2·8, 2·2, 1·2, and 0·4 hr., respectively. Similar results were obtained with solutions made alkaline with Na_2CO_3, borax, and Na_3PO_4, these substances having no stabilising action. $Na_4P_2O_7$ behaves similarly to Na_3PO_4 at 82°, but at lower temp. (especially at 49°, the temp. for bleaching wool) it has pronounced stabilising power. Na silicate [(I), $\equiv Na_2O,2\cdot5SiO_2$) is an excellent stabiliser, and 1-vol. aq. H_2O_2 having p_H 6·0, 7·0, 8·0, 9·0, 9·6, 10·5, and 12·0 and containing 0·72% of (I) suffered 50% decomp. at 82° in 3·75, 3·5, 11·0, 5·5, 4·0, 1·5, and 0·16 hr., respectively. In commercial wool-bleaching liquors containing 6 lb. of (I) per 100 gals., 50% of (I) may be replaced by Na_3PO_4 without loss of stability. H_2O_2 bleach liquors are more stable when prepared with hard than with soft H_2O, Mg hardness being more effective than Ca hardness. Bleaching of cotton with aq. H_2O_2 is satisfactory only at $\nless$ 82° and p_H 9·8—11·0. Stainless steel and monel metal are satisfactory for bleaching machines since they are inactive towards H_2O_2; Cu is the most active decomp. catalyst. A. J. H.

Prevention of decomposition of [prussiate aniline-black] padding liquor. Anon. (Text. Rec., 1936, **53**, Feb., 57).—Addition of 0·5 lb. of Na formaldehydesulphoxylate to 60 gals. of liquor is sufficient to preserve it for $\nless$ 1 day. Decomp. is also retarded by addition of NH_2Ph. A. J. H.

Staybrite steel as applied to the dyeing industry. F. Godber (J. Soc. Dyers & Col., 1936, **52**, 45—48).—The use of Staybrite steel for dye vats and machinery is discussed. S. C.

Comparison of current standards of light-fastness in dyed textiles. P. Krais (Angew. Chem., 1936, **49**, 55—57).—The German, English, and American standard dyeings are compared in sunlight and in the Custers exposure tester (B., 1935, 267). This instrument gives, with one exception, results closely parallel to the sunlight-exposures vals. S. M. N.

Effect of repeated machine-laundering on textile materials. O. Routala and J. E. Salomaa (Suomen Kem., 1936, **9**, **A**, 4—9).—Figures are given for the rise in ash content and loss in strength of cotton and linen fabrics. It is stated that addition of $NaPO_3$ to the wash H_2O gives a better white and reduces the loss in strength. S. M. N.

Reclaiming chlorinated dry-cleaning solvents by adsorption. L. E. Stout and A. B. Tillman (Ind. Eng. Chem., 1936, **28**, 22—25).—A continuous adsorption and filtration process has advantages over distillation for recovering used dry-cleaning solvent. It is necessary to remove acids and saponifiable material, but mineral oil in moderate concn. is in some respects advantageous. Experiments with an azeotropic mixture of CCl_4 and $C_2H_4Cl_2$ showed that activated C and activated MgO will both preferentially remove the polar substances, but SiO_2 gel removes both saponifiable and unsaponifiable oils; in the latter case, however, the residual oil is not appreciably improved in colour or odour. C. C.

Sizing of viscose-rayon crêpe yarn in cakes. J. Brandwood (Silk & Rayon, 1936, **10**, 186, 188—189).—Sizing with siccative oil emulsions at 45°, and subsequent drying, winding on to bobbins, twisting, and back-winding processes are described. A. J. H.

Accelerated ageing test for weighted silk. W. D. Appel and D. A. Jessup (J. Res. Nat. Bur. Stand., 1935, **15**, 601—608).—Specimens of cloth are exposed for 20 hr. to the radiation from a C-arc lamp, running under specified conditions and enclosed in glass, at 75—77% R.H. The ratio of breaking strength after exposure and before exposure, determined in that direction showing the greater difference, is taken as a measure of the stability of the fabric towards light, heat, and moisture. J. S. A.

Patents.

Bleaching or other treatment with liquid of artificial silk yarn. Kirklees, Ltd., and A. Bennett (B.P. 442,037, 26.9.34).—" Cakes " of yarn from the centrifugal spinning pots are mounted on horizontal perforated tubes and carried continuously through a series of washing treatments in each of which the liquor is simultaneously sprayed over and forced through the cakes. A. J. H.

Dyeing of pelts. I. G. Farbenind. A.-G. (B.P. 441,871, 26.7.34. Ger., 7.12.33. Addn. to B.P. 440,742; B., 1936, 271).—The process of the prior patent is extended to include the use of salts of 1 : 5-$C_{10}H_6(OH)_2$, $OH\cdot C_{10}H_6\cdot Hal$, $NH_2\cdot C_{10}H_6\cdot OH$, or $C_{10}H_5(Hal)(NH_2)\cdot OH$ with aromatic or heterocyclic amines, excluding salts there specified. In an example, a pelt, pretreated with a Cr mordant, is treated in presence of H_2O_2 at $\ngtr$ 32° with the salt of 1 : 8 : 7-$NH_2\cdot C_{10}H_5Cl\cdot OH$ with *p*-$NHPh\cdot C_6H_4\cdot NH_2$. A. W. B.

Treatment [delustring] of artificial silk. H. Dreyfus (B.P. 441,868—9, 26.7.34).—Impregnation with H_2O-sol. salts is followed by treatment at 95—105° with steam and NH_3 or other volatile base, which results in pptn. of the metal oxide. (A) covers Sn and (B) Ti salts. A. W. B.

Impregnation of textiles [for waterproofing]. F. Hoelkeskamp, Assr. to Amer. Bemberg Corp. (U.S.P. 1,984,306, 11.12.34. Appl., 18.8.32. Ger., 10.10.31).—The fabric is soaked in 15% aq. $NiSO_4$ and then in dil. aq. NaOH, centrifuged and washed to remove sol. salts, dried, and impregnated with a 5 : 2 mixture of wax and stearin containing 30% of borax. A. R. P.

Liquid treatment of materials in web or sheet form. W. W. Spooner (B.P. 441,529, 12.6.35. Addn. to B.P. 429,592; B., 1935, 766).—Further precautions to avoid strain on the material are described. B. M. V.

Wetting etc. agents.—See III. **Filler for textiles etc.**—See VII.

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

(A) **Active vanadium catalysts for manufacture of sulphuric acid.** (B) **Replacement of tin in B.O.V. vanadium catalyst.** G. K. Boreskov (Sborn. Trud. Ukrain. Chim. Inst. Odessa, 1935, No. 1, 8—48, 76—87).—(A) $SnCl_4$ is added to a solution of Na silicate and KVO_3 (60—70°), to a faintly alkaline reaction, when about 80% of the V is pptd. as a K vanadostanno-zeolite. $BaCl_2$ is then added, when the remaining V is pptd., and the ppt. has the composition $K_2O,2BaO,8SiO_2,2SnO_2,V_2O_5$ (I) (B.O.V. catalyst). A second catalyst (II) is obtained by adding aq. KOH to $Ca(VO_3)_2$, followed by K silicate, and pptn. is effected by adding aq. $AlCl_3$ and $BaCl_2$, as above.

(I) and (II) give 95—97% conversion of SO_2 into SO_3, at optimum temp. of 450° and 430°, respectively; they retain full activity after 27 months of action, and are not inactivated by H_2O, CO, CO_2, H_2S, CS_2, HCl, SeO_2, or light and heavy hydrocarbons. The [As] necessary to inactivate is 80,000 times $>$ in the case of Pt catalysts. The activation temp. rises abruptly at temp. $<$ the optimum for both catalysts.

(B) [with M. A. Guminskaja]. The activity of catalysts of the composition $0\cdot9K_2O,1\cdot4BaO,12SiO_2,V_2O_5$ is $<$, and that of those containing Al in place of Sn $>$, that of (I), whilst the cost is less. R. T.

Utilisation of intermediate products of extraction of vanadium from ores, concentrates, and slags for the preparation of vanadium catalysts. I. Utilisation of calcium vanadate. J. A. Prokopetz. **II. Utilisation of alkaline extracts of titanomagnetite metallurgical slag.** M. L. Barlamov. **III. Utilisation of Ural extracts for preparation of vanadium catalysts on a chromo-zeolite base.** M. A. Guminskaja (Sborn. Trud. Ukrain. Chim. Inst. Odessa, 1935, No. 1, 49—58, 59—64, 65—75).—I. Crude $Ca(VO_3)_2$ (I) is extracted during 2·5 hr. with boiling 70% K_2CO_3, and then for a further 2·5 hr. with 30% K_2CO_3, when 95% of the V is present in solution as KVO_3, utilisable for the prep. of Boreskov's B.O.V. catalyst (cf. preceding abstract). The necessary expenditure of K_2CO_3 is 0·9 kg. per kg. of (I).

II. Aq. Na_2CO_3 extracts of Kertsch titanomagnetite slag contain V_2O_5 4·17, Cr_2O_3 5·27, and $NaHCO_3$ 5·1 g. per litre. HCl is added to neutralise the $NaHCO_3$, and K silicate is then added, followed by $AlCl_3$ and $BaCl_2$ in such proportions as to give a ppt. containing SiO_2 11·8, Al_2O_3 1·0, and BaO 2·12 pts. per 1 pt. of V_2O_5; the catalytic activity is = that of Boreskov's second catalyst (cf. preceding abstract). Satisfactory catalysts could not be obtained by substituting $FeCl_3$ for $AlCl_3$, or Mg, Ca, or Cu for Ba.

III. A highly active catalyst, of the composition $K_2O,1\cdot4BaO,12SiO_2,Cr_2O_3,V_2O_5$, is obtained by Boreskov's method from KVO_3, K silicate, $CrCl_3$, and $BaCl_2$. The same product is obtained by reducing Cr-containing slag extracts with SO_2, to yield a solution containing Cr^{III} and V^{IV}, to which a sufficient amount of fresh extract is added for the reaction $Cr^{VI} + 3V^{IV} \rightarrow Cr^{III} + 3V^{V}$ to take place, and aq. K silicate and $BaCl_2$ are added to the solution at 70°. R. T.

Determination of small amounts of nitric acid [in sulphuric acid]. P. Osswald (Angew. Chem., 1936, 49, 153—154).—H_2SO_4 under examination is diluted to 65—70%, or solid material is dissolved in H_2SO_4, and mixed with aq. $FeSO_4$ + $NaHSO_3$. NO_3' is completely reduced to NO on warming to 100°, forming $Fe(NO)SO_4$ which is stable under the conditions stated. The colour produced is matched against that given by H_2SO_4 of known $[NO_3']$. J. S. A.

Phosphoric acid and phosphates from Nelsonite ore. F. X. Ferney (Chem. Met. Eng., 1936, 43, 22—26).—Analyses of various phosphate ores and a description of the production of H_3PO_4 and $CaHPO_4$ from Nelsonite ore by treatment with H_2SO_4 at the works of the Southern Mineral Products Corp., Piney River, Va., are given. A feature of the process is the removal of discoloration from H_3PO_4. D. K. M.

Elimination of fluorine and silicon from technical phosphoric acid. M. O. Dornisch and M. V. Sladkova (J. Chem. Ind. Russ., 1935, 12, 1160—1161).—Most of the Si and 95% of the F present in technical H_3PO_4 are removed by adding KCl (1 hr. at 50°), when K_2SiF_6 separates in a readily filterable form. The advantages of applying the purification are: purer H_3PO_4, yielding better-quality and more easily-filterable $CaHPO_4,2H_2O$, and recovery of F. R. T.

Acid-resistant linings of carbon. F. Hoffmann (Chem. Fabr., 1936, 9, 96—97).—Plates of C, prepared in the same way as electrodes, are a good substitute for ceramic plates in the internal lining of sulphite-pulp cookers. Their acid-resistance is better and they are lighter and less liable to crack through temp. changes. Their lower mechanical strength is not important. They can be set with a silicate acid cement. C. I.

Platinised nickel gauze for contact oxidation of ammonia. I. E. Adadurov and A. N. Prozorovski (J. Appl. Chem. Russ., 1935, 8, 1321—1329).—Non-oxidisable Ni gauze used in the catalytic oxidation of NH_3 is corroded by H_2 evolved in the first stage of the process; platinising the Ni does not protect it, as the H_2 readily penetrates into the crystal lattices of both Pt and Ni. The presence of Pt (up to 6%) on the Ni greatly enhances its activity, 99% oxidation being attainable at 700—900°. R. T.

Distribution of moisture in ammonium nitrate. I. I. Z. Chaskes (J. Appl. Chem. Russ., 1935, 8, 1344—1353).—H_2O adsorbed from the air by the surface layers of heaps of NH_4NO_3 rapidly sinks to the bottom of the pile, the highest concn. being found usually at a depth of 20 cm. from the surface. H_2O is drawn up by capillary action from a damp floor to a height of 12—15 cm. from the bottom of the pile. R. T.

Manufacture of sodium sulphide. J. F. M. White and A. H. White (Ind. Eng. Chem., 1936, 28, 244—246).—The reduction of Na_2SO_4 by H_2 at 704° is at first faster than that at 645°, but then decreases owing to the formation of a liquid mixture of m.p. slightly $<$ 700°. CO is a less efficient reducer. The rate of reduction (v) with solid carbonaceous matter decreases in the order bituminous coal (I), charcoal, lampblack, and graphite; reduction is slow until liquid appears. Degassing sugar charcoal does not influence its reducing power. CaO increases v with solid reducers below 750°, above which temp. the dissociation of $CaCO_3$ is disadvantageous. The equilibrium conditions could not be studied because all vessels are attacked by hot Na_2S, graphite being the most resistant. Reduction is possible at a lower temp. than that recorded; *e.g.*, complete reduction occurs in 1 hr. at 750° by (I) and CaO. R. S. B.

Natural deposits of sodium sulphate in North Dakota. I. Lavine and H. Feinstein (Amer. Inst. Min. Met. Eng., 1936, Contr. 97, 8 pp.).—Deposits of $Na_2SO_4,10H_2O$ containing 86—95% of Na_2SO_4 (on the dry cake) and estimated at 20×10^6 tons have been surveyed. D. K. M.

Drying and processing of pebble phosphate in the Florida field. C. N. Becker (Amer. Inst. Min. Met. Eng., 1936, Tech. Publ. 677, 13 pp.).—A description with diagrams of plant for the storage, drying, and calcining of phosphate rock. D. K. M.

New sources of potassium. A. A. Arseniuk (J. Appl. Chem. Russ., 1935, 8, 1338—1343).—The K_2O content of the ash of different specimens of hemp chaff varies from 17 to 86%. R. T.

Potash from polyhalite by reduction process. F. Fraas and E. P. Partridge (Ind. Eng. Chem., 1936, **28**, 224—230).—$K_2SO_4,MgSO_4,2CaSO_4,2H_2O$ (I) has been reduced by a 3 : 1 mixture of H_2 and CO in a laboratory rotating furnace at an optimum temp. of 830°. Ease of reduction decreases in the order $MgSO_4$, $CaSO_4$, K_2SO_4; at 830° $MgSO_4$ forms MgO and the remaining sulphates are reduced to sulphides. At 880° and with a high partial pressure of H_2O, $CaSO_4$ forms some CaO. K compounds are not volatile below 880°. The reducing gases may be derived from H_2O vapour and CH_4 (natural gas), approx. 16,000 cu. ft. of CH_4 being necessary for 1 ton of (I). The industrial application of the process is discussed. R. S. B.

The Dead Sea: a storehouse of chemicals. M. A. Novomeysky (Inst. Chem. Eng., Mar., 1936, Advance proof, 24 pp.).—The composition of the H_2O of the Dead Sea, climatic conditions, and variations in surface level are described. In the recovery of K and Br by solar evaporation from H_2O pumped from a depth, deposition of NaCl commences immediately. Subsequent deposition of carnallite (I) is carried out in 3 stages as only at *d* 1·31—1·32 is the product reasonably pure. This is converted into sylvinite by treatment with H_2O. The (I) sludge is removed from the pans by suction dredges from time to time without draining them. C. I.

Froth flotation of southern barite ores. R. G. O'Meara and G. D. Coe (Amer. Inst. Min. Met. Eng., 1936, Tech. Publ. 678, 6 pp.).—Four barite ores with different impurities: (*A*) Fe oxide, (*B*) Fe oxide and fluorite, (*C*) quartz, and (*D*) calcite and fluorite, after grinding to minus 65-mesh, yield on flotation, using Na silicate (I) (1·0) with Na oleate (0·3) and oleic acid (0·5 lb./ton of feed) as reagent for ores *A* and *C* and (I) with emulsion X_1 (0·5 lb./ton) for ores *B* and *D*, concentrates containing $\nless$ 94% of $BaSO_4$. An ore containing $BaSO_4$ 32·45, PbS 5·3, and mainly fluorite to 100% did not yield saleable concentrates. D. K. M.

Slurry–Mafeking limestone deposits, with special reference to their economical and commercial possibilities. W. E. Sinclair (J. Chem. Met. Soc. S. Africa, 1935, **36**, 145—158).—The structures of the limestone strata are detailed and typical analyses given. J. W. S.

Pretreatment of magnesite deposits at Zobten. G. Gerth and A. Baumgarten (Chem.-Ztg., 1936, **60**, 177—178).—This $MgCO_3$ is mixed with quartz, $CaCO_3$, talc, serpentine, and Fe_3O_4 and is at present extracted only as hand-picked lumps. Magnetic separation, however, will remove serpentine and may give a saleable product direct if the SiO_2 content is not too high. It is also possible to separate the $MgCO_3$ by froth flotation, using Na oleate, the impurities being depressed with Na silicate and an acid salt. Combination of the two processes gives a product with 2—3% SiO_2. C. I.

Preparation of crystalline aluminium hydroxide from chromate–aluminate solutions by precipitation with sulphuric acid. F. F. Volf and E. P. Michailova (J. Appl. Chem. Russ., 1935, 8, 1361—1372).—$Al(OH)_3$ containing traces of Cr and 0·5% of SO_4'' is quantitatively pptd. in a readily filterable, microcryst. form from alkaline solutions containing (per litre) $\nless$ 7 g. of Al_2O_3 and 220—445 g. of Na_2CrO_4 at 80° by adding 15—17% H_2SO_4 at a rate sufficient to neutralise 0·5—1·5 g. of Na_2O per litre per hr. R. T.

Talc and soapstone in Washington. H. Wilson and J. A. Pask (Amer. Inst. Min. Met. Eng., 1936, Contr. 99, 25 pp.).—The composition, physical properties, and methods of winning these materials are given. D. K. M.

Concentration of Georgia kyanite ore. R. G. O'Meara and B. W. Grandrud (Amer. Inst. Min. Met. Eng., 1936, Contr. 98, 3 pp.).—In general, grinding, classification, and tabling, with careful control, of mica schist and massive Georgia kyanite ores yield a fair recovery of a 90% kyanite concentrate. To improved the yield and quality of the concentrate, flotation is necessary, using pine oil 0·08, Na oleate 0·4, and oleic acid 0·8 lb. per ton. D. K. M.

Analcite. Preparation and solubility between 182° and 282°. F. G. Straub (Ind. Eng. Chem., 1936, **28**, 113—114).—Analcite (I) (SiO_2 52·7—54·2, Al_2O_3 24·5—24·6, Na_2O 14·4—13·1, H_2O 8·2—8·1%) has been prepared as a scale of rounded grains (photomicrograph given) by heating aq. Na silicate and Na aluminate at 282° for 46 hr. The solubility of (I) at 182—282° in H_2O and aq. NaOH has been determined; it increases with temp. and NaOH content, but more Al_2O_3 than SiO_2 goes into solution. The tests appear to indicate that if the SiO_2 content of boiler H_2O is kept at $<$ 2·2 millimols. per litre the formation of (I) scale would be prevented. D. K. M.

Removal of silica from solution at boiler temperatures. F. G. Straub (Ind. Eng. Chem., 1936, **28**, 36—37).—Heating aq. Na silicate containing SiO_2 3·76 and NaOH 15—50 millimols. per litre, alone and with addition of 0·5—1·5 millimols. of Na aluminate at 243°, and with addition of $Ca_3(PO_4)_2$ (0·15—0·20 millimol. per litre) at 182°, 207°, 243°, and 282°, did not reduce the SiO_2 content. With addition of excess of MgO the SiO_2 content was reduced to 0·1 millimol. per litre at 182—282° and to 0·03 millimol. by addition of MgO and Na aluminate, Al_2O_3 being in solution. The effect of MgO was not altered by addition of Na_2SO_4 (1·5—6·8) or of NaCl (1·3—3·0 millimols. per litre). D. K. M.

Rational analysis of lead compounds in oxide and semi-sulphide lead ores. S. M. Anisimov and G. G. Zapevalov (Tzvet. Metal., 1934, No. 10, 100—118).—Anglesite dissolves selectively in 25% aq. NaCl. Cerussite dissolves readily in neutral 15% NH_4OAc; the solubility is selective in presence of $Pb_5(PO_4)_3Cl$ and PbS, but not for $PbSO_4$. Pyromorphite is readily sol.

in slightly acidified cold aq. NaCl. Galenite is somewhat sol. in aq. NaCl acidified with HCl or H_2SO_4. A method of mineral analysis based on these solubility differences is described. Ch Abs. (e)

Active manganese dioxide from pyrolusite. V. V. Kozlov and T. I. Volfson (J. Chem. Ind. Russ., 1935, 12, 1167—1171).—Powdered pyrolusite is dissolved in 30% HCl (40—80° ; 2 hr.) ; 5·8% remains undissolved, and the Cl_2 production amounts to 88—95% of theory. The filtered solution is made feebly alkaline with 40% NaOH, and Cl_2 is passed at 1—5° to almost complete oxidation of $Mn(OH)_2$ to MnO_2, which is collected and washed with 1% H_2SO_4. The MnO_2 thus obtained gives 95·4% yields of dye in the oxidation of leuco-malachite-green, at an optimum temp. of 0—2° ; it should, whenever possible, be used wet, as its activity falls considerably on drying. R. T.

Preparation of sulphur from carboniferous pyrites. S. L. Juzko (J. Chem. Ind. Russ., 1935, 12, 1146—1152).—Fresh carboniferous FeS_2 entering an oven at the highest level is decomposed by the hot gases (700°) to yield FeS and S. At the next lower level SO_2 is reduced to S by the C, whilst at the lowest level FeS and C are oxidised by a mixture of flue gas and air to yield Fe_2O_3 and SO_2. The flue gases after condensation of S contain $\ngtr$ 2·5% of COS, CS_2, H_2S, and SO_2 ; these are largely eliminated by passage over a bauxite catalyst before return to the oven. Possible yields of 80—85% of S are claimed. R. T.

Determination of sulphurous acid and sulphuric acid in roaster gases. O. Routala (Suomen Kem., 1935, 8, B, 50).—SO_2 + SO_3 are absorbed in 0·1N-I, and the total SO_4'' formed is pptd. with benzidine. J. S. A.

Absorption of nitrogen oxides by silica gel. M. J. Schapiro and A. M. Savinaev (Sborn. Trud. Ukrain. Chim. Inst. Odessa, 1935, No. 1, 106—122).—NO and NO_2 are adsorbed on SiO_2 gel containing > 10% of H_2O ; regeneration is effected by passing air at 150—200°, when the products of distillation consist chiefly of HNO_3. R. T.

Preparation of chlorine derivatives of phosphorus from phosphorites. A. J. Zvorikin (J. Appl. Chem. Russ., 1935, 8, 1380—1387).—A mixture of air and Cl_2 is passed through an intimate mixture of finely-powdered phosphorite and C at 700—1000° ; the yields of PCl_3, according to $Ca_3(PO_4)_2 + 6Cl_2 + 4C = 3CaCl_2 + 2PCl_3 + 4CO_2$, increase with rising temp., amount of C, [Cl_2], and fineness of division of the substrates. R. T.

Zeolites.—See I. **Catalyst for MeOH.**—See III. **Disintegrating filter paper by $Ca(NO_3)_2$.**—See V. **K from $K_4Fe(CN)_6$.**—See X. **$PbTiO_3$.**—See XIII. **Phosphate fertilisers.**—See XVI. **Ca gluconate.**—See XVIII.

Patents.

Removing sodium hydroxide from mixtures thereof with potassium hydroxide. C. J. Aydelotte, W. R. Caverly, and W. H. Wright, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,982,241, 27.11.34. Appl., 30.3.33).—Caustic residues from indigo synthesis are treated with SO_2 sufficient to convert the excess of NaOH over that required for the synthesis into Na_2SO_3, and the solution is evaporated to d 1·525 and cooled to < 50°, whereby all the Na_2SO_3 separates. The mother-liquor is further evaporated and used again in the process. A. R. P.

Purification of sodium carbonate. H. D. Hellmers, Assr. to West End Chem. Co. (U.S.P. 1,984,342, 11.12.34. Appl., 17.5.33).—Carbonaceous impurities are removed by roasting the material in a multiple-hearth furnace through which air containing N oxides is passed. A. R. P.

Revivification of sodium bicarbonate solution. R. W. Pack, Assr. to Sun Oil Co. (U.S.P. 1,982,688, 4.12.34. Appl., 3.12.31).—Solid $CO_2 \equiv$ the Na_2CO_3 present is added to reconvert this into $NaHCO_3$. A. R. P.

Production of ammonia compounds [ammonium sulphate]. F. W. Sperr, jun., Assr. to Koppers Co. of Delaware (U.S.P. 1,983,320, 4.12.34. Appl., 4.6.31).—The NH_3 is stripped from coke-oven gases in steelworks by using, instead of H_2SO_4, waste pickling acid from the descaling plant, the operation being carried out in two stages, in the first of which the free acid is neutralised and the $Fe^{\cdot\cdot\cdot}$ pptd., and in the second the $Fe^{\cdot\cdot}$ is oxidised to $Fe^{\cdot\cdot\cdot}$ and pptd. with more NH_3-containing gas. A. R. P.

Production of syngenite, and production of potassium sulphate from potassium chloride. Palestine Potash, Ltd. From H. E. Z. Raczkowski and W. Hillkowitz (B.P. 435,772, 27.3.34).—Finely-ground anhydrite or $CaSO_4,0\cdot5H_2O$ is vigorously stirred with aq. KCl at $\ngtr$ 30° and the solution quickly removed to prevent reversion of the syngenite formed. Decomp. of the latter into K_2SO_4 and $CaSO_4$ is effected by known means ; a 40% yield of K_2SO_4 is the max. obtainable. A. R. P.

Production of alkali pyroarsenates. G. H. Wagner and W. L. Mowe, Assrs. to Aluminum Co. of America (U.S.P. 1,983,717, 11.12.34. Appl., 4.1.34).—A 7 : 4 : 5 mixture of As_2O_3, $NaNO_3$, and Na_2CO_3 is heated rapidly to 500—600° in shallow Fe trays to produce solid $Na_4As_2O_7$ and NO. A. R. P.

Treatment of crude phosphates. A. Foss, Assr. to Norsk Hydro-Elektrisk Kvaelstof A./S. (U.S.P. 1,983,024, 4.12.34. Appl., 20.5.33. Norw., 21.5.32).—Native $Ca_3P_2O_8$ or calcined bone meal is dissolved in sufficient HNO_3 to form H_3PO_4 and $Ca(NO_3)_2$, and the solution is filtered and evaporated with NH_4NO_3 and cooled to separate crystals of $5Ca(NO_3)_2,NH_4NO_3,10H_2O$. The mother-liquor is neutralised with NH_3 to form $(NH_4)_2HPO_4$ and any ppt. of Ca_3PO_4 is returned to the first stage. A. R. P.

Production of disodium phosphate. N. C. Lindberg, Assr. to Victor Chem. Works (U.S.P. 1,984,146, 11.12.34. Appl., 16.7.32).—H_3PO_4 is neutralised with Na_2CO_3, then with Na_3PO_4 to give a solution of d 1·57 which is boiled to ppt. $FePO_4$ and $AlPO_4$ impurities, diluted to d 1·40—1·45, again boiled for 30 min., filtered hot, and set aside to crystallise. A. R. P.

Composition of matter [filler for papers, textiles, etc.]. C. H. Champion, Assr. to R. T. Vanderbilt Co., Inc. (U.S.P. 1,984,173, 11.12.34. Appl., 13.5.31. Renewed 25.10.34).—Claim is made for a dry mixture containing 75—90% of $CaCO_3$ and a 1—5 : 1 mixture of alum and CaO ; when mixed with H_2O a uniform suspension of $CaCO_3$ in $Al(OH)_3$ is obtained suitable for use in paper-surfacing etc. A. R. P.

Calcium sulphite and paper containing same. G. Haywood, Assr. to Industrial Chem. Sales Co., Inc. (U.S.P. 1,984,188, 11.12.34. Appl., 8.3.33).—A mixture of casein 12—30 and $CaSO_3$ 88—70% for use as a paper filler is claimed. A. R. P.

Calcination of gypsum. W. B. Senseman, Assr. to Raymond Bros. Impact Pulverizer Co. (U.S.P. 1,984,201, 11.12.34. Appl., 23.3.28).—The mineral is ground in an atm. of hot air in a disintegrator. A. R. P.

Manufacture of acid calcium citrate. A. H. Bennett (B.P. 435,586, 24.8.34).—Aq. citric acid is treated with $\ngtr$ half the amount of CaO or $CaCO_3$ necessary for complete neutralisation, whereby pure $CaC_6H_6O_7,3H_2O$ separates in crystals. The filtrate is then treated with more CaO to bring the total added to two thirds of the theoretical ; a further crop of crystals is thus obtained. A. R. P.

Manufacture of lead arsenate. O. F. Hedenburg, Assr. to Grasselli Chem. Co. (U.S.P. 1,984,305, 11.12.34. Appl., 12.7.32).—Kerosene (2 gals.) is thoroughly mixed with an aq. paste of PbO (1000 lb.), and the requisite quantity of H_3AsO_4 is added with vigorous stirring ; the ppt. of $Pb_3As_2O_8$ is collected, washed, dried, and heated to expel the oil, leaving a loose powder readily wetted by H_2O. A. R. P.

Treatment of ferric oxide used for removal of sulphur impurities from gases. G. Keillor, sen., F. B. and R. D. Keillor (B.P. 436,211, 16.3.34).—Spent oxide from gas desulphurisers is heated in steam at the m.p. of S to remove malodorous constituents and the product is used as a soil insecticide. A. R. P.

Treatment of beryllium-bearing ores. C. James, Assr. to Skinner & Sherman, Inc. (U.S.P. 1,982,873, 4.12.34. Appl., 27.10.28).—Beryl is fused with CaO and coke in a blast furnace to yield a fusible slag, which is ground and digested with H_2SO_4. The solution is filtered and treated with $(NH_4)_2SO_4$ to recover the Al as alum, the mother-liquor is neutralised and boiled with Na_2S to ppt. FeS and the remainder of the Al as $Al(OH)_3$, and the Be is recovered from the filtrate as basic carbonate by addition of aq. NH_3 and $(NH_4)_2CO_3$. A. R. P.

Treatment of aluminium-containing raw materials. E. L. Rinman (B.P. 435,870, 3.4.34).—Clay is roasted at 600° and digested with HCl to extract Al etc., leaving a residue of SiO_2 suitable for use as an adsorbent. The solution is treated with a mixture of CaO and $Ca(AlO_2)_2$ (I) until neutral, evaporated to dryness, and heated in steam at 1000—1200° to recover the HCl and form a mixture of CaO and (I), part of which is used again in the process and the remainder digested with aq. Na_2CO_3 to recover $NaAlO_2$ (II). Alternatively, after neutralisation of the HCl solution as above, the ppt. is removed and part digested with NaOH to produce (II) while the remainder is mixed with the mother-liquor, and the mixture dried and heated in steam as in the first procedure. A. R. P.

Purification of carbon dioxide gas. F. J. Metzger and A. A. Backus, Assrs. to Air Reduction Co., Inc., and U.S. Industrial Alcohol Co. (U.S.P. 1,982,223, 27.11.34. Appl., 14.3.31).—Odours and moisture are removed from CO_2 for the manufacture of solid CO_2 by passing the gas after the first stage of compression through activated C and after the second and third stages through a column of granular porous Al_2O_3. A. R. P.

Stabilisation of hydrogen peroxide solutions. B. Laporte, Ltd., I. E. Weber, and W. S. Wood (B.P. 435,401, 17.3.34).—HPO_3 or $NaPO_3$ (0·05—1%) and about 0·1% of phenacetin or Na salicylate are added as stabilisers. A. R. P.

Sulphur preparation. C. J. Ramsburg, Assr. to Koppers Co. of Delaware (U.S.P. 1,983,399, 4.12.34. Appl., 5.8.31).—Crushed rock S is heated with hydrocarbon oil or in a current of coal gas to form H_2S, which is absorbed in Fe_2O_3 or in aq. NaOH and the product is treated with an O_2-containing gas to liberate colloidal S. A. R. P.

Extraction of halogens from fluids. Kodak, Ltd. (B.P. 435,738, 26.3.35. Fr., 31.3.34).—Polyvinyl alcohol (obtained by hydrolysis of the acetate with KOH in EtOH solution) (10 pts.) is dissolved in 100 pts. of H_2O, the solution is cooled, treated with 24 pts. of conc. HCl and 9 pts. of 40% CH_2O, and stirred until it begins to become opalescent ; it is then poured into a mould and set aside until it becomes a white elastic mass, which is washed free from acid and used either as an absorbent for removing I from dil. aq. solutions or in gas-masks for absorbing Cl_2 from the air. A. R. P.

Manufacture of alkali cyanides. E I. Du Pont de Nemours & Co. (B.P. 442,528, 8.8.34. U.S., 8.8.33).—See U.S.P. 1,966,253 ; B., 1935, 1043.

Stable preps. containing active halogen.—See III. **Portland cement.**—See X. **Caustic alkali and Cl_2 from brines.**—See XI. **Fertilisers.**—See XVI.

VIII.—GLASS ; CERAMICS.

Heat-resisting glassware with special reference to tests for quality. S. F. Dunkley (Gas World, 1936, **104**, 172—178).—The composition and physical properties of the glass are briefly described and the various tests for resistance to thermal shock discussed. As a result of numerous trials, it is recommended that glasses be classified as "*A*"-quality glass, for extreme conditions, *i.e.*, for use with high-pressure gas, outdoor electric lamps, multiple-superheater gas ; "*B*," for normal conditions, with indoor electric lamps, low-pressure gas, etc. ; and "*C*" for purely decorative illumination. After a period of operation of 1 hr. followed by a lapse of 30 sec. between extinction and immersion, quality "*A*" should withstand quenching in H_2O at 10°. The corresponding figures for qualities "*B*" and "*C*" are 45 and 90 sec., and 55° and 100°, respectively. J. A. S.

Gaseous inclusions in glass. Determination of their nature. H. Schilling (Chem.-Ztg., 1936, **60**, 149).—Inclusions are caused by too low (bubbles are on the surface only and are retained by surface tension) or too high a temp. of the melt (distillation of free alkali), too fine a state of division of the mixture (trapped air forms bubbles too small to coalesce), or SO_2 from added sulphate. The faulty glass is powdered under boiled H_2O and the evolved gas examined; alkali is determined by grinding under dil. H_2SO_4, filtration, and evaporation of the filtrate. R. S. C.

Tear-tempering of glass rods. M. Eichler (Z. Physik, 1935, 98, 280—282).—Tensile strength of glass rods decreases with decreasing rate of loading below 140°, but above this temp. it increases. A. B. D. C.

Absorption of radiation by transparent media [glasses]. G. Bozza and I. Secchi (Chim. e l'Ind., 1935, 17, 687—689).—The % of the total radiant energy of normally incident sunlight reflected, absorbed, and transmitted by plates of various glasses, including plain glass plates and glass coated with Co glass, glass plates cemented together, etc., have been determined. D. R. D.

Priest–Lange reflectometer applied to nearly white porcelain enamels. I. G. Priest (J. Res. Nat. Bur. Stand., 1935, 15, 529—550).—The theory, construction, and manipulation of the instrument are described. Measurements with porcelain enamel surfaces are described. H. J. E.

Standardisation of the testing of enamels against chemical attack. W. Dawihl (Chem. Fabr., 1936, 9, 15—18).—Suggestions are made for a generally applicable method of testing enamel. The surface method is better than the powder method in taking account of the effect of firing on the surface layer, and the use of a coated rod decreases the effect of material not covered by the attacking liquid. 10% aq. HCO_2H is a suitable attacking agent for ordinary ware enamel, tests being made at the b.p. and for ½ hr. The extent of attack is measured when possible by loss in wt.; if the solution is evaporated and ignited, account must be taken of the loss of H_3BO_3. J. W. S.

New German ceramic raw materials from pure oxides for the construction of chemical apparatus. E. Ryschkewitsch (Chem. Fabr., 1936, 9, 12—14).—Recent developments in the use of Al_2O_3, BeO, ZrO_2, MgO, ThO_2, and MgO,Al_2O_3 in the ceramic industry are described and their several applications in the manufacture of chemical equipment discussed. J. W. S.

Steel-ladle refractories. A. Jackson (Metallurgia, 1936, 13, 93—94).—Properties of refractories used for lining the ladles, and the defects in ingots arising from the use of unsuitable materials, are discussed. W. P. R.

Tentik emery. A. V. Znamenski (J. Appl. Chem. Russ., 1935, 8, 1373—1379).—Emery from the Tentik deposits is contaminated with about 55% of sand or clay; its active SiO_2 content is given approx. by $A = x - 3{\cdot}8y$, where x is the total SiO_2 and y the $Al_2O_3 + Fe_2O_3$ content, or, more exactly, by $k = -\log_e A/(A - E)$, where k is const. for a given sample, n is the no. of extractions with aq. Na_2CO_3, and E the total amount of SiO_2 dissolved in n extractions. Admixture of emery to cement retards setting; its beneficial effects become apparent after $\nless$ 3 months, and may depend on binding of excess $Ca(OH)_2$, or on its structural effect. Heating reduces the active SiO_2 content of emery except in presence of contaminants (sand). R. T.

Talc and soapstone.—See VII.

Patents.

Purification of sand [for glass manufacture]. T. Earle (U.S.P. 1,983,270—2, 4.12.34. Appl., [A] 26.1.31, [B] 19.9.32, [C] 15.12.30. Renewed 10.4.34).—(A) The sand is just moistened with dil. H_2SO_4 and heated at about 200° to concentrate the acid and cause it to react with the Fe_2O_3 on the surface; after cooling, the acid and salts are washed out with H_2O and the purified sand is dried. (B) A small amount of conc. H_2SO_4 is thoroughly mixed with the sand to coat the surfaces of the grains without impeding the free flowing of the sand, and the mixture is treated as in (A). (C) Either of the above mixing operations is carried out in a rubber-lined mill to loosen conglomerated particles before heating. A. R. P.

Ultra-violet ray-transmitting glass. K. Fuwa and F. Suzuki, Assrs. to Gen. Electric Co. (U.S.P. 1,983,359, 4.12.34. Appl., 25.10.32. Jap., 14.11.31).—To reduce the Fe_2O_3 in the ordinary soda–lime glass the charge is mixed with NaF 1—5 and $(NH_4)_2C_2O_4$ 1—5%. A. R. P.

Manufacture of refractory products from raw materials rich in magnesium orthosilicate, particularly olivine rocks. V. M. Goldschmidt (B.P. 441,516, 19.1.35. Austr., 13.7. and 20.9.34).—Products with substantially const. vol. are obtained by heating (to $<$ the softening point) olivines containing considerable amounts of impurities, provided that the material contains $\nless$ 60% of MgO,SiO_2, $\ngtr$ 10% of Fe (calc. as FeO), $\ngtr$ 10% of hydrosilicates, $\ngtr$ 20% of rhombic and 10% of monoclinic pyroxene, and $\ngtr$ 10% of felspar. Further additions of finely-divided Cr_2O_3 or its compounds (0·3—10% of Cr_2O_3) or corundum, spinel, or TiC (0·3—2%) may be made. J. A. S.

Furnace walls.—See I. **Cutting glass.**—See X.

IX.—BUILDING MATERIALS.

Constitution of cement clinkers. System $CaO–Al_2O_3–SiO_2$ and its application to the study of cement clinkers. B. Tavasci (Chim. e l'Ind., 1935, 17, 461—472).—The method of examining microscopically samples of the material etched by means of different liquids has been applied to the portion of the system $CaO–Al_2O_3–SiO_2$ covering the compositions of cement clinkers, synthetic mixtures and actual cements being examined. The compound described previously (A., 1915, ii, 51) as $3CaO,5Al_2O_3$ does not exist, but there is a *compound* $CaO,2Al_2O_3$, which decomposes at 1765° into Al_2O_3 and a liquid phase. The corr. diagram for the Al_2O_3-rich portion of the system $CaO–Al_2O_3$ is given. D. R. D.

Preservation of wood. H. Ramstetter (Chem.-Ztg., 1936, 60, 173—176).—Treatment of wood with chloronaphthalene vapour as a preservative against both fungi and insects gives good results owing to the low vapour tension and complete insolubility in H_2O of the reagent. Wood so treated retains an odour which is, however, quite harmless to human beings. It should be applied before painting with a fire-resistant paint. C. I.

Relative wood-preservative efficiency of the ter- and quadri-valent forms of arsenic. S. Kamesam (Current Sci., 1935, **4**, 409—410).—Of two sets of 12 specimens of wood exposed to the weather for 42 months after treatment with 2·5% aq. As_2O_3 and As_2O_5, 7 in each set were destroyed. Similar tests with 1·5% solutions gave results slightly in favour of As_2O_5. N. M. B.

Utilisation of wood waste. N. C. Jones (Chem. and Ind., 1936, 92—93).—The crushed waste is compressed into combustible logs. C. W. G.

Wood–water relationships. I. Molecular sorption and capillary retention of water by Sitka spruce wood. W. W. Barkas (Proc. Physical Soc., 1936, **48**, 1—17; cf. B., 1935, 497).—By flooding the wood-flour with aq. sucrose after evacuation (so that only true mol. sorption affects the concn. of the solution), and measuring the change in concn. with an interferometer, an attempt is made to distinguish between the amount, w_a, of H_2O held by mol. sorption and that, w_c, held by capillary retention. Owing to minute adsorption of sucrose by the wood results are inconclusive, but a min. val. of w_a is found, varying with the v.p. of the solution and amounting at infinite dilution to about 23% of the dry wt. of the wood. The difference between the total sorption measured on the v.p. isothermal and the min. val. of w_a is taken to represent the max. val. of w_c. N. M. B.

Wood tanks. Equipment for chemical process industries. C. R. Harte, jun. (Ind. Eng. Chem., 1936, **28**, 176—179).—The different timbers used, method of erecting a tank, economic considerations, and the physical effects of a no. of liquids on different timbers are described and illustrated. D. K. M.

Sintering etc. of [cement] powders.—See I. **Asphalt–bitumen emulsions.**—See II. **Emery [in cement].**—See VIII. **Efflorescence of concrete under stored cacao beans.**—See XIX.

Patents.

Acoustical (A) concrete, (B) plaster. L. B. Eaton, Assr. to Kalite Co., Ltd. (U.S.P. 1,983,021—2, 4.12.34. Appl., [A] 17.3.31, [B] 19.8.33).—(A) Sound-absorbent concrete consists of a 6 : 1 mixture of volcanic pumice ballast and Portland cement mixed with a gelatinous solution of glue and alum. (B) Soundproof plaster for facing walls consists of a mixture of pumice powder (minus 20- to plus 100-mesh), plaster of Paris, an albuminous frothing agent, *e.g.*, blood- or egg-albumin, and dextrin. A. R. P.

Substances for use as foundations, pavement and like surfaces, bankings, fillings, etc. W. J. Woodfine (B.P. 441,503, 9.8.34).—Common earth 24 cwt., pitch 4 cwt., and creosote oil 18 gals. are mixed and applied hot. The mixture may be sandwiched with stone rubble. B. M. V.

(A) Reduction of permeability of structures and granular masses. (B) Consolidation of granular mineral masses. H. G. Lloyd (B.P. 441,568 and Addn. B.P. 441,943, 17.9.34).—Induration is effected by the injection separately of solutions of $Ca(HCO_3)_2$ and $Ca(OH)_2$. (Cf. B.P. 416.391; B., 1934, 1013.) B. M. V.

Production of building materials similar to xylolite. P. Engels (B.P. 441,933, 28.7.34).—Cleaned straw chaff or meal is mixed with Sorel cement. B. M. V.

Surfacing of [worn] roadways [by heat etc.]. F. C. Rands and T. F. N. Alexander (B.P. 441,575, 23.11.34).

Asphalt.—See II. **Hydraulic lime.**—See X.

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

Low-temperature reduction of magnetite ore. Effect of catalytic compounds. G. C. Williams and R. A. Ragatz (Ind. Eng. Chem., 1936, **28**, 130—133; cf. B., 1933, 108).—The reduction of magnetite by metallurgical coke and hardwood charcoal at 900° in presence of fixed proportions of a wide variety of compounds shows that the rate of reduction is greatly accelerated by Na, K, and certain Ca compounds, and that their catalytic action is a function of their concn. The presence of SiO_2 tends to inhibit the catalytic effect of Na_2CO_3. Hardwood charcoal is a more effective reducing agent than metallurgical coke. W. P. R.

Relation between the constitution of oölitic minerals and the nature, formation, and entrapment of blast-furnace dust. J. P. Arend, A. Jungblut, and C. Aschman (Rev. Mét., 1936, **32**, 363—392).—The variation of properties with the grading of blast-furnace dust, especially the chemical composition, sp. wt., and the hydration capacity, enables a close relation to be established between blast-furnace dust and oölitic minerals. A petrographic study of the origin of oölites indicates the mode of formation of the different constituents of blast-furnace dust. The problem of cleaning blast-furnace gas is treated by aërodynamical methods, and the theory advanced is confirmed by results obtained in a small-scale cleaning plant. W. P. R.

Austenitic cast irons. P. A. Russell (Foundry Trade J., 1935, **53**, 325—327).—Addition of $\not> 0{\cdot}30\%$ of P to an alloy cast Fe containing C 3, Si 1·5, Mn 1·0, Ni, 12—15, Cu 5—7, and Cr 2% increases the soundness but lowers the strength and ductility. W. P. R.

Effect of mixed acids on irons and steels. J. Eddy and F. A. Rohrman (Ind. Eng. Chem., 1936, **28**, 30—31).—The rate of dissolution of a series of standard "S.A.E." C- and low-alloy steels in H_2SO_4–HNO_3–H_2O mixtures indicates that high-C steels retain their passivity longer than low-C steels. Max. resistance to mixed acids is obtained by quenching the steels. W. P. R.

Cementation of iron and ferrous alloys by beryllium. J. Laissus (Rev. Mét., 1935, **32**, 293—301, 351—360, 401—422; cf. B., 1935, 311).—Cementation of Fe by Be is carried out by heating specimens packed in Be powder (98% purity) in a closed box, which is then placed in a second box containing C. The influence of time, temp., and C content of the Fe has been investigated and thickness and character of the Be deposit were examined by microscopical means. The surface hardness (Brinell) of 0·9% C steel "cemented" with Be at 1000° is 1506, which is > that of nitrided steels. The effect of a Be deposit on the resistance to scaling at high temp. and to corrosion by various reagents is described. W. P. R.

Nitrogen content and structural abnormality of sintered carbonyl steels. H. Cornelius and H. Esser (Arch. Eisenhüttenw., 1935—6, **9**, 367—368).—Commercial carbonyl Fe contains 0·015—0·021% N, which is probably due to combination of the fine Fe powder with N_2 at 250°, at which temp. the $Fe(CO)_5$ is decomposed, or to the introduction of NH_3 into the atm. in which it is decomposed to prevent deposition of C on the Fe particles. The presence of N in no way affects the structural abnormalities of carbonyl steels. A. R. P.

Preparation of steel to avoid porosity in castings. C. E. Sims (Trans. Amer. Foundry Assoc., 1935, **6**, 323—338).—A discussion of optimum conditions. Ch. Abs. (*e*)

Relationship of moulds and cores to porosity in steel castings. G. Batty (Trans. Amer. Foundry Assoc., 1935, **6**, 339—363).—A review and discussion. Ch. Abs. (*e*)

Foundry parting powder. M. Barrett (Chem. & Ind., 1935, 902).—The sections of sand moulds may be separated by a powder containing tripoli (I) (98%) and a H_2O-repellent material such as Al stearate (II), intimately mixed by adding a colloidal suspension of (II) in aq. NH_3 to the finely-ground (I). E. H. B.

Prevention of formation of abnormal structure in carburised steel. I. H. Sawamura (Tetsu-to-Hagane, 1935, **21**, 67—72).—Abnormal structure was found in Armco Fe carburised in a mixture of charcoal powder and $BaCl_2$ at 900° and 1000°. It was scarcely evident in specimens carburised in hydrocarbon gases (especially C_2H_2) at 900°. If the effect is due to the presence of O in the steel, the hydrocarbons may deoxidise and carburise simultaneously. Ch. Abs. (*e*)

Recent progress in special steels. (Sir) R. Hadfield (Metallurgia, 1935, **13**, 11—14).—Advances made in heat- and corrosion-resisting, tool, magnet, high-tenacity, and structural steels in the last 10 years are briefly reviewed. A. R. P.

Progress in corrosion- and heat-resisting steels. W. H. Hatfield (Metallurgia, 1935, **13**, 41—44).—The former class includes "Staybrite" with additions of W and Ti, to eliminate weld decay, or Mo, to increase resistance to AcOH and H_2SO_4; other such steels are one with Ni 12—13, Cr 12—13% and another with Ni 2, Cr 16—20%. Heat-resisting steels include plain-Cr, Cr–Ni, and Cr–W types. E. H. B.

Melting ferromanganese in tar-oil furnaces. J. Haag (Stahl u. Eisen, 1936, **56**, 40—47).—The properties of tar and tar oil as fuels are discussed, and the construction of suitable burners and furnaces is described. There are advantages in the use of molten instead of solid ferromanganese in steel-making, and it can be cheaply and efficiently melted in tar-oil furnaces. W. P. R.

Recent applications of molybdenum in metallurgy. J. Cournot (Rev. Mét., 1936, **32**, 562—576).—The properties of rolled and forged steels, cast steels, and special cast Fe, containing up to 1% of Mo. are described. W. P. R.

Formation of flakes in nickel–chromium–molybdenum steels. I. Musatti and A. Reggiori (Rev. Mét., 1936, **32**, 531—551).—Although the formation of flakes in steel can be avoided by slow cooling from the forging temp. to 200°, thermal stresses set up by more rapid cooling are not high enough to cause internal rupture. Plain C, Ni–Cr, and Ni–Cr–Mo steels show flakes if they are quenched in H_2O after annealing for 7 hr. in H_2 at 1150°, but the same steels are free from defect if they are annealed in N_2. If quenched from 700° after a 7-hr. anneal in H_2 at 1130° flakes are present, but are absent if the steels are annealed at 800° in H_2 and quenched in H_2O. In every case the Ni–Cr–Mo steel is more liable to give rise to the defect than the Ni–Cr steel. The formation of flakes is stated to be caused by the high pressure of H_2 liberated at the lower temp. W. P. R.

Flakes in forged steel. L. Guillet and M. Ballay (Rev. Mét., 1936, **32**, 522—529).—The tendency for alloy steels to develop flakes varies with the composition and the method of manufacture, acid open-hearth steels being less liable to show the defect then basic steels. If the H content is an important factor, methods of degassing before pouring the ingot should be effective in overcoming the trouble. To avoid the formation of flakes in susceptible steels, ingots should be rolled before cooling and the rate of cooling from forging temp. to 200° should never exceed 1°/min. W. P. R.

Influence of the common alloying elements on the properties of steel. E. C. Bain (Rev. Mét., 1936, **32**, 553—561).—An element may affect the properties of steel (1) by entering into solid solution with ferrite, (2) by affecting the distribution of the Fe_3C, (3) by forming complex carbides, (4) by lowering or suppressing the phase changes, and (5) by forming oxides and altering their distribution. Of these influences (4) is the most important. (5) affects the grain size of the austenite at the usual quenching temp. and has some influence on the mass effect in hardening by quenching. A table is included which gives the effect on the hardness, and other properties of steel, of additions of Mn, Si, Cr, Ni, Mo, W, V, Ti, Co, Al, Zr, and Cu. W. P. R.

Manufacture of ferrocerium. H. Foelsch (Chem.-Ztg., 1935, **59**, 1036—1038).—Mischmetall produced by electrolysis of fused rare-earth chlorides contains Ce 49·5, La + Pr + Nd 44, Fe 4·5, Al 0·5, Ca 0·3, Si 0·5, and C 0·7%; for the prep. of Fe–Ce for the flints of automatic lighters the alloy is melted with 20% of Fe and 7·5% of a 1 : 1 Mg–Zn alloy under a layer of fused chlorides at 1100° and cast in a rod mould preheated to 800—900° and surrounded with an insulating bed of sand. The rods are allowed to cool very slowly to room temp. before removal from the mould; rapid cooling renders them almost non-pyrophoric. A. R. P.

Iron sand. I. Manufacture of vanadium steel from Hisagi sponge iron. K. Uyeno (Rep. Imp. Ind. Res. Inst., Osaka, 1931, **12**, Pt. 14, 74 pp.).—Japanese Fe sand contains 0·03—0·4% V. The production and properties of V steel are discussed. Ch. Abs. (*e*)

Beryllium-iron alloys. W. Kroll (Met. & Alloys, 1936, **7**, 24—27).—Fe–Be, Fe–Ni–Be, and Fe–Ni–Cr–Be alloys are briefly discussed. It is suggested that Be may find use in deoxidation and desulphurisation of special steels. E. H. B.

Determination of nitrides in steel by the combustion method. R. Maeda (Tetsu-to-Hagane, 1935, **21**, 22—26).—The Pregl–Dumas combustion method is modified and applied to determine N in nitrides of Fe, Si, Al, Cr, Ni, Mn, Ti, V, and Zr, and their alloys. Higher vals. than by the distillation method were obtained for nitrides of Si, Al, Ni, V, and W, probably owing to the insolubility of these nitrides in acids. Ch. Abs. (*e*)

Determination of arsenic in steel. G. J. Veinberg and T. V. Piradjan (Rep. Centr. Inst. Met., 1934, No. 16, 185—189).—The sample is dissolved in aqua regia, and excess oxidising agent removed with NH_4CNS or KCNS. S is filtered off and As pptd. by $SnCl_2$ and set aside in the warm. The As ppt. is collected, washed with cold H_2O, dissolved in HNO_3, oxidised with 4% aq. $KMnO_4$, neutralised with aq. NH_3, acidified with HCl, treated with KI, and titrated with $Na_2S_2O_3$. Ch. Abs. (*e*)

Judging the purity of steel by deep-etching. E. Houdremont and H. Schrader (Arch. Eisenhüttenw., 1935—6, **9**, 273—275).—The deep-etching test does not yield satisfactory results on hot-forged steel since in this state there is a preferential attack on the grain boundaries, especially when the grain size is large ; the specimen should therefore be annealed at 800—850°, quenched in H_2O (hypoeutectoidal steel) or in oil (eutectoidal or hypereutectoidal steels), and tempered at 670—620°. Phosphide inclusions are revealed by deep-etching longitudinal sections, and sulphide inclusions by similar treatment of transverse sections. The deep-etching test affords a rapid means of distinguishing between steels made by different processes, but the results are not a good guide to the quality of the steel from the viewpoint of the engineer. A. R. P.

Action of carbide etching reagents. R. Mitsche (Arch. Eisenhüttenw., 1935—6, **9**, 311—312).—The only suitable etching reagents for the carbides which occur in steel are those containing oxidising agents and OH' ; the best is an alkaline solution of $KMnO_4$, which stains the carbides various shades of brown. It is suggested that the action is due to the formation of local cells between the ferrite and cementite, whereby the $Fe^{\cdot\cdot}$ dissolved from the former is oxidised by the $KMnO_4$ and deposited on the surface of the latter. A. R. P.

Tempering of high-speed steel. O. W. Ellis (Metal Progr., 1935, **28**, 85—87).—The results of a co-operative experiment, in which a high-speed W–Cr–V steel was subjected to a prescribed heat-treatment, are recorded in graphical form. W. P. R.

Influence of heat-treatment between the A1 and A3 points on the structure and notched toughness of low-carbon ingot steel. E. Dobinsky and H. Hanemann (Arch. Eisenhüttenw., 1935—6, **9**, 359—366).—The resistance to impact of notched bars of mild steel with $\not> 0{\cdot}3\%$ C after annealing at a temp. between the A1 and A3 points is superior to that produced by normalising due to a finer distribution of the pearlite. The distribution and structure of the pearlite areas alone determines the notched toughness, grain size being without effect. A. R. P.

Hydrogen as the cause of low elongation and reduction in area of steel. C. Drescher and R. Schäfer (Arch. Eisenhüttenw., 1935—6, **9**, 327—331).—Experiments are described which indicate that the cause of low elongation figures in tensile tests on steel and the formation of a flock-like fracture is adsorbed H_2. A prolonged low-temp. (100—500°) anneal removes this H_2 and increases the elongation and reduction in area of rolled steel ; it also increases the tensile strength of cast steel. A. R. P.

Internal fissures in railroad rails. H. F. Moore (Metal Progr., 1935, **28**, 46—52).—Examination of stresses existing on the rail during service indicate that they approach the ultimate shear strength of the rail. The development of internal fissures is closely related to the occurrence of shatter cracks, and at present there are no ready means of detecting such cracks in rails. W. P. R.

Elasticity relations in welded joints and their resistance to vibratory tensile stresses. E. Diepschlag, A. Matting, and G. Oldenburg (Arch. Eisenhüttenw., 1935—6, **9**, 341—345).—The endurance limit of welds is lower the greater is the difference between the deformability of the basis metal and the weld metal ; the latter, therefore, should be chosen to give a weld having the same elastic properties as the basis metal, or, in large structures, the weld should be inclined to the direction in which the vibratory stresses are conc. A. R. P.

Oxidation of iron and steel at elevated temperature, and the structure of the scale. K. Endo (Rep. Res. Lab. Nippon-Seitetsu, Yawata Steel Works, 1935, **14**, No. 2, 1—16).—Data for the wt. increase due to oxidation of six C steels (0·11—0·62% C) are recorded. The outer parts of the oxide film consisted of Fe_2O_3, the middle was Fe_3O_4, and the inner part a mixture of Fe_3O_4 and FeO. Ch. Abs. (*e*)

Corrosion. F. Tödt (Chem. Fabr., 1936, **9**, 1—2).—A summary of modern theories and problems in corrosion research. J. W. S.

Standardisation of corrosion specifications and corrosion tests. F. Tödt (Chem. Fabr., 1936, **9**, 3—4).—The importance of the geometrical form of the test-sample as well as its surface area and previous history is emphasised. Conditions which require specification for conducting corrosion tests are summarised. J. W. S.

Organic inhibitors of corrosion. Aliphatic amines. C. A. Mann, B. E. Lauer, and C. T. Hultin (Ind. Eng. Chem., 1936, **28**, 159—163).—The inhibition of corrosion of mild steel in acid solution by NH_3 and aliphatic amines has been measured. It is due to adsorption of inhibitor ions on the metal surface and increases with the mol. wt. of the amine, whilst *tert.*- > *sec.*- > primary amines in effect. NBu^a_3, *n*-di- and tri-amylamines are excellent inhibitors, inhibition being practically complete with 0·66, 0·34, and 0·13%, respectively, in *N*-H_2SO_4. S. C.

Influence on the working conditions in tinning [iron] on the porosity of tinplate. F. Peter and G. Le Gal (Arch. Eisenhüttenw., 1935—6, 9, 285—287).—The porosity of tinplate made by the hot-dipping process depends chiefly on the cleanliness of the Fe surface and on the thickness of the Sn coating. The presence of impurities in the flux and the presence of adsorbed H_2 from the pickling operation play only minor rôles in the production of porosity. A min. thickness corresponding to a deposit of 100 g. of Sn per sq. mm. is required before a completely non-porous layer is obtained, and then only if the Fe surface is perfectly clean and bright before immersion in the Sn bath. A. R. P.

Reactions of iron with molten zinc. W. Püngel, E. Scheil, and R. Stenkhoff (Arch. Eisenhüttenw., 1935—6, 9, 301—304).—Fe is attacked by molten Zn in the galvanising bath in one of two ways : (*a*) a dense protective layer of $FeZn_3$ (I) is formed, the reaction soon becomes very slow at const. temp., and the rate of dissolution of the Fe increases only slowly with rise in temp. ; (*b*) a thick fibrous layer of $FeZn_7$ (II) it formed which continues to increase in thickness as const. temp. and allows fairly rapid dissolution of the Fe to take place ; the needle-like crystals of (II) sometimes assume remarkable crystal patterns. There is a crit. temp., depending on the nature of the steel, above which (I) is always formed instead of (II) ; this temp. is lowered when the steel contains Cr and Al and raised by C or Cu. A. R. P.

Statistical microscopical study of ores and mill products from the Anyox plant of the Granby Consolidated Mining, Smelting, & Power Co., Ltd., Anyox, British Columbia. R. E. Head, A. L. Crawford, F. E. Thackwell, and A. L. Christensen (U.S. Bur. Mines Rept. Invest. 3290, 1935, 18 pp.).—Briquettes of the primary mill heads and flotation concentrates, middlings, and tailings of a Cu-bearing ore have been examined microscopically and their mineralogical constitution is ascertained. E. H. B.

The Balimbing Mine, West Coast of Sumatra. D. W. J. Grey (Bull. Inst. Min. Met., No. 375, 1935, 48 pp.).—The ore is a much-weathered, ferruginous clay containing quartz, felspar, pyrite, marcasite, and zircon with 3—6 dwt. of Au per ton. Direct cyanidation is impossible owing to difficulties in settling and filtering ; classification removes about 30% of the ore as a thin clayey suspension from which the Au cannot be economically recovered, but it permits cyanidation of the remainder. The best recoveries are obtained by wet grinding, passing the pulp over blanket strakes to recover the coarse Au as a concentrate containing 500—600 oz. of Au per ton, and treating the tailings by flotation. In this process 4% solutions of $Pb(OAc)_2$ and Na_2S are mixed in a 5 : 2 ratio in a small agitator until part of the pptd. PbS becomes cryst., the mixture is thoroughly incorporated with the pulp, and the latter then floated with the addition of Na_2CO_3 0·9, Aerofloat-15 0·14, and K butylxanthate 0·19 lb. per ton. After re-treatment the concentrates assay 200—300 oz. and the tailings 0·12 dwt. of Au per ton, the total recovery on the strakes and in the concentrates being > 95%, and the total cost of mining and milling 18s. 10d. per ton, of which flotation reagents cost < 11d. A. R. P.

Flotation of pyrites tailings from Karabash concentration plant. S. I. Mitrofanov and I. S. Eliseev (Tzvet. Metal., 1934, No. 8, 57—63).—Cu pyrite tailings (4—5 kg. of CaO per ton of solid) were floated with, and without, addition of H_2SO_4 to the thickened or non-thickened tailings. The first method is applicable where the medium is highly basic. The H_2SO_4 used depends on the CaO (0·8—4·3 kg. per ton for non-thickened, and 0·3—0·8 kg. per ton for thickened, tailings). Ch. Abs. (*e*)

Selective flotation of copper–zinc ore from the deposits "October 15th Anniversary" (Urals). S. I. Mitrofanov and S. I. Kropanev (Tzvet. Metal., 1934, No. 8, 63—69).—The ore contained pyrite, chalcopyrite, sphalerite, and covelline. Analyses are given. NaCN and $ZnSO_4$ (1·2, 1·7 kg. per ton, respectively) were used as Zn-depressing reagents. Cu and Zn flotations were carried out at p_H 7·2—7·4 and 9—10 respectively. Ch. Abs. (*e*)

Effect of particle size on ore flotation. S. M. Jasiukevitsch (Tzvet. Metal., 1934, No. 10, 68—86).—Tests are described on the flotation of galena, Zn sulphide ores, chalcopyrite, pyrrhotite, antimonite, calcite, and quartz with various flotation reagents. Data for the max. floatable particle sizes are given. The *d* of the particles has no effect on floatability. Ch. Abs. (*e*)

Smelting and roasting of ores in the crude state. V. J. Mostovitsch (Tzvet. Metal., 1934, No. 10, 29—35).—Achisaisk ore (Zn 13·6—15·9, Pb 5·13—10·6, Fe 27·4—29·7, SiO_2 8·81—9·4, MgO 4·5—5·5%) was smelted with 20—25 pts. of coal per 100 pts. of ore. No fluxes were required. Recoveries of Zn and Pb were 85—90 and 95%, respectively. Ch. Abs. (*e*)

Extraction of zinc with sulphuric acid from unroasted lead–zinc sulphide ore of Kantaga by the Makovetzki method. A. Makovetzki and V. G. Olesov (Tzvet. Metal., 1934, No. 9, 113—124).—ZnS is converted into $ZnSO_4$ by H_2SO_4. Fe, Al, Ca, Mg, Co, and Mn in the ore also form sulphates, but Cu, Pb, As, Sb, Cd, Ag, and Au remain undissolved. Zn is recovered electrolytically (yield 93—98·8%). The insol. residue is used as a Pb concentrate. Ch. Abs. (*e*)

Fires at the Ural copper pyrites mines and their probable origin. A. P. Schischkov (Tzvet. Metal., 1934, No. 9, 35—55).—Old lumber supports become carbonised by the prolonged action of acidic mine H_2O. When dry this carbonised wood inflames readily. Ch. Abs. (*e*)

Elimination of free sulphuric acid from mine water. A. I. Veselov (Tzvet. Metal., 1934, No. 9, 56—59).—A discussion of the use of CaO to eliminate H_2SO_4 formed from FeS_2. Ch. Abs. (*e*)

Large single crystals of copper. Simplified method for their preparation. J. G. Thompson (Met. & Alloys, 1936, 7, 19—21).—Single crystals several in. long and up to 2½ in. in diam. have been made by cooling in a special graphite crucible within an Arsem furnace. The orientation of the crystals was determined by etching. E. H. B.

Corrosion of copper. G. H. Damon and R. C. Cross (Ind. Eng. Chem., 1936, **28**, 231—233).—The rate of corrosion (*v*) of Cu at 21±2° in unaërated H_2SO_4 decreases with increasing concn. up to 25*N*, *i.e.*, approx. at the point of min. solubility of O_2. *v* is determined by the diffusion of O_2 through the liquid surface, except with liquid surface areas large relative to the area of the specimen. Diffusion of O_2 through the liquid is too rapid to influence *v*. The max. val. of *v*, 40 mg. per 100 sq. cm. per 24 hr., occurs with $0{\cdot}2N$-H_2SO_4. At $< 0{\cdot}2N$ the acid is depleted, and at $> 25N$ the acid oxidises the metal, but no Cu_2S is formed. R. S. B.

Porosity in leaded bronze bushings. A. W. Lorenz (Trans. Amer. Foundry Assoc., 1935, **6**, 311—322).—Factors causing porosity are discussed. One oz. of phosphor-Cu or 1 lb. of Zn per 100 lb. of melt (Cu 80, Sn 7, Pb 13%) produced undesirable shrinkage in heavy sections. Ch. Abs. (*e*)

Creep tests on bearing metals. J. Galibourg, L. Guillet, and Popoff (Rev. Mét., 1935, **32**, 393—397).—Creep curves for temp. from 75° to 175° and loads up to 3 kg./sq. mm. for antifriction metal are given. W. P. R.

New low-melting alloy. S. J. French (Ind. Eng. Chem., 1935, 27, 1464—1465).—The freezing range (72—70°) of Lipowitz eutectic alloy (Bi 50, Pb 27, Sn 13, Cd 10%) is steadily depressed by addition of up to about 20% of In. An alloy containing 18·1% of In freezes sharply at 46·5°, is less oxidisable when molten than Lipowitz alloy, and has a similar degree of ductility and malleability. E. H. B.

Effect of thallium on the f.p. of Lipowitz alloy. S. J. French and D. Saunders (Met. & Alloys, 1936, 7, 22—23).—Additions of up to 6% of Tl progressively lower the f.p. of Lipowitz alloy from 69·7° to 66·6°. The alloys containing Tl supercool even when stirred moderately; otherwise the properties resemble those of Lipowitz alloy. E. H. B.

Recent applications of bismuth. J. Cournot (Mém. Soc. Ing. Civ. France, 1935, 88, 396—405).—The Bi–Pb eutectic (58% Bi), which melts at 125°, solidifies without contraction and is the best material for reproducing surface characteristics by casting. The quaternary alloy Bi 48, Pb 28·5, Sn 14·5, Sb 9% may be used in the precision assembly of metal parts, whilst that of Bi–Cd–Pb–Sn (Wood's or Lipowitz metal) is employed as a filling for tubes during bending. E. H. B.

Alloys for temperatures above 1150°. G. Nordstroem (Metal Progr., 1935, 28, 68—69).—Alloys of the Kanthal type (Cr 25, Al 5, Co 3%) are compared with the well-known 80 : 20 Ni–Cr alloys. Although they can be used as furnace-heating elements at temp. > those suitable for the 80 : 20 alloys, their strength falls rapidly at these temp. W. P. R.

Removal of sulphur from tin and its alloys. A. A. Bulach (Tzvet. Metal., 1934, No. 8, 115—116).—285 kg. of Sn (S 0·2, Fe 0·61%) were heated to 530° and 5 kg. of NaOH were added. Slag was removed after 25 min., 3 kg. of NaOH were added, and slag was again removed in 25 min. The product contained a trace of S and 0·11% Fe. Ch. Abs. (*e*)

One-pulp settlement and filtration in cyanidation of gold ores. R. J. Lemmon (Proc. Austral. Inst. Min. Met., 1935, No. 98, 349—356).—Flocculation of clayey gangues should not generally be made until Au dissolution has proceeded to a max., since the floccules may enshroud the Au particles and prevent their dissolution; drastic flocculation after dissolution of the Au may result in losses due to adsorption of sol. Au on the floccules. When the suspensoids are ferruginous or the H_2O used contains sol. Fe salts, flocculation with CaO or Na_2CO_3 may lead to loss of CN′ as $Fe(CN)_6''''$; this may be greatly reduced by prior addition of Pb salts. When the H_2O contains much $Ca^{\cdot\cdot}$ or $Mg^{\cdot\cdot}$ its η may prevent free settling; this difficulty is best overcome by addition of Na_2CO_3 and $NaAlO_2$ to ppt. part or all of the Cu and Mg and flocculate the ppt., the floccules tending to be adsorbed on the clay particles, which themselves are then flocculated. A. R. P.

Floating gold in sulphide ores by the Brinker process. F. A. Brinker (Min. & Met., 1936, **17**, 103—104).—For the recovery of Au from ores containing pyrite (or arsenopyrite) and stibnite the ore is ground with $CuSO_4$ and NaOH sufficient to ppt. all of the Cu, the pulp is floated with K butylxanthate (I) and cresylic acid to recover the pyrite, and the tailings are floated with $Pb(OAc)_2$, (I), and tar oil. Practically all the Au accompanies the pyrite, but the Sb_2S_3 carries some Au and much Ag. A. R. P.

Bullion parting at the Homestake mine. N. Herz (Min. & Met., 1935, **16**, 500—504).—Bullion obtained from the cyaniding and amalgamation processes contains Au 73—82, Ag 17·5—23, Cu 0·5—3, Pb 0·5—1·5, Fe $\not>$ 0·05, and Sb $\not>$ 0·5%. It is refined by the chlorination process, using clay pots brasqued with borax for the Cl_2 treatment; the chloride slag is ladled off from time to time and the speed of introduction of the Cl_2 reduced as the Au becomes finer. The final purity obtained is > 99·4% Au. The slag is melted with a small amount of Na_2CO_3 and borax to recover entrained Au as an 80 : 20 Ag–Au alloy, which is returned to the chlorination stage, while the residual AgCl is granulated and reduced to Ag by treatment with dil. H_2SO_4 and scrap Fe. The sponge Ag is digested with HCl to remove Cu and then melted under borax and Na_2CO_3. A. R. P.

Gold precipitation improved by adding caustic starch. C. W. Dowsett (Min. & Met., 1936, **17**, 105).—Clarification of the solution obtained in cyaniding oxidised and clayey Au ores is accelerated and improved by addition of a solution made by boiling 2 pts. of starch in 80 pts. of H_2O for 10 min., adding 1 pt. of NaOH, and boiling for a further 10 min. A. R. P.

Precious metals from nickel sulphide ores. H. Komatsubara (Japan Nickel Rev., 1936, 4, 4—17).—Processes used for recovering Ag, Au, and the Pt metals from anode slimes and carbonyl residues obtained in working up Canadian Cu–Ni ores are described, and the properties and uses of the Pt metals are outlined. A. R. P.

Lead and zinc flotation sections of the concentrator of Broken Hill South, Ltd. T. A. Read (Proc. Austral. Inst. Min. Met., 1935, No. 98, 305—348).—The new plant utilises the Cunningham flotation machine, in which the impeller is provided with upper and lower sets of blades separated by a diaphragm, the upper or volute blades acting as a pump and the lower (radial) blades as agitators; in addition, the pulp is delivered by a pipe on to the top of the impeller, which rotates under a flange or cover of the pipe, and provision is made for the return to the cell at the head of the series of low-grade concentrates produced lower down the series. The slimes from the classifiers are fed through rougher cells, and the concentrates from these through cleaner cells to recover a Pb concentrate containing Pb 73, Zn $<$ 5%, and Ag 45—50 oz. per ton, and a Zn tailing containing Pb 0·9 and Zn 14·8% from a feed containing Pb 10·4, Zn 13·6%, and Ag 7·0 oz. per ton. The coarse sand from the classifiers is conc. on Butchart tables to recover a high-grade galena, and the tailings containing Pb 4·5, Zn 14·4%, and Ag 5·6 oz. per ton are floated in scavenging cells to give a concentrate containing Pb 34·1, Zn 23·4%, and Ag 44·1 oz. per ton with a tailing containing Pb 0·9 and Zn 13·3%; the concentrate is reground and re-treated in the slime section. The reagents used in Pb flotation are Na silicate 0·072, K ethylxanthate 0·041, and eucalyptus oil 0·046 lb. per ton. The Zn tailings from both sections are floated together, using $CuSO_4$ 0·933, CaO 0·389, Na-aërofloat 0·163, and eucalyptus oil 0·089 lb. per ton to give a final Zn concentrate containing Zn 53·2, Pb 1·5%, and Ag 1·6 oz. per ton with a tailing containing Zn 1·2, Pb 0·65%, and Ag 0·6 oz. per ton. A. R. P.

Treatment of precious metal matte. C. C. Downie (Metallurgia, 1935, 13, 21—22).—The ground matte is roasted to obtain the max. sulphation of Cu and Ag, leached with 2% H_2SO_4, the Ag pptd. from the leach liquors with scrap Cu, the $CuSO_4$ crystallised, and the leach residue smelted with precious-metal residues and PbO in the blast furnace to recover the vals. in a rich Pb bullion which can be cupelled directly. A. R. P.

Function of platinum in measuring high temperatures. T. Nakada (Japan Nickel Rev., 1936, 4, 113—118).—The characteristics of thermocouples of Pt *versus* 10 and 13% Rh–Pt alloys are shown graphically and briefly discussed. A. R. P.

Platinum metals as materials of construction. F. E. Carter (Japan Nickel Rev., 1936, 4, 21—28).—Various uses of the Pt metals and their alloys are described. A. R. P.

Casting processes for precious metals for dentistry. H. Yamaguchi (Japan Nickel Rev., 1936, 4, 102—112).—The pressure, vac., and centrifugal methods of casting dental plates are described. A. R. P.

Silver–palladium dental alloys. S. Hatada (Japan Nickel Rev., 1936, 4, 75—81).—Suitable alloys for dental plates consist of Ag with 25—30% Pd, with or without a small addition of Rh. The 70 : 30 Ag–Pd alloy has m.p. 1250°, Brinell hardness 75, coeff. of expansion $1·5 \times 10^{-5}$, and tensile strength 49·5 kg. per sq. mm., is highly resistant to corrosion, does not discolour in the mouth, and does not set up electrochemical effects in contact with Au dental alloys or Au solders. A. R. P.

Precious metals for pen nibs. M. Homma (Japan Nickel Rev., 1936, 4, 94—101).—The prep. of 14-ct. Au for fountain-pen nibs and the methods used in welding on and grinding the hard pen-point are briefly described. A. R. P.

Platinum metals for jewellery. Y. Yamamoto (Japan Nickel Rev., 1936, 4, 29—47).—The composition and properties of alloys of Pt with small amounts of precious and base metals are given briefly. A. R. P.

Preparation of potassium by the thermal method from potassium ferrocyanide and cyanide. B. A. Petrov and B. F. Ormont (J. Appl. Chem. Russ., 1935, 8, 1330—1337).—A 2 : 1 mixture of anhyd. $K_4Fe(CN)_6$ (I) and grease-free Fe filings is heated at 550—950° in an Fe oven, with a layer of grease-free Fe wire above it, when the reactions (I) $\rightarrow$ 4KCN + Fe + 2C + N_2 (at 550—850°), and 2KCN $\rightarrow$ 2K + 2C + N_2 (at 850—950°; catalysed by Fe) take place. Any KCN volatilising during the process is decomposed by the Fe wire, and the K distils over into an Fe container. KCN may be substituted for (I) in the above process. The K so obtained is of high purity, and the cost of production is considerably $<$ by the usual methods. R. T.

Recent developments in the manufacture and applications of magnesium and magnesium alloys. W. C. Devereux (Metallurgia, 1935, 13, 47—49).—A brief review of cast and wrought Mg alloys. E. H. B.

Complex alloys of magnesium, based on the magnesium–cadmium system. I. Obinata and M. Hagiya (Tetsu-to-Hagane, 1935, 21, 85—90).—Addition of 0·5—0·6% of Cu, Ni, Ag, or Al to Mg containing 1—10% of Cd hardened the alloy considerably. Sn, Mn, Zn, Sb, and Hg had less effect, and Pb and Te had practically none. The cast alloys were harder than those which were annealed and quenched. Ageing occurred in alloys with Al or Zn. Ni, Cu, Ag, Al, Pb, Te, and Sb lowered the resistance of Mg–Cd alloys to corrosion by H_2O and salt solutions. Ch. Abs. (*e*)

Corrosion of magnesium alloys. II. Corrosion of cast magnesium alloys. III. Influence of heat-treatment on corrosion of cast magnesium alloys. IV. Corrosion of magnesium and Electron in contact with other metals. V. O. Kroenig and G. A. Kostuilev (Trans. Res. Inst. Aircraft Mat. U.S.S.R., 1933, No. 4, 5—58; No. 5, 5—30; No. 7, 5—24; cf. B., 1933, 710). II. Cast Mg, with (max. contents) Al 12·21, Mn 1·16, Zn 3·99, Cu 2, Cd 4·95, Ni 3·10, Si 0·69, and Pb 0·82%, was tested for corrosion in NaCl solution, H_2O, and air. In sea-H_2O, Mn improves the corrosion-resistance of Mg (optimum 0·3—0·4%), but has no effect with distilled or tap-H_2O. Mn increases the resistance of Mg–Al alloys to sea-H_2O. Al similarly increases the resistance of Mg. 5% of Cd improves the resistance of binary alloys in distilled H_2O. Zn has no effect on the corrosion, and Pb and Ni are harmful. 0·1% of Cu improves the corrosion-resistance of Mg–Al–Zn–Mn alloys.

III. Mg alloys with Al, Mn, Zn, Cu, Cd, Fe, Ni, and Si become less homogeneous on heating. Heat-treatment decreases their resistance to corrosion by 3% aq. NaCl.

IV. Tests are described on the corrosion of Mg with Al 0·03, Fe 0·04, and Si 0·02%, and of Electron (Al 8·4, Fe 0·06, Si 0·02, Cu 0·12, Zn 1·02, Mn 0·36%) when placed in 3% aq. NaCl and other salt solutions in closed circuit with a second metal. The corrosion was always increased by this means, the order of decreasing effect of the second metal being Pt, Al, Fe, Ni, Cu, Pb, Mn, Zn, and Hg. Ch. Abs. (*e*)

Aluminium as a [German] domestic material and as a substitute for other metals. H. Schmitt (Z. Metallk., 1936, **28**, 17—19).—An abstract of a lecture. A. R. P.

[Effect of] addition of inhibitors to solutions corroding aluminium. H. Roehrig (Rev. Mét., 1936, **32**, 577—580).—The addition of 0·3—1·0% of nicotine (I) or (I) sulphate to HCl reduces the attack of the acid on Al and Al alloys. In 15 min. the loss of wt. of Al samples in 20% HCl is 239 g./sq. in., which is reduced to 3·8 g./sq. in. if 0·3% of (I) sulphate is added to the acid. Other inhibitors described include $(CH_2Ph)_2S$, Brindisi resin, I, Na_3PO_4, and certain proprietary org. compounds. W. P. R.

Action of dilute acids on aluminium. C. F. Poe, R. M. Warnock, and A. P. Wyss (Ind. Eng. Chem., 1905, **27**, 1505).—Al sheet (Al 99·26, Fe 0·53, Cu 0·03, Si 0·16, Mn 0·00%) has been exposed to *N*-, 0·1*N*-, and 0·01*N*-acids during periods up to 12 weeks at 25°, or with *N*-acids boiled for 30 min. each day; and also Al utensils have been exposed for 5 hr. to simmering 0·1*N*-acids. Of the inorg. acids tested, the halogen acids are the most active; of the org. acids, AcOH and its Cl-derivatives, HCO_2H, and lactic acid are rather active. Results are tabulated for a large no. of acids. E. H. B.

Metallic cementation. III. Cementation by aluminium powder. T. Kasé (Kinz.-no-Kenk., 1935, **12**, 49—66; cf. B., 1936, 197).—The cementation of Al into Fe, Cu, and Ni at 600—1200° was studied. The rate of diffusion of Al increased abruptly at the A3 point of Fe. The cemented surfaces resisted atm. oxidation and corrosion by fused salts at high temp. The Al-cementation surfaces of Fe and Ni were not readily attacked by conc. HNO_3. Ch. Abs. (*e*)

Corrosion of wrought aluminium alloys. V. O. Kroenig and N. D. Bobovnikov (Trans. Res. Inst. Aircraft Mat. U.S.S.R., 1934, No. 16, 4—39).—For duralumin with $> 5\cdot2\%$ of Cu, heat-treatment lowers the mechanical properties. Duralumin-type alloys with 0·5—0·7% of Si are improved mechanically by artificial ageing, and acquire a greater corrosion-resistance after natural ageing. Artificial ageing has the opposite effect, owing to separation of CuAl or MgSi at the grain boundaries. Addition of Cd to Al–Mg alloys does not improve their mechanical properties or corrosion-resistance, either before or after heat-treatment. Alloys with $\not> 8\%$ (optimum 6%) of Mg and $\not> 1\%$ (optimum 0·5—1%) of Mn have good mechanical properties and corrosion-resistance either before or after heat-treatment. Ch. Abs. (*e*)

Structural corrosion of aluminium alloys. G. V. Akimov and A. S. Oleschko (Trans. Res. Inst. Aircraft Mat. U.S.S.R., 1934, No. 18, 3—13, 13—30).—Tests of the corrosion of various Al alloys in 3% aq. NaCl are described. In the system Al–Zn, corrosion is due to uneven distribution of Zn in the alloy grain. In Al–Cu, $CuAl_2$ inclusions serve as cathode areas, and Cu–Al solid solutions as anodes. In Al–Fe, $FeAl_3$ inclusions are strong cathodes. In Al–Mn and Al–Ni, Al_3Mn and Al_3Ni, respectively, serve as weak cathodes. In Al–Mg–Si, Mg_2Si serves as a strong cathode. Ch. Abs. (*e*)

Special apparatus used for testing aluminium alloys. E. J. Pike (Metallurgia, 1935, **13**, 35—37).—Reference is made to the Amsler repeated-impact fatigue-testing machine, a friction tester, the " whirling rig " in which a standard casting is tested under alternating stress, and to an attempt to map internal-stress distribution in heat-treated Al alloys by *X*-ray methods. E. H. B.

Determination of gallium in aluminium. J. A. Scherrer (J. Res. Nat. Bur. Stand., 1935, **15**, 585—590).—The HCl solution of the metal is extracted with Et_2O, when $GaCl_3$ is removed quantitatively. The Et_2O-sol. material is fumed down with $H_2SO_4 + HNO_3$ to oxidise org. matter, and the residue treated with H_2S successively in acid and neutral solution to remove Fe, Sn, etc. Ga is finally pptd. with cupferron (I), and ignited to Ga_2O_3. Alternatively, Cu, Sn, and Fe may first be removed as sulphides, and Ga, V, Ti, and Zr then pptd. together with (I). The ppt. is ignited to the mixed oxides and weighed. The ppt. is fused with $KHSO_4$, $Fe_2(SO_4)_3$ is added, and the solution made alkaline with NaOH. V in solution is determined colorimetrically with H_2O_2. Ti is determined similarly in a H_2SO_4 solution of the ppt., and Zr is finally pptd. with $(NH_4)_2HPO_4$. Ga is then calc. by difference. J. S. A.

Quantitative analysis of aluminium alloys. G. Scheibe and A. Schöntag (Metallwirts., 1936, **15**, 139—141).—Si, Cu, Na, and Mg may be determined rapidly by visual comparison with air lines, the Al spectrum being poor in lines in the appropriate region. Mg may also be determined by comparison with the Cu spectrum, an Al alloy electrode being used with one of Cu. The accuracy attainable is suitable for process control; greater accuracy is obtained by a photographic method. Details of procedure are given. C. E. H.

Use of " economy metals " in chemical apparatus construction. Block (Chem. Fabr., 1936, **9**, 65—67).—The use of welded thin sheet and tubing structures and of plated Cu and Fe sheet for industrial chemical apparatus in place of solid Ni, Ag, Sn, etc. is discussed. J. S. A.

Surface colouring of metals. G. Buchner (Chem.-Ztg., 1935, **59**, 841—843).—A brief review of the principles and methods involved. A. R. P.

Sprayed metal and its uses. E. J. Tangerman (Amer. Machinist, 1935, **79**, 360—363).—A general review of methods and applications. Ch. Abs. (*e*)

Influence of the springing of the tensile machine on the stress–elongation diagram. W. Späth (Arch. Eisenhüttenw., 1935—6, **9**, 277—282).—The effect of the strength of the spring in the machine on the results obtained for the yield point and elongation in tensile tests is discussed. A. R. P.

Consequences of cold-working [metals] and their disappearance with rise in temperature. G. Tammann (Z. Metallk., 1936, **28**, 6—17).—Recent work on the effects of cold-work on the electrical and magnetic properties and hardness of Cu, Ag, Au, Al, Fe, Ni, Pt, and solid-solution alloys of these metals, and on the recovery of these properties on annealing, is critically reviewed. A. R. P.

Separation from supersaturated mixed crystals in a temperature gradient. G. Tammann and W. Boehme (Z. anorg. Chem., 1935, **226**, 87—91).—The relation between hardening and microscopic structure has been determined by subjecting a bar of alloy, of rectangular section, to a suitable temp. gradient, after which Brinell hardness tests are applied, and the microstructure is observed at various positions on the same specimen corresponding to known temp. In Cu containing 6·1% of Ag the increase in hardness coincides approx. with the beginning of the microscopically visible crystallite separation. In a duralumin containing 4% of Cu, and quenched from 500°, no such parallelism is observed. An explanation is offered. F. L. U.

***X*-Ray equipment for studying metals at high temperatures.** W. P. Goss (Metal Progr., 1935, **28**, 163—166).—Apparatus for determining the *X*-ray diffraction patterns of metals at high temp. is described. The specimen takes the form of a wire or ribbon which is heated by the passage of an electric current through it. Temp. of the wire is determined by means of an optical pyrometer. W. P. R.

Nickel–chromium alloys in the high-frequency furnace. F. Jablonsky (Technologist, 1934, **40**, 71—78).—Ni–Cr and Cu–Cr wires are liable to split in the direction of drawing of the wire when used as electrical resistors in high-frequency apparatus. This is due to absorption of gases by the alloy during its manufacture in high-frequency furnaces. Addition of Ca (0·04), Si (0·25), or Ti (0·1%) prevents gas absorption. Manufacturing conditions are described. Ch. Abs. (*e*)

Continuous electric brazing in controlled atmospheres. A. R. Robiette (Machinery, 1935, **46**, 193—196).—The method is described. Steel parts which have been Cu-brazed have an annealed structure with fairly large grain size, owing to heating above 1100°. Parts can be normalised or hardened after brazing. The protective furnace atm. is produced by cracking NH_3 and mixing with air, or by mixing partly burned coal gas or C_4H_{10} with air. Ch. Abs. (*e*)

Peculiarities in the formation of metallic deposits. J. Billiter (Rev. Mét., 1936, **32**, 518—521).—The crystal structure of electrolytically deposited metal is influenced by that of the cathode, and the primary film deposited may also exert similar influence under certain conditions of c.d. and concn. of electrolyte. The conditions producing smooth and rough deposits are discussed. W. P. R.

Motion of liquid around an obstacle during electrodeposition. E. P. Harrison and H. Gollop (Nature, 1936, **137**, 234—235).—Photographs of ridges of Cu deposited on cathode plates moving at certain speeds through the electrolyte are reproduced and discussed. L. S. T.

Study of aluminium–mercury–zinc anodes in acid zinc-plating baths. A. K. Graham and P. G. Kolupaev (Met. & Alloys, 1936, **7**, 14—17).—Sand-cast elliptical anodes containing Hg 0·23, Al 0·3—0·5%, remainder Zn are employed in a $ZnSO_4$–$Al_2(SO_4)_3$–NH_4Cl bath at p_H 2—4 and in other acid zinc baths at p_H 4·0, with temp. $\ngtr$ 50° and c.d. $\ngtr$ 300 amp./sq. ft. without polarisation or sludging. E. H. B.

Removal of cobalt from solutions in the electrolytic production of zinc. V. G. Ageenkov and E. A. Tzagikjan (Tzvet. Metal., 1934, No. 10, 119—144).—Co can be separated from aq. $ZnSO_4$, in presence of As and Te, by Zn powder. Ch. Abs. (*e*)

Silica in the processes of leaching dross and filtering acid pulp at the Electrozinc plant. V. G. Ageenkov and K. M. Mamsurov (Tzvet. Metal., 1934, No. 10, 87—99).—Colloidal SiO_2 in the solution obtained by leaching Zn ore with H_2SO_4 causes difficulties during filtration. The solubility of SiO_2 increases with the temp. of the preliminary roasting and with the initial acidity of the solution. A smaller liquid : solid ratio reduces the solubility of SiO_2 (optimum 10 : 1). Coagulation of SiO_2 occurs in neutral solution, its completeness being $\propto$ [$Fe(OH)_3$]. It does not occur in acid solution, even in presence of considerable $Fe(OH)_3$. The rate of filtration of acid pulp $\propto$ the temp., but does not depend on the duration of heating of the solution. Ch. Abs. (*e*)

Modern anodes for nickel[-plating] baths. O. Reichardt (Chem.-Ztg., 1936, **60**, 98—99).—Recent attempts to improve the efficiency of Ni anodes by casting them in the form of a lattice, cutting them in such a way as to produce numerous sharp edges, hammering them to increase the *d*, and adding small amounts of NiO to the metal before casting are reviewed. The last-named procedure gives the best results. A. R. P.

Electrodeposition of chromium for wear-resistance. J. Kronsbein (Electrodep. Tech. Soc., Preprint, 1935, 23—26).—Cr coatings for wear-resistance are thicker, but not necessarily harder, than decorative coatings. Operating conditions for plating steel from a CrO_3 bath are detailed and applications reviewed; the latter are limited by sensitiveness to impact. C. E. H.

Influence of bath temperature on chromium [plate] hardness. R. J. Piersol (Metal Clean. Finish., 1935, **7**, 169—172; cf. B., 1935, 1051).—With a bath containing 250 g. of CrO_3 and 2·5 g. of H_2SO_4 per litre (c.d. 1 amp. per sq. in.) it was impossible to obtain hard Cr-plate at $>$ 38°. The hardness increased with falling temp. The optimum conditions for wear-resistance are a high c.d. and bath temp., and rapid rates of deposition. Ch. Abs. (*e*)

Platinum plating. T. Yoshida (Japan Nickel Rev., 1936, 4, 82—84).—Two baths are recommended: (*a*) containing H_2PtCl_6 0·6, NaOH 0·25, Na_2HPO_4 6·0, $NaHCO_3$ 1·0, KNO_3 1·0, and H_3BO_3 1—2 oz. per gal.; (*b*) $(NH_4)_2PtCl_6$ 15·5, NH_4Cl 6·25, and Na citrate 125 g. per litre. A. R. P.

Methods of platinum plating. K. Sadakata (Japan Nickel Rev., 1936, 4, 85—93).—The composition of various phosphate, citrate, and nitrite Pt-plating baths is given and methods of operating them are described. A few corrosion tests on Pt-plate above an intermediate Ag-plate indicated that the porosity of the Pt-plate produced from any of the above baths was about the same as that of a standard Cr-plate. A. R. P.

Electrical contact materials. G. Suzuki (Japan Nickel Rev., 1936, 4, 63—74).—The manufacture and properties of contacts of W, Ag–Cu–Cd alloys, Pt–Ag–Au alloys, and Ir–Pt alloys are described. A. R. P.

Determination of magnesium metal, magnesia, and magnesium fluoride in the products of electrolytic recovery of metallic magnesium. V. J. Tartakovski (Trans. Inst. Econ. Min. U.S.S.R., 1934, No. 64, 16 pp.).—The sample is treated with a mixture of AcOH and $K_2Cr_2O_7$. MgO dissolves, and Mg and MgF_2 are filtered off (the Mg becomes passive). Mg in the residue is dissolved with AcOH. Alternatively, MgO is converted into MgF_2 by HF, and the Mg dissolved from the Mg–MgF_2 mixture by AcOH. MgO and MgF_2 are determined by the first method. Ch. Abs. (*e*)

Roasting furnace.—See I. **Cast ferrous alloys in the paper industry.**—See V. **Staybrite steel and the dyeing industry.**—See VI. **Platinised Ni gauze. SO_2 and H_2SO_4 in roaster gases.**—See VII. **Steel-ladle refractories.**—See VIII. **Reaction between paint and Zn.**—See XIII. **Slags as fertilisers.**—See XVI.

Patents.

Heating and quenching metals and cutting glass. Electric Furnace Co., Ltd., Assees. of E. F. Northrup (B.P. 435,343, 24.8.34. U.S., 24.8.33).—The metal is heated locally by means of an induced high-frequency current or by electromagnetic means and the quenching medium is injected on to the hot metal through the coils of the heating means. A. R. P.

(a) **Milling process,** (b) **ore leaching [for roasted sulphide ores].** T. Earle (U.S.P. 1,983,273—4, [a] 21.10.33, [b] 2.4.31).—The ore (roasted if sulphides are present) is moistened with dil. H_2SO_4 and heated to a temp. sufficient to conc. the acid and sulphatise the vals., which are then recovered by leaching. In (b) the amount of acid added is restricted to that necessary to dissolve selected vals., *e.g.*, Cu from roasted pyritic ores. A. R. P.

Ore concentration. W. G. Clark, Assr. to F. R. Feitshans (U.S.P. 1,983,968, 11.12.34. Appl., 22.1.31. Renewed 13.6.34).—The finely-ground ore pulp is passed through a flat, inclined tube up which a current of H_2O flows at such a speed as to drive the lighter minerals to the top while the heavier minerals fall down the tube assisted by a wave-like vibratory motion imparted to the tube. A. R. P.

Production of refined metal. J. W. Flannery (U.S.P. 1,983,604, 11.12.34. Appl., 13.1.34).—Fe, Cr, Mn, or Ni oxide ores are smelted with C and slag-forming materials, including sufficient Na_2CO_3 to make a pasty slag at a temp. $<$ that at which the C reduces the oxides to metal, so that the metal forms in small particles within a pasty slag and gradually falls to the bottom as the temp. rises to make the slag fluid. A. R. P.

Treatment of metals with slags. Soc. d'Electro-chim., d'Electromét., et des Aciéries Électr. d'Ugine (B.P. 436,450, 6.4.34. Fr., 11.4.33).—Oxides are removed from metals by pouring the molten metal in a thin stream into a molten slag containing TiO_2 35, SiO_2 25, Al_2O_3 30, CaO 5, and MnO 5%. A. R. P.

Simultaneous manufacture in a rotary furnace of iron or steel and Portland cement or hydraulic lime. L. P. Basset (B.P. 436,443, 3.4.34. Fr., 3.4.33).—A mixture of Fe ore and fluxes to produce pig Fe and the desired cement clinker is mixed with powdered coal sufficient to reduce the Fe oxides to metal and the CO_2 in the limestone to CO and leave a 5% excess, and the mixture is passed continuously through a rotary, coal-dust-fired, cylindrical furnace into which sufficient air is admitted to burn the CO evolved. A. R. P.

Malleable iron and grey cast iron. Crane, Ltd., and H. H. Shepherd (B.P. 435,656, 17.11.34).—Cu 0·25—3·0, Ti 0·05—0·5, and Al 0·015—0·15% are added to molten mottled or white cast Fe containing preferably less Si than usual. A. R. P.

Manufacture of articles from malleable cast iron. K. Roesch and O. J. Schleimer (B.P. 435,602, 23.3.35. Ger., 31.10.34. Addn. to B.P. 434,846; B., 1935, 1147).—The Mn content of the cast Fe described in the prior patent (*loc. cit.*) is $\nless$ twice, but $\ngtr$ 2% of, the Si content. A. R. P.

Heat-treatment of steel tyres or wheels. C. P., O. F. A., and N. P. P. Sandberg (B.P. 436,530, 12.4.34).—The tyres are heated to $>$ the crit. range and sprayed with gradually decreasing amounts of H_2O until the temp. falls to $>$ 500° but $<$ the crit. range; they are then placed in an insulated chamber and allowed to cool slowly to room temp. A. R. P.

Nitrided articles of manufacture [tungsten-steel drills]. J. V. Emmons, Assr. to Cleveland Twist Drill Co. (U.S.P. 1,982,421—2, 27.11.34. Appl., [a] 8.2.33, [b] 26.10.34).—Claim is made for drills composed of (a) a martensitic steel containing Cr 0·1—12·1, and one or more of the following: W 0·1—18·69, Mo 1·55—11·15, and V 0·22—3·29%, or (b) C 0·7, W 18, Cr 4, and V 1%, the surface in each case being hardened by heating in NH_3 at 400—600°. A. R. P.

High-speed steel. Heraeus Vacuumschmelze A.-G., and W. Hessenbruch (B.P. 435,552, 19.3.34).—Steel containing Be 0·1—3·0 (0·6), C 0·2—2·5 (0·8), W 12—25 (18), Mo 0—17·5 (0), V 0—7·5 (0), Cr 3—5 (4), Co (when C is $>$ 0·55%) 3—15% is quenched from 1100—1350° and aged at 400—700°. A. R. P.

Valve steel. A. L. Boegehold and A. A. Peterson, Assrs. to Gen. Motors Corp. (U.S.P. 1,981,898, 27.11.34. Appl., 7.12.32).—Steel for the poppet valves of internal-combustion engines contains Si 3·4—4·4 (3·75), Cr 2·6—3·0 (2·9), Al 0·2—0·6 (0·4), Mo 0·75—1·5 (1·25), Ti 0·25—1·5 (0·5—0·8), and C 0·3—0·5%. A. R. P.

Manufacture of compound metal bodies [steel coated or lined with stainless steel]. F. F. Gordon (B.P. 436,401, 4.6.34).—Mixtures of finely-divided Mn and Ni, Fe, Co, or Cr, or alloys thereof, are used as solders, and the composite article is heated under pressure to the m.p. of the powdered mixture to effect a union between the parts. A. R. P.

Prevention of corrosion on metals [iron or steel]. J. Graham (B.P. 435,420, 17.4.34).—Hot-rolled steel is mechanically descaled as it issues from the rolls and painted with a protective paint while cooling from 120° to 60°. A. R. P.

Plating iron with aluminium. A. Wimmer (U.S.P. 1,982,563, 27.11.34. Appl., 30.3.33. Ger., 23.12.29).—The Fe is dipped into a molten bath of Al containing 0·2—15 (12)% Si, the presence of which prevents diffusion of the Fe into the Al and the formation of hard spots on annealing. A. R. P.

Manufacture of ferrous alloys. F. R. Bonte (B.P. 436,202, 1.1.34. U.S., 28.6.33. Addn. to B.P. 406,131; B., 1934, 458).—Steel containing Mo and Si or Ni is worked while the C is present as carbide, then heated to a high temp. to cause most of the C to ppt. as graphite, and finally selected parts are subjected to a heating and quenching operation to dissolve the C and produce a surface-austenitic or -martensitic structure. A. R. P.

Refining [iron or chromium boride] alloys. A. M. Kuhlmann, Assr. to Electro Metallurg. Co. (U.S.P. 1,982,959, 4.12.34. Appl., 4.6.32).—Fe–B or Cr–B alloys made by the aluminothermic method are melted with FeS or Cr_2S_3 to remove the Al. A. R. P.

Hardening or tempering of copper. J. V. Chicon (U.S.P. 1,981,718, 20.11.34. Appl., 6.6.33).—Molten Cu is stirred with a 3 : 1 mixture of CaO and rosin, then cast into moulds, and hot-worked while applying powdered rosin to the surface of the hot ingot. A. R. P.

Bearing-metal alloy [bronze]. A. W. Schluchter. Assr. to Gen. Motors Corp. (U.S.P. 1,981,927, 27.11.34, Appl., 12.11.32).—Claim is made for an alloy of Cu 60—50 (55), Pb 40—50 (45), and Ca $\ngtr$ 0·1%. A. R. P.

Stainless copper-base alloy. R. A. Wilkins, Assr. to Revere Copper & Brass Inc. (U.S.P. 1,983,205, 4.12.34. Appl., 31.5.33).—White alloys readily workable hot and cold and resistant to atm. tarnishing consist of Cu 65—90 (68), Ni 5—22 (19), Cr 0·5—5 (3—3·5), Mn 0·25—5 (4)%, and Zn the remainder; Ni + Cu must be 80—95% and small amounts of Sn ($\ngtr$ 0·5) and V ($\ngtr$ 0·1)% may also be added. A. R. P.

Improving the physical and mechanical properties of metals and alloys. Comp. Gén. d'Electromét., Assees. of Verein. Deuts. Metallwerke A.-G., and H. Lepp (B.P. 436,204, 4.1.34. Ger., 10.1.33).—Cu, Ni, or their alloys are refined by melting them with a little Zn under a flux containing $BaCO_3$, Na_2CO_3, and C to remove the S, then under a 1 : 1 mixture of $BaCO_3$ and Na_2CO_3 to which is added a small amount of oxidising agent to remove occluded gas. A. R. P.

Reduction of zinciferous material. P. M. Ginder and E. C. Handwerk, Assrs. to New Jersey Zinc Co. (U.S.P. 1,983,025, 4.12.33. Appl., 30.12.31).—In the recovery of Zn from roasted Zn ores by continuous distillation of coked briquettes in a vertical retort, part of the gases from the condenser or from the flues is returned to the bottom of the retort above the discharge seal to assist in expelling the Zn vapours from the retort. A. R. P.

Purification of zinc metal. P. M. Ginder, G. T. Mahler, and H. M. Cyr, Assrs. to New Jersey Zinc Co. (U.S.P. 1,980,480, 13.11.34. Appl., 10.1.33).—The Zn is distilled from a series of retorts through reflux columns, the liquid returned from the bottom of one column passing back to the retort immediately preceding that from which it was distilled. A. R. P.

Age-hardening silver of sterling or higher standard. J. C. McFarland, Assr. to Wadsworth Watch Case Co., Inc. (U.S.P. 1,984,225, 11.12.34. Appl., 14.9.32).—An alloy of Ag 92·5, Cu 2·5—7·4 (6·3), Al 0·1—5 (1), and Mg, Pb, Sb, Zn, or Be 0·1—5% (Zn 0·2%) is quenched from 620—760° and reheated at 290—300° for 1 hr. to obtain a Rockwell-*B* hardness of 84—94. A. R. P.

Apparatus for recovering gold and other precious metals from milled ores and placer material. F. D. Lewis (U.S.P. 1,983,701, 11.12.34. Appl., 16.5.33).—Mechanical arrangements of a centrifugal amalgamator are claimed. A. R. P.

Refining auriferous material [coins, jewellery, etc.]. Deuts. Gold- u. Silber-Scheideanstalt vorm. Roessler (B.P. 435,731, 4.2.35. Ger., 6.2.34).—The metal is electrolysed in dil. HCl, preferably containing $CuCl_2$, at a high c.d. and the sludge is digested with HNO_3 or H_2SO_4 to extract the Cu and Ag and leave a residue of Au ($>$ 99·9%); if much Ag is present the sludge is first reduced with H_2SO_4 and Fe. A. R. P.

[Fusible] alloy. J. H. Derby (U.S.P. 1,982,645, 4.12.34. Appl., 1.2.33).—Claim is made for an alloy of Hg 1·0—5 (7·5) with the eutectic alloy 90—95% containing Bi 50, Pb 26·7, Cd 10, and Sn 13·3%. A. R. P.

Production of carbides, carbonitrides, nitrides, borides, silicides, and titanides. Verein. Edelstahl A.-G. (B.P. 435,754, 21.12.33. Ger., 21.12.32).—N_2 is bubbled through $TiCl_4$ or passed over MoO_3 at 1400°, or C_6H_6 vapour is passed over heated W carbonyl and the mixture of vapours is passed through a white-hot graphite tube, whereby the corresponding carbide and/or nitride is formed. By using mixtures with $TiCl_4$, $SiCl_4$, or BCl_3 titanides, silicides, or borides of W or Mo can be obtained. [Stat. ref.] A. R. P.

Hard-metal [carbide] compositions. A. H. Stevens. From Firth-Sterling Steel Co. (B.P. 436,255, 20.7.34).—Claim is made for sintered mixtures of VC and/or TiC 15—60 (32), Mo and/or W 25—82 (60), and Al 3—15 (8)%. A. R. P.

Hard cemented carbide materials. G. J. Comstock, Assr. to Firth-Sterling Steel Co. (U.S.P. 1,981,719 and 1,982,857, [a] 20.11.34, [b] 4.12.34. Appl., [a] 12.12.32, [b] 1.12.32).—(a) Claim is made for a sintered mixture of WC 48, TaC 20, Al_2O_3 (corundum or alundum powder) 19, and an Fe-group metal (Co) 12%. (b) The material contains TiC 40—60 (46), WC 20—40 (29·62), TaC 5—20 (12·70), and Co 3—15 (11·68)%. A. R. P.

Preparation of metallic beryllium and its alloys. Comp. de Prod. Chim. et Electromét. Alais, Froges et Camargue (B.P. 435,747, 29.4.35. Ger., 30.4.34).—BeF_2,NaF (I) is heated at 1000° with an alloy of Cu 75, Mg 25% to give an alloy of Cu 86, Be 11, and Mg 3 which is freed from Mg by remelting it with a further quantity of (I). A Be–Zn alloy can be prepared in a similar way from (I) and a Mg–Zn alloy; on heating this alloy at 1280° under a fused chloride mixture the Zn distils off, leaving a residue of molten Be. A. R. P.

[Magnesium] alloys. R. E. Paine, Assr. to Magnesium Development Corp. (U.S.P. 1,984,151—2, 11.12.34. Appl., 9.11.33).—Claim is made for Mg alloys containing (a) Ag 0·5—8·0 (4), or (b) Cu 0·5—15 (2) and Sn 0·5—20 (6)%. A. R. P.

Magnesium-base alloy. J. A. Gann, Assr. to Dow Chem. Co. (U.S.P. 1,983,975, 11.12.34. Appl., 9.8.33).—Claim is made for an alloy of Mg with Mn 0·1—5 (1·5)% and Sn 0·1—15%. A. R. P.

Composition for treating aluminium alloys. W. Bonsack, Assr. to Nat. Smelting Co. (U.S.P. 1,981,798, 20.11.34. Appl., 1.6.32).—The grain size is refined and the tensile strength and elongation of the 92 : 8 Al–Cu alloy are improved by melting it under a flux of KCl 33, NaCl 14, cryolite 3, CaF_2 39, and H_3BO_3 11%. A. R. P.

Treatment of metal during cold-rolling. G. H. Orozco, Assr. to Chandler Chem. Co. (U.S.P. 1,982,065, 27.11.34. Appl., 30.12.33).—The rolls are lubricated with a solution containing borax 1—20 (6), Na_3PO_4 0·2—5·0 (0·5), and soap 0·2—5·0 (0·5)%. A. R. P.

Manufacture of ductile electrolytic iron from sulphide ores. J. R. Cain, Assr. to F. A. Eustis (U.S.P. 1,980,381, 13.11.34. Appl., 27.5.31).—Aq. $FeCl_2$ is electrolysed in a divided cell and the anolyte continuously withdrawn and reconverted into $FeCl_2$ by digesting it with cupriferous pyrites, removing the insol. residue, treating the filtrate with scrap Fe to ppt. dissolved Cu, adjusting to p_H 1—3, saturating with H_2S, filtering, neutralising to ppt. $Fe(OH)_3$ and colloidal matter, filtering, and adjusting to p_H 1·5—2·5. A. R. P.

Manufacture of [a ferrous metal] arc-welding electrode. M. L. Luckenbaugh and T. D. Radcliffe, Assrs. to Standard Oil Co. of California (U.S.P. 1,983,552, 11.12.34. Appl., 23.3.29).—The rod is wrapped in a cotton sleeve, soaked in aq. NaOH, dried at 100°, and repeatedly soaked in water-glass solution (*d* 1·38) and dried at 180°. A. R. P.

Manufacture of alloys for permanent magnets. R. Bosch A.-G. (B.P. 435,544, 23.1.34. Ger., 12.1.34).—Ni–Al–Fe alloys are cast into preheated moulds to cool the metal quickly to 600—800° and then allow it to cool slowly to room temp. The mould is preferably surrounded by sand or other heat insulator. A. R. P.

Production of sheets, bands, and objects of metal for electrical purposes. J. E. Pollak. From Hoesch-Köln Neuessen A.-G. f. Bergbau u. Hüttenbetr. (B.P. 441,775, 24.7.34).—Si–Fe alloys of large grain, *i.e.*, 0·5—10·0 sq. cm. grain size, are produced by successive deformations alternating with heat-treatment. The reduction of thickness is 35—5% each time except the last, the reduction varying inversely with the Si content (0·5—5·0%). Heat-treatment in all cases except the last is at 800—850°, and preferably is followed by quenching to 500—800°. B. M. V.

Inorganic insulation for electrical [steel] sheets. C. A. Scharschu, Assr. to Allegheny Steel Co. (U.S.P. 1,982,179, 27.11.34. Appl., 8.6.31).—The sheets are sprayed with a suspension of CaO 15 and Fe_2O_3 28 pts. in water-glass solution (Na silicate 70 pts. in 200 pts. of H_2O) and then baked at 780—800°. A. R. P.

Testing ferromagnetic substances. Brit. Thomson-Houston Co., Ltd. (B.P. 435,438, 8.1.35. Ger., 8.1.34).—Magnetic devices for detecting lack of homogeneity in Fe or steel by measuring the second differential of a strong magnetic field surrounding the metal are claimed. A. R. P.

Manufacture of metal- [zinc-]coated ferrous article. F. M. Crapo, Assr. to Indiana Steel & Wire Co. (U.S.P. 1,984,335, 11.12.34. Appl., 12.8.31).—The article is galvanised by hot-dipping and the Zn coating subsequently thickened by electrodeposition of Zn from a cyanide or sulphate bath. A. R. P.

Manufacture of fine [metal] powder. R. Torikai (B.P. 441,921, 25.5.34. Jap., 5.6.33).—An electric discharge is passed between electrodes of the material (metal) it is desired to powder, in a gaseous atm. at a pressure of 200—0·00005 mm. Hg. B. M. V.

Production of highly electropositive metals within sealed vessels, *e.g.*, thermionic valves. M.-O. Valve Co., Ltd., and M. Benjamin (B.P. 436,527, 12.4.34).—A mixture of finely-divided Al and BaO, SrO, CaO, or Li_2O (Al : O = 1 : 1) or a 1 : 1 mol. mixture of Na_2CO_3 and Al_2O_3 is heated at 1000° in H_2 to form an "aluminite" which is used as a getter or for photoelectric purposes in thermionic valves. A. R. P.

Electrodeposition of metals. Harshaw Chem. Co. (B.P. 436,042, 3.11.34. U.S., 14.3. and 4.5.34).—To obtain bright plates of Ni, Cu, Sn, Zn, or Cd from sulphate baths a small quantity of a sulphonated derivative of a terpene is added to the electrolyte. This may be made, *e.g.*, by heating pine oil with H_2SO_4 or oleum at 80°. A. R. P.

Electrolytic coating of metals. J. H. Gravell (B.P. 435,773, 27.3.34. U.S., 11.12.33).—A protective coating is formed on ferrous metals, Mn, Mg, Cd, Co, Zn, Sn, or their alloys by a.-c. electrolysis at 80° in solutions of $ZnHPO_4$ or of acid phosphates of Cd, Ca, Al, Ni, Co, or Mn. A. R. P.

Composite metal products. Mond Nickel Co., Ltd. (B.P. 436,329, 6.11.34. U.S., 7.11.33).—The surface of alloys containing Cr is plated with Ni or a Ni alloy, the alloy placed, Ni side down, on a polished surface of the foundation metal, and the whole is heated under pressure until the two layers cohere. A. R. P.

Electroplating of metallic articles. J. Kronsbein and C. F. Neale (B.P. 435,631, 28.5.34).—Magnetic devices for immersing Fe articles in and removing them from the plating vat are claimed. A. R. P.

Electrolytic deposition of a metal upon a metallised non-conducting surface. Electrical Res. Products, Inc., Assees. of A. G. Russell (B.P. 435,694, 18.6.35. U.S., 20.6.34).—The edges of the metallised article, *e.g.*, a wax master record, are covered with U-shaped metal clips to prevent the subsequent electroplate from curling away from the edges. A. R. P.

Removal of galvanic or electrolytic deposits of metal from a cathode. W. E. Evans. From Kelsen Special Sheet Holding Soc. Anon. (B.P. 436,282, 9.1.34).—The deposit is treated with an acid solution which penetrates the interstices or grain boundaries and loosens the deposited metal from the cathode without attacking the latter. A. R. P.

Manufacture of beryllium and light alloys thereof. L. Burgess (U.S.P. 1,980,378, 13.11.34. Appl., 10.11.33).—A divided cell contains a molten electrolyte of BeF_2 20—25, BaF_2 35—40, and KF 35—40 floating on molten Cu. In one compartment a current is passed between a graphite anode and the Cu, to deposit Be in the Cu, and in the other between the Be–Cu alloy and a layer of molten Al (cathode) floating on the electrolyte, whereby the Be passes from the Cu to the Al. A. R. P.

Production of bright aluminium surfaces. Aluminum Co. of America, Assees. of R. B. Mason and M. Tosterud (B.P. 436,154 and 436,481, 5.4.34. U.S., 10.2.34).—Highly polished reflective surfaces of Al are rendered resistant to atm. corrosion by anodic treatment in (A) 1—60% H_2SO_4 containing 0·2—1·5% HF, (B) a solution containing CrO_3 1—25 (5—10) and HF 0·2—1·5 (0·5—1%). (A, B) The resulting clear transparent films are stabilised and rendered impermeable by heating in hot H_2O. A. R. P.

Electrolytic formation of oxidised films on aluminium and its alloys. Peintal, Soc. Anon. (B.P. 436,270, 5.2.35. Switz., 19.4.34).—The metal is anodically oxidised in a solution of a sulphonic acid derived from C_6H_6, PhMe, $C_{10}H_8$, or anthracene. A. R. P.

Surface hardening of [ferrous-]metal articles, particularly gear wheels. Gleason Works (B.P. 435,831, 17.10.34. U.S., 4.8.34).

Hg boiler and power plant.—See I. **NH_3 from steelworks coke-oven gas.**—See VII.

XI.—ELECTROTECHNICS.

Progress in design and application of electric furnaces. H. Knight (Metallurgia, 1935, **13**, 53—56).—A review, reference being made to a 5-ton, high-requency induction furnace, C–SiC thermocouples giving an e.m.f. of 0·3 millivolt/1°, and rocking resistor furnaces. E. H. B.

Alkaline storage battery. X. Electrolysis of alkali zincate solution. S. Tanaka (J. Electrochem. Assoc. Japan, 1934, **2**, 415—420 ; cf. B., 1935, 681).—Data are recorded for the electrolysis of aq. alkali zincates with Fe, Co, Cr, Cd, Zn, and Hg cathodes. The Zn deposit in storage batteries with these metals as cathodes is apt to fall off, and the dissolution of Zn is incomplete at the higher discharging current. A Ni-mesh cathode is to be preferred. Ch. Abs. (*e*)

Graphitisation of electrodes. N. P. Boshko (J. Chem. Ind. Russ., 1935, **12**, 1161—1167).—The sp. conductivity of graphite electrodes falls with increasing content of mineral matter, and with increasing coarseness of the grains of material used (coke, petroleum coke, soot, anthracite). Graphitisation is best accomplished at 2500°, and involves a considerable fall in ash content, due to volatilisation of chlorides ; any of the enumerated materials will yield satisfactory electrodes if the mineral content is reduced by prior chlorination. R. T.

Parallel employment of low- and high-frequency transformers for charging Cottrell precipitators. S. P. Zebrovski (Physikal. Z. Sovietunion, 1935, **7**, 213—225).—Formulæ for the particle mobility, no. of collected particles per sec., etc. are derived. Ch. Abs. (*e*)

Application of luminescent screens to glass surfaces. W. H. Kohl (Canad. J. Res., 1935, **13**, **A**, 126—132).—An outline is given of the methods which have been used and their relative merits. A process based on the activation of the glass surface with a deposit of S is described, and the physical properties of such a screen have been examined. Possible mechanisms of the process are discussed. E. E. A.

Determining mercaptans.—See II. **Heat-resisting glassware.**—See VIII. **Magnet steel. Zn extraction. Precious metals from Ni ores. Analysis of Al alloys. *X*-Ray equipment for studying metals. Ni–Cr alloys in furnaces. Brazing. Formation of metallic deposits. Motion of liquids during electrodeposition. Zn-plating baths. Electrolytic zinc. Ni-plating baths. Cr-plate. Pt-plating. Contact materials. Determining Mg etc.**—See X. **Examining pharmaceutical products.**—See XX. **Determining CO, CO_2, and benzine in air. p_H measurements in water and sewage work.**—See XXIII.

Patents.

Apparatus for electrical separation of mixed particles. Metallges. A.-G. (B.P. 441,965, 5.3.35. Ger., 9.3.34).—An electrostatic apparatus comprises (1) an earthed feed roller, (3) a charged roller rotating in the opposite direction to (1), and (2) an intermediate roller rotating in the same direction as (1) and of semi- or non-conducting material, insulated from the earth, Optionally, another surface similar to (2) but stationary may be placed above the feed shoot. B. M. V.

Electric primary cells. C. J. Gordon (B.P. 441,894, 12.10.34 and 1.10.35).—A no. of Mg electrodes wrapped in fibrous material are enclosed loosely in a casing, which may be the other electrode. The fibrous material is pervious to air and electrolyte, and the spaces between the Mg dollies serve for access of air for depolarisation to the whole length. B. M. V.

Manufacture of photoelectric cells. Gen. Electric Co., Ltd., and C. H. Simms (B.P. 436,023, 31.5.34).—A borosilicate glass bulb coated internally with Ag is heated at 400° while filled with Cs vapour at low pressure so that the interior of the glass is slightly etched; the tube is cooled, opened, washed with H_2O and dil. HNO_3, and again silvered internally, and treated as usual to deposit a mixture of Cs and Cs_2O on the Ag. A. R. P.

Electrolytic cell [for manufacture of caustic alkali and chlorine from brines]. W. G. Michel (U.S.P. 1,982,224, 27.11.34. Appl., 25.7.32).—Constructional details are claimed. A. R. P.

[Electron-emissive] electrodes. J. B. J. M. Abadie (B.P. 441,787, 25.8.34. Fr., 26.8. and 17.10.33).—The electrodes are manufactured by heating metal supports in an oxidising flame, dipping into a coating material, and heating in a reducing flame, the last two steps being repeated as often as is necessary. The coating consists of a mixture of salts and/or oxides of alkali and/or alkaline-earth metals, at least one of the constituents being fusible at a high temp. When spiralised the filaments are suitable as starting electrodes. B. M. V.

Coating electrodes [of radio-valves with graphite]. G. E. Long, Assr. to Bell Telephone Labs., Inc. (U.S.P. 1,981,652, 20.11.34. Appl., 28.4.31).—The electrode is heated to redness in vac. to remove occluded gas, sprayed with colloidal graphite ("Aquadag"), dried, and heated in vac. or in H_2 at 500—900°. A. R. P.

Manufacture of [carbon] electrodes [for radio-valves]. C. P. Marsden and C. M. Wheeler, Assrs. to Hygrade Sylvania Corp. (U.S.P. 1,982,821, 4.12.34. Appl., 2.6.33).—An amorphous C electrode of the desired shape is graphitised and then heated by high-frequency current to 1200° in air to expel occluded gases and burn out any residual amorphous C. A. R. P.

Electrode for electron-discharge devices [radio-valves]. E. A. Giard, Assr. to Cutler-Hammer, Inc. (U.S.P. 1,981,620, 20.11.34. Appl., 26.3.32).—A grid composed of a Ni alloy with a small proportion of Be superficially oxidised to BeO is claimed. A. R. P.

Alkali-metal vapour electric-discharge device. Brit. Thomson-Houston Co., Ltd. (B.P. 441,603, 21.8.35. U.S., 23.8.34).—Ordinary glass (of reasonably low SiO_2 content and free from Pb, Zn, Cd, Tl, and Fe) is protected from Na vapour by a thin film of B_2O_3 glaze containing a stabilising oxide, applied after the device has been shaped. B. M. V.

Apparatus for irradiation of liquids, particularly milk. L. Cuny (B.P. 441,524, 29.4.35).—The liquid is irradiated while passing through and completely filling the space between plates which are permeable to ultra-violet light, and is preferably impelled by the pressure of CO_2 introduced into, *e.g.*, a heating autoclave. B. M. V.

Manufacture of [copper oxide] electrical cut-outs. E. A. Harty, Assr. to Gen. Electric Co. (U.S.P. 1,982,384, 27.11.34. Appl., 12.2.32).—Cu sheet is heated in air at 1000° for 7·5 min., cooled, reheated at 150—500° (480°) for 3·5 min., and air-cooled. The duration and temp. of annealing and the rate of cooling may be varied according to the breakdown voltage desired. A. R. P.

[Insulated] electrical conductor [copper wire]. J. C. Patrick (U.S.P. 1,981,968, 27.11.34. Appl., 14.7.30).—The insulation consists of rubber containing a large proportion of the product obtained by heating diolefine dihalides with alkaline polysulphides. A. R. P.

Adjustable resistances or potentiometers. Elektr. Glühlampenfabr. J. Kremenezky A.-G. (B.P. 442,032, 13.8.34. Austr., 11.8.33).—An adjustable brush or switch arm is coated with amalgam on its contact face. B. M. V.

[Electrical] insulating material. R. H. Harrington, Assr. to Gen. Electric Co. (U.S.P. 1,983,367, 4.12.34. Appl., 30.3.33).—To a mixture of artificial rubber isomeride 89, Mn linoleate drier 1, and drying oil 10% are added 10—20% of turpentine and $Cr_2O_3 \equiv$ 50—60% of the wt. of the final mixture. The articles to be insulated, *e.g.*, commutator segments, are coated with the mixture and baked at 150—125° for $\frac{1}{4}$—4 hr. A. R. P.

Cable-impregnating compounds. J. C. Jennings and W. B. Dick & Co., Ltd. (B.P. 441,882, 27.7.34).—A solution of natural and/or synthetic resins, more especially rosin from which oxidised substances have been removed, in a volatile solvent, *e.g.*, petroleum spirit free from aromatics and having b.p. 100°, is incorporated with a mineral oil, and the solvent is evaporated at $< 100°$. J. S. G. T.

Fluorescent [X-ray] screens. F. F. Renwick and F. J. Shepherd (B.P. 441,898, 31.10.34).—Fluorescent material is mounted on a support which is coated with, or incorporates, a white insol. pigment consisting of an oxide or carbonate of a metal of at. wt. $\ngtr$ that of Zn (*e.g.*, TiO_2). J. S. G. T.

Electrical storage batteries or accumulators. Three Star Accumulators, Ltd., and F. C. Grund (B.P. 442,022, 30.7.34).

[Plates for] electric accumulators. Expanded Metal Co., Ltd., and H. P. Salmon (B.P. 436,266, 19.1. and 27.2.35).

Apparatus for measuring magnetic properties. Siemens & Halske A.-G. (B.P. 441,968, 5.4.35. Ger., 7.4. and 11.6.34).

Testing the structure of magnetisable structural materials. B. Suschyzki (B.P. 441,604, 30.8.35).

[Heating of] thermionic cathodes. M.-O. Valve Co., Ltd., C. J. Smithells, and G. W. Warren (B.P. 435,957, 20.9.34).

Electric-discharge tubes. N. V. Philips' Gloeilampenfabr. (B.P. 441,754, 23.7.35. Ger., 4.10.34).

Electric-discharge lamps. Brit. Thomson-Houston Co., Ltd. (B.P. 441,985, 10.8.35. U.S., 10.8.34).

[Mercury] metal-vapour current rectifiers. J. T. Shevlin. From Siemens-Schuckertwerke A.-G. (B.P. 436,048, 19.12.34).

Electric resistances. Brit. Thomson-Houston Co., Ltd. (B.P. 441,977, 5.6.35. Ger., 7.6.34).

Welding rods for use in automatic electric arc-welding. Murex Welding Processes, Ltd., and J. H. Paterson (B.P. 436,396, 10.4.34).

[Laminated] contacts for electric switches and the like. Igranic Electric Co., Ltd., and W. F. Grafton (B.P. 441,931, 28.7.34).

Electromagnetic driving means.—See I. **Fibrous insulation.**—See V. **Ultra-violet ray-transmitting glass.**—See VIII. **Heating metals etc. Refining auriferous material. Electrolytic Fe. Arc-welding electrode. Magnet alloys. Metal sheets, bands, etc. Insulated steel sheets. Zn-coated ferrous metal. Metal powder. Metals in valves. Electrodeposition of metals. Composite metal products. Plating of metals. Removing metal deposits. Be and light alloys thereof. Bright Al surfaces. Oxide films on Al.**—See X. **Coating surfaces.**—See XIII.

XII.—FATS ; OILS ; WAXES.

Manufacture of lard. J. Henry (Food, 1936, **5**, 239—240).—A brief description.

Determination of butyric acid value [of fats]. J. Grossfeld (Z. Unters. Lebensm., 1935, **70**, 459—470).—A rapid examination for butter fat is made by a simplified semi-micro-determination of the $PrCO_2H$ (I) val., the results of which agree, when 0·6 c.c. of the molten fat is taken, to within $\pm 2\%$ with results by the usual methods. With $<$ this amount of fat a correction is applied, for which tables are given. The (I) val. of human milk fat varies from 0·8 to 6·4. In addition to (I) and hexoic acid, this fat contains appreciable quantities of the next higher homologues.
E. C. S.

Continuous soap manufacture : Löffl process. J. M. Vallance (Soap, 1936, **12**, No. 2, 65—66, 75).—A brief description of the Löffl process of saponification under pressure, followed by spray-drying of the soap paste. E. L.

Detergency of soap solutions. B. G. Acharya and T. S. Wheeler (Proc. Indian Acad. Sci., 1935, **2**, A, 637—645).—A standard method is described for measuring the adsorption of soap by cotton. Conditions which promote cleansing also facilitate adsorption, so probably it is the soap adsorbed on the fibres which cleanses. The adsorption test may therefore provide an accurate method of comparing the detergent powers of soap solutions. J. W. S.

Drying oils. XIX. Oxidation of linseed oil. R. S. Taylor and J. G. Smull (Ind. Eng. Chem., 1936, **28**, 193—195).—Linseed oil was oxidised by bubbling air through it, and at various stages of oxidation n_D, heat of combustion, I val., and extent of reaction with maleic anhydride (Diels–Alder reaction) were observed. The point at which the oil begins to exhibit the latter reactivity was found to coincide with the point at which the other criteria were changing rapidly, which accords with the formation of conjugated double-linking systems (on which subsequent condensation and polymerisation are considered to occur). S. S. W.

Hempseed oil. H. Friedman (Amer. Paint J., 1936, **20**, No. 14, 48—50).—Composition and properties are given. Although drying rather more slowly than linseed oil, it possesses certain advantages as a paint and varnish oil ; *e.g.*, the dried film has less tendency to turn yellow and is more H_2O-resistant. D. R. D.

Flax studies. I. Relation between weight per measured bushel, weight per thousand kernels, and oil content of flax seed. II. Refractometric method for determining the oil content of flax seed. W. F. Geddes and F. H. Lehberg (Canad. J. Res., 1936, **14**, C, 45—47, 48—61).—I. Neither the wt. per bushel nor the wt. per 1000 grains is related to the oil content of the seed.

II. The method is based on the change in *n* of a mixture of Halowax and $1\text{-}C_{10}H_7Br$ on dilution with linseed oil (cf. Coleman and Fellows, B., 1928, 902).
A. G. P.

Almond and apricot-kernel oils. R. G. Harry (Pharm. J., 1936, **136**, 199—200).—Characteristics of 5 samples of commercial apricot-kernel oils and 8 of almond oil were the same as those of oils obtained by laboratory extraction of the kernels ; the two oils are, for practical purposes, so similar that they should be considered identical. Notes on adulteration and a modification of the Bieber test are given. E. H. S.

Oil of Tennessee red cedar. H. B. Huddle (Ind. Eng. Chem., 1936, **28**, 18—21).—Virgin red cedar (*Juniperus virginiana*) yields about 3·5% and the sap cedar $<$ 1% of oil. The *d*, n_D^{20}, $[\alpha]_D^{20}$, and the sap., acid, Ac, and I vals. of the oil are recorded. F. N. W.

Lecithin and quinol as antioxidants for vitamin-*A* [in liver oils]. H. N. Holmes, R. E. Corbet, and E. R. Hartzler (Ind. Eng. Chem., 1936, **28**, 133—135).—Either substance separately affords protection for -*A* in halibut- or cod-liver oil, but together the protection is $>$ additive. E. C. S.

Comparison of the spectrometric method and antimony trichloride test for determination of vitamin-*A* potency [of cod-liver oil]. W. S. Jones and W. G. Christiansen (J. Amer. Pharm. Assoc., 1935, **24**, 1072—1074).—Compared with those vals. given by the biological assay, potency vals. determined on 11 oils by the spectrometric method diverged more widely (and were generally higher) than the $SbCl_3$ vals. E. H. S.

Modern fatty oil [refining] processes. T. Andrews (Oil and Col. Tr. J., 1936, **89**, 367—372).—The sliming, bleaching, neutralising, and deodorising processes are described. D. R. D.

Orientation of molecules of beeswax and its effect on the rigidity of the honeycomb. P. Woog and N. Yannaquis (Compt. rend., 1936, **202**, 76—78).—Specimens of comb heated at 38° have mechanical properties superior to those of comb kept at 15°. The effect of mol. orientation in the wax is discussed.
H. J. E.

Glycerol determinations Group-detection of solvents etc.—See III. **Oiticica oil. Tung oil vehicles.**—See XIII. **Gelatin in emulsions.**—See XV. **[Oil from] *Cryptocarya latifolia* nuts.**—See XIX. **Compound solution of cresol.**—See XXIII.

Patents.

Manufacture of soaps. C. Leyst Küchenmeister (B.P. 442,046, 7.12.34. Ger., 24.9.34).—A suitable mixture of partly evaporated sulphite-cellulose waste lyes (fermented or unfermented) and fresh caustic lye is used to saponify fats (coconut oil); salting-out of the product is unnecessary. Any SO_2 in the sulphite lyes is removed by heating, and any Ca pptd. by Na_2CO_3, prior to saponification. E. L.

Lime-soap grease. W. D. Hodson (U.S.P. 1,982,662, 4.12.34. Appl., 9.12.29).—Claim is made for a mixture of a CaO soap of a fatty acid (10—25%), a viscous mineral oil, and 1—5% of $N(C_2H_4{\cdot}OH)_3$ or a glycol derivative, *e.g.*, the Et or Bu ether of $C_2H_4(OH)_2$. A. R. P.

Drying oils. Imperial Chem. Industries, Ltd., E. W. Fawcett, and E. E. Walker (B.P. 442,000, 24.11.33. Addn. to B.P. 422,941; B., 1935, 238).—The products of fish oils having I val. $>$ 120, *e.g.*, menhaden, Japanese sardine oil, are distilled under high vac. as in the prior process, in order to remove unpolymerised constituents, yielding oils suitable for use in paints and varnishes. E. L.

Heat-derivative[s] of China wood [tung] oil. W. Nanfeldt, Assr. to World Bestos Corp. (U.S.P. 1,998,768, 23.4.35. Appl., 3.10.32).—Tung oil is heated up to 360° at the rate of $>$ 18·3° (*e.g.*, 22°) per min., any distillate obtained below 360° being returned to the liquid; after reaching 360° the distillate is collected separately until about 8 vol.-% of the original charge has been removed. The distillate is a solvent for cellulose (*e.g.*, in wood), rubber, resins, paints, and gelatinised tung oil; the viscous still-residue is miscible with solvents and resins and can be used as a plasticiser for rubber, as a bonding agent in, *e.g.*, linoleum, for impregnating fabrics, etc. Both fractions are emulsifiable with H_2O. E. L.

Polishing composition. H. S. Polin, Assr. to Polin, Inc. (U.S.P. 1,995,862, 26.3.35. Appl., 18.11.32).—H_2O emulsions containing a natural or synthetic wax of m.p. $>$ 75° (chlorinated $C_{10}H_8$, candelilla, etc.) 10—35 (15)%, a Na soap $\not<$ 20%, and an emulsifying agent, *e.g.*, casein 1—10%, with non-drying animal and/or vegetable oil, are claimed as simultaneous detergents and wax polishes. E. J. B.

Compositions for treatment of surfaces. W. J. Tennant. From Henkel & Co. G.m.b.H. (B.P. 442,772, 13.6.34. Cf. B.P. 440,259; B., 1936, 206).—Abietinol or its derivatives are used as solvents or softeners for cleaning or polishing agents for furniture, floors, etc. containing fats or waxes as a basis. E. L.

Lubricants.—See II. **Washing etc. agents.**—See III.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Increasing the efficiency of paint production. S. Smith (Paint Var. Prod. Man., 1935, **13**, No. 6, 18—22).—The relative advantages of different types of paint mill are discussed. D. R. D.

Recent improvements in raw materials [for the paint and varnish industries]. Anon. (Paint Var. Prod. Man., 1935, **13**, No. 6, 24—28).—A review. D. R. D.

Use of petroleum solvents as specifically applied to southern [American] paint formulation. E. M. Toby, jun. (Amer. Paint J., 1936, **20**, No. 18, 7—9, 62—68).—The selection and testing of petroleum thinners for paints and varnishes are discussed. Experiments are described illustrating the advantages of solvents of high kauri–BuOH val. Formulæ for satisfactory cellulose nitrate solvent mixtures containing petroleum thinners in place of aromatic hydrocarbons are given. D. R. D.

House-paint formulation for the south [of the United States]. J. F. Broeker (Paint, Oil, and Chem. Rev., 1936, **98**, No. 3, 22—25, 46).—The formulation of paints to suit the climatic conditions is discussed in the light of exposure trials, the results of which are reported. D. R. D.

Reduction of oil usage in white paints. F. Schmid (Farben-Ztg., 1936, **41**, 207—209).—By use of raw and boiled linseed oil, stored for $>$ 1 year, choice of oils of low acidity, and special technique, oil pastes can now be produced with much lower oil content than hitherto. A new type of paste is obtained, the pigment particles being "oil-sheathed," and when thinned with oil–turpentine mixtures the pastes give glossy instead of matt paint films. Typical oil saving is illustrated by ZnO paste containing 15% of oil against 21—25% hitherto, giving finished paints containing 24% of oil against 50%. S. S. W.

Softening of linseed oil films. C. H. Rose and D. S. Bolley (Ind. Eng. Chem., 1936, **28**, 115—118).—Various linseed oil films, with and without driers and pigmented with white lead, were allowed to dry at 25° and 50% R.H. while exposed to artificial light corresponding to midsummer sunlight, and the changes in solubility in $COMe_2$ are recorded and graphed. After normal drying, subsequent changes in the solid gel linoxyn film lead to softening, accompanied by increased solubility in $COMe_2$ and drop in I val. of the sol. phase. Increased unsaturation of the oil and presence of driers decrease the after-softening, whilst the pigmented films gradually attain a degree of solubility not subsequently decreasing with age. S. S. W.

Oiticica oil. E. Stock (Farben-Chem., 1936, **7**, 45—46).—Satisfactory varnishes can be prepared by heating the raw oil with rosin and CaO at 280° until a drop solidified on a glass plate breaks up on being scratched with the finger-nail. Pre-melting the rosin in the raw oil followed by addition of CaO gave the best product. Pre-heating the oil was without advantage. S. M.

Cause of "crystallisation" of tung oil vehicles. J. Hyman and T. Greenfield (Ind. Eng. Chem., 1936, **28**, 238—241).—Films of a low-temp.-bodied tung oil varnish were subjected to the $(CH_3)_2O$ flame and to continuous sparking in air and in a "N_2-free" atm. (He : O_2 = 4 : 1). Comparison of the tendencies to "frosting" of these films indicates that traces of NO_2 cause this phenomenon. With the particular varnish tested, 4 pts. of NO_2 in 10^7 pts. of air produced the "crystallising" effect. Some anomalous results in the spark tests showed the presence of traces of N_2 in the He–O_2 mixture. S. S. W.

Reaction between paint films and zinc surfaces. H. J. Wing (Ind. Eng. Chem., 1936, **28**, 242—243).—Reaction occurs between Zn and oxidation products formed during the drying of oleo-resinous varnishes etc., giving compounds, *e.g.*, $(HCO_2)_2Zn$, probably accounting for the poor adhesion of paint to galvanised Fe etc. These compounds are detectable on the reverse side of peeled paint films. S. S. W.

Action of free fatty acids in oil paints. A. V. Blom (Farben-Ztg., 1936, **41**, 233—235).—The acid val. of the oil used for grinding has considerable bearing on the behaviour of paint. The pigment–vehicle interfacial forces are modified by the presence of free acids (both the quantity and nature of which are significant), and figures are quoted from the literature illustrating such effects on ease of dispersion, extent of sedimentation, and reactivity of pigment with vehicle. S. S. W.

Lead titanate. D. W. Robertson (Ind. Eng. Chem., 1936, **28**, 216—218).—$PbTiO_3$ forms a chemically inert paint with very fine uniform particles, 0·2—0·3 μ in diam. Ultra-violet light is strongly absorbed and the paint prevents fading when mixed with tints. The paint is durable and rust-inhibitive, and in many ways resembles C black. Its use provides new information on the general theory of paints; *e.g.*, views on the necessity of heterogeneity in particle size must be revised. R. S. B.

Formulation of protective coatings with pigment colours. A. F. Brown (Paint, Oil, and Chem. Rev., 1936, **98**, No. 3, 28—30).—Methods of attaining max. colour stability, covering power, hiding power, and heat-resistance, and for avoiding "flooding," settling in the can, and bleeding, by suitable choice of the pigment are discussed. D. R. D.

Properties of plasticisers for nitrocellulose lacquers. V. A. Kraus (Farbe u. Lack, 1936, 100; cf. B., 1935, 510).—Further exposure tests of nitrocellulose (I) lacquers containing 20 ester plasticisers confirm the good weather-resistance imparted by Ph_2 phthalate, whilst 9 alkyl phthalates, 3 hydrophthalates, 3 sebacates, and 1 adipate were all markedly inferior and gave approx. the same results. Castor oil was satisfactory when the wt. added was $\nless$ the wt. of (I). S. M.

Resins. XXI. Refined New Zealand kauri copal. XXII. "Run" amber. E. Stock (Farben-Ztg., 1936, **41**, 182—184).—XXI. 3 samples of this resin had: acid val. 67·3, 63·01, 77·0; sap. val. 92·58, 129·05, 84·17; sinter point 120—126°, 130—135°, 150°; m.p. $>$ 170°, 175°, $>$ 170°; and ash content (Fe) 0·30—0·35, 0·21—0·24, 0·26—0·27%, respectively. Their solubilities in a wide range of solvents (hot and cold) and the fluorescence characteristics of the solutions under the ultra-violet lamp are tabulated. Experimental varnishes were prepared from them, and results indicate that these resins are satisfactory raw materials therefor.

XXII. The characteristics of 10 samples of "run" amber are reported. The question of loss of solubility on ageing having been raised, the fact that these samples, which range in age from 3 to 5 years, are completely sol. in C_6H_6–EtOH is significant. Run amber is considered to be a desirable raw material for varnishes. S. S. W.

Development of Dakota lignite. XI. Influence of catalysts in reaction between lignite-tar distillate and formaldehyde. W. Franta and I. Lavine (Ind. Eng. Chem., 1936, **28**, 119—121; cf. B., 1933, 530).—The catalytic effects of 73 substances on the reaction between CH_2O and tar distillate were determined and are tabulated. In general, org. acids and alcohols retard the reaction; neutral org. compounds and salts have little effect, strong acids, bases, acid and basic salts, and strong oxidising and reducing agents all have pronounced accelerating effects. The last-named type give dull, crumbly resins, whilst retarders and neutral compounds give glossier, tougher, and harder resins. The reaction time varied from 2 to 847 min. according to the catalyst used. In a few cases the effect of catalyst concn. on the time required for resinification was investigated. With K_2CO_3, $SnCl_2$, HCl, H_2SO_4, and K_2SO_4 the time rapidly approaches a const. val. With KOH the curves show a min. C. C.

Aldehyde phenolic condensations from a chemical viewpoint. N. J. L. Megson (Trans. Faraday Soc., 1936, **32**, 336—345; cf. B., 1934, 28).—In condensations with phenols and CH_2O in presence of acid, products of dihydroxydiarylmethane type, the yield of which decreases with increase of CH_2O, have been isolated. Xanthenes and higher Me homologues of phenols have been obtained from products of pyrolysis of resins. These results support the hypothesis that Novolak (sol. and fusible) resins are mixtures of chain compounds of phenol–methylene type. Their formation may be written generally: $x\text{ROH} + (x-1)\text{CH}_2\text{O} = \text{OH}\cdot\text{R}'\cdot\text{CH}_2\cdot[\text{R}''(\text{OH})\cdot\text{CH}_2]_{x-2}\cdot\text{R}'\cdot\text{OH} + (x-1)\text{H}_2\text{O}$. F. L. U.

Conditions under which insoluble and infusible resins are produced, especially those formed by arylsulph[on]amide and formaldehyde. G. Walter (Trans. Faraday Soc., 1936, **32**, 402—407).—In the condensation of mono- and poly-sulphonamides, amides of arylsulphonamidocarboxylamides, and anilinesulphonamides with CH_2O, the presence of $>$ 1 active NH_2-group is necessary for the formation of insol. and infusible resins, except when too copious substitution leads to steric hindrance. The properties of insolubility and infusibility are due chiefly to the formation of complicated ring-systems (cf. B., 1933, 639; 1934, 1020). F. L. U.

Utilisation of wood generator-gas tar for preparation of plastic masses. I. P. Losev, G. S. Petrov, K. A. Andrianov, and P. I. Panasiuk (J. Chem. Ind. Russ., 1935, **12**, 1171—1176).—The phenolic fraction is removed by steam distillation at 300°; the residual pitch is, by virtue of its resistivity to corrosion by acids, its mechanical properties, and its heat-stability, suitable for accumulator vessels. The phenolic fraction yields a rapidly polymerising product with CH_2O, unsuitable, however, for technical purposes as a result of its low plasticity; admixture of 25% of coal-tar phenols permits the production of satisfactory bakelite products with CH_2O or MeCHO. R. T.

Filtering pigments.—See I. **Camphor from turpentine.**—See III. **Hempseed oil.**—See XII. **Latex coatings.**—See XIV.

Patents.

Zinc-dust paints. New Jersey Zinc Co., Assees. of L. D. Grady, jun. (B.P. 436,164, 7.4.34. U.S., 6.9.33).—A small quantity (0·25—1%) of CaO, BaO, activated bauxite, or other H_2O-adsorbent substance is added to Zn-dust paints to prevent H_2 evolution during storage. A. R. P.

Asphaltic coating composition and material coated therewith. H. J. Barrett, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,995,957, 26.3.35. Appl., 31.1.31).—Coatings prepared from varnishes containing asphalt and an oil-modified alkyd resin are improved if the latter contains 5—23% of alkyd resin (cf. U.S.P. 1,934,709; B., 1934, 797), or if part of the oil is substituted by rosin, run Congo, or other acidic resin, or a naphthenic acid. 16 examples are given. S. M.

Rust-resisting coating composition. H. O. Albrecht, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,995,954, 26.3.35. Appl., 10.6.31).—H_3PO_4 is incorporated with a varnish base (asphalt, resin, drying oil) in a hydrocarbon solvent in which H_3PO_4 is insol., together with an org. solvent for H_3PO_4 miscible with the first solvent, *e.g.*, a saturated aliphatic monohydric alcohol (BuOH, C_5H_{11}·OH). S. S. W.

Coating of surfaces [with cellulose lacquers]. Electrical Research Products, Inc., Assees. of W. W. Werring and T. S. Huxham (B.P. 442,050, 18.1.35. U.S., 31.1.34).—Surface layers of cellulose (acetate) derivatives are bonded to telephone-dial no. plates, phonograph records, etc. by applying them by known means over a thermo-setting primer, *e.g.*, a baking oil primer or a phenol–CH_2O lacquer, the solvent in the top lacquer, *e.g.*, $COMe_2$, partly dissolving the primer, and the coated article is finally heated to arrest this penetrating action. S. S. W.

Cellulose ester composition containing pinacol. H. B. Smith, Assr. to Eastman Kodak Co. (U.S.P. 1,997,319, 9.4.35. Appl., 18.7.34).—Pinacol or its hydrate is added as plasticiser to org. derivatives of cellulose (plasticiser 5—100, cellulose acetate 100 pts.). F. R. E.

Coating and filling materials. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 441,879, 27.7.34).—Compositions of bitumens (petroleum pitch) dispersed with H_2O by means of H_2O-insol. emulsifying agents (humic acid, clay) and containing a powdered cellulosic filler (sawdust) are claimed. Stability is improved by incorporation of 2% of benzine. S. S. W.

Treatment of rosin [to remove oxidised products]. J. N. Borglin and L. N. Bent, Assrs. to Hercules Powder Co. (U.S.P. 1,995,600, 26.3.35. Appl., 19.11.31).—A solution of rosin in a hydrocarbon solvent (petrol) is washed with an alkyl-, hydroxyalkyl-, polyalkyl-, or polyhydroxyalkyl-amine, the pptd. hydroxyabietate is removed, and the rosin recovered from the solution. S. S. W.

[Phenol–aldehyde] synthetic resin composition. S. L. M. Saunders (B.P. 442,053, 8.3.35. Addn. to B.P. 431,951; B., 1935, 861).—A vegetable oil is added at any stage in the prior process. S. M.

Preparation of compositions containing urea–formaldehyde condensation products. S. L. M. Saunders (B.P. 442,054, 8.3.35).—A dispersion of a methylolurea in an org. solvent containing $\nless$ 1 OH group, *e.g.*, OH·$[CH_2]_2$·OEt, is heated in presence of an acid catalyst with more than sufficient CH_2O to form a dimethylolurea. The product is suitable for air-drying lacquers. S. M.

Manufacture of condensation products from primary aromatic amines and formaldehyde. Soc. Chem. Ind. in Basle (B.P. 441,978, 7.6.35. Switz., 9.6.34).—Amines, *e.g.*, NH_2Ph (in a H_2O-insol. solvent, *e.g.*, C_6H_6), are added to excess, *e.g.*, 3 mols., of CH_2O in presence of alkali, *e.g.*, Na_2CO_3. The products are isolated at low temp., *e.g.*, at 30—40°. They are believed to be of the type R·N(CH_2·OH)$_2$, readily yield 1 mol. of CH_2O, and are valuable in pharmacy and in the prep. of artificial masses. A. W. B.

Manufacture of vinyl resins. Soc. Nobel franç. (B.P. 442,057, 29.3.35. Fr., 3.5.34).—Condensation products of polyvinyl alcohols and aldehydes are stabilised, so that they do not yellow when stoved, by incorporating as antioxidant about 1% of a polyhydric phenol, *e.g.*, quinol, pyrogallol. S. M.

Polymeric lactide resin. G. L. Dorough, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,995,970, 26.3.35. Appl., 4.4.31).—Lactide is polymerised at 273—300° and freed from low-mol.-wt. compounds by distillation under reduced pressure. S. M.

Artificial resin plasticisers [for nitrocellulose]. Beck, Koller & Co., Inc., Assees. of A. G. Hovey (B.P. 441,912, 12.4.35. U.S., 5.5.34).—A non-drying oil (I val. < 100), *e.g.*, castor, palm, is heated with glycerol (I) in a closed kettle in presence of a small amount of NaOH, PbO, CaO, etc. until an alcohol-sol. product is formed; a dibasic aliphatic acid or anhydride (C $\ngtr$ 5), *e.g.*, succinic, maleic, and more (I) are added and the cooking is continued in an inert atm. A liquid resin is produced which is sol. in PhMe and miscible with nitrocellulose solutions. S. M.

Laminated materials and articles. Celluloid Corp. (B.P. 442,066, 14.6.35. U.S., 26.6.34).—Metal thread, foil, tinsel, etc. are hot-pressed between sheets of cellulose acetate or other thermoplastic. S. M.

Sealing compositions for containers. Crosse & Blackwell, Ltd., W. Clayton, and R. I. Johnson (B.P. 441,877, 27.7.34).—Compositions of rubber latex or dispersed rubber and colloidal graphite (10—30% of the dry rubber) are claimed. S. S. W.

Polymerised bituminous, premoulded expansion joint. A. C. Fischer, Assr. to P. Carey Manufg. Co. (U.S.P. 1,982,506, 27.11.34. Appl., 21.12.25).—A mixture of polymerised tung oil 5, bituminous material 85, and finely-ground inert filler 10% is claimed. A. R. P.

Fibrous insulation.—See V. **Depositing metal on non-conductors.**—See X. **Tung oil derivatives.**—See XII. **Wound plaster.**—See XX.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Internal protective coatings for [rubber] latex containers. E. Rhodes and K. C. Sekar (J. Rubber Res. Inst. Malaya, 1935, **6**, 81—89).—A no. of paint-like preps. have been tried as to their capacity to provide an internal coating for Fe drums to prevent direct contact of these with the latex and formation of FeS thereby. Good results were obtained by wetting the inside of the drums with latex (1 gal.) containing 0·7% of NH_3 to which had been added a smooth paste of ZnO (2 lb.) in H_2O (1 quart). After draining away surplus latex, the remaining film was dried by sun heat. D. F. T.

Thermal plasticising of rubber. II. Technical characteristics of "softened" rubber. M. I. Farberov and A. V. Susliakov (India-Rubber J., 1936, **91**, 282—286; cf. B., 1936, 289).—By thermal treatment it is possible to obtain rubber with any desired degree of plasticity over a wide range. The saving of power resulting from the use of such rubber may amount to 15—50%, depending on the % of the rubber in the stock and on the desired plasticity. Thermoplasticised rubber shows less "calender grain" and a lower H_2O absorption than ordinary masticated rubber, and the mechanical properties after vulcanisation are equal to those of products from ordinary masticated rubber of comparable plasticity. D. F. T.

Hard rubber; its carbon and hydrogen content. H. L. Fisher and Y. Schubert (Ind. Eng. Chem., 1936, **28**, 209—211).—Analysis of 4 samples of hard rubber containing 100—150% of the S necessary for formation of C_5H_8S shows that extraction of free S by $COMe_2$ is not complete in 66 hr. With purified rubber and the theoretical % of S, vulcanisation at 141° for 40 hr. gives substantially only addition of S and no substitution until saturation is complete. With crêpe rubber and excess of S the additive reaction is accompanied by substitution, as is evident from the % of combined S attained and the formation of H_2S. The extent to which natural protein may be responsible for the formation of H_2S is left undecided. D. F. T.

Effect of oxygen absorbers in rubber. A. A. Somerville (Ind. Eng. Chem., 1936, **28**, 11—17).—There is evidence that O_2 dissolved in rubber and adsorbed in compounding ingredients contributes to the ageing phenomena with rubber. Commercial antioxidants in the main act catalytically to prevent oxidation and do not appreciably absorb O_2. It is now found that the additional presence of certain O_2-absorbing substances in rubber provides resistance to flex-cracking which is not prevented by ordinary antioxidants. Bomb-ageing tests indicate that pyrogallol (I)–ethanolamine (II) in rubber has no age-resisting properties; when, however, this alkaline form of (I) is used together with an antioxidant (β-$C_{10}H_7\cdot NHPh$), greatly increased resistance to cracking on repeated flexion results. The above explanation and these results are confirmed by the fact that Bz_2O_2 in rubber markedly increases the flex-cracking tendency, which, however, is almost completely eliminated again by the presence of (I)–(II). The tendency of high % of C black to accentuate flex-cracking can be suppressed by the use of this O_2 absorber. Quinol is less effective than (I). D. F. T.

Surface deterioration of ebonite. III. Examination of some samples after prolonged exposure to air and light. J. R. Scott (J. Res. Assoc. Brit. Rubber Manufrs., 1936, **5**, 2—9; cf. B., 1930, 293).—Samples which had been exposed under glass for 15 years showed superficial cracking and masses of a whitish deposit; the majority showed a content of combined S $>$ that corresponding to C_5H_8S. The exposure appeared to have caused oxidation of part of the caoutchouc to "resin," leaving a residue richer in S. Certain of the samples containing org. softening ingredients, *e.g.*, palm pitch or carnauba wax, had deteriorated $<$ the others. The swelling properties of the samples towards C_6H_6 had little relation to the stability. D. F. T.

Structure of synthetic rubbers. Polychloroprenes. A. L. Klebanski and V. G. Vassiljeva (J. pr. Chem., 1936, [ii], **144**, 251—264).—The ozonide from α-polychloroprene (I) (Carothers *et al.*, B., 1932, 156) (in CCl_4) with conc. aq. H_2O_2 gives $(\cdot CH_2\cdot CO_2H)_2$ (II) (82·3% yield) and a little HCO_2H; decomp. with H_2O affords (II) and much resin. ω-Polychloroprene (III) (*loc. cit.*) similarly gives 87·1% of (II), whilst ozonolysis of μ-polychloroprene (IV) in $CHCl_3 + H_2O$ affords 81·6% of (II). (I), (III), and (IV) thus contain the same fundamental group, probably $\cdot CH_2\cdot[CCl{:}CH\cdot CH_2\cdot CH_2\cdot]_nCCl{:}CH\cdot CH_2\cdot$ (cf. *loc. cit.*). Prolonged treatment of (IV) with $CHCl_3$ in presence of air gives (I). H. B.

Weed-killers on rubber estates.—See XVI.

Patents.

[Rubber] latex composition. W. E. Messer, Assr. to United States Rubber Co. (U.S.P. 1,995,859, 26.3.35. Appl., 14.10.32).—Latex is compounded with a H_2O-sol. (alkali-metal) methyl*cyclo*pentamethylenedithiocarbamate; the mixture is used for the production of vulcanised latex or vulcanised rubber products. D. F. T.

Preparation of reversible rubber compositions from rubber latex and their reversal. R. J. Noble, Assr. to Heveatex Corp. (U.S.P. 1,995,747, 26.3.35. Appl., 12.5.34).—Latex to which a H_2O-sol. stabiliser (caseinate or albuminate) has been added is flocculated by a chemical (a Zn or similar salt) which insolubilises the stabiliser. After the flocks have been de-watered to a consistency resembling cottage cheese, the semi-solid mass (20—30% of H_2O) can be reconverted into latex by addition of H_2O and a solvent (aq. NH_3) for the insolubilised stabiliser. D. F. T.

Production of rubber threads. Kölnische Gummifädenfabr. vorm. F. Kohlstadt & Co. (B.P. 442,087, 31.7.34. Ger., 31.7.33).—Latex composition (including filling, dyeing, and curing constituents) [$\nless$ 65 (80)% of solids] is squirted to hang freely and then dried by exposure to air without coagulating baths; vulcanisation may follow if desired. B. M. V.

Manufacture of articles from [rubber] latex. W. J. Dean (U.S.P. 1,995,767, 26.3.35. Appl., 12.12.32).

—A strip of fabric is led through a bath of latex so as to effect impregnation and interconnexion of the fibres, and then after passing through a drying zone such that the rate of coagulation is approx. equal to the rate of travel, may be washed in a water-bath for removal of lipin. Apparatus is described. D. F. T.

Production of dry raw rubber. A. Thorp (B.P. 441,850, 19.7.34).—Raw rubber is obtained as fine powder by spraying latex on to a (travelling) support so as to form a thin skin, which is dried, dusted, and comminuted, *e.g.*, by a grinding or cutting device, before removal from the support. Apparatus is claimed. D. F. T.

Rubber solvent. W. Seaman and G. L. Matheson, Assrs. to Standard Oil Development Co. (U.S.P. 1,996,001, 26.3.35. Appl., 23.7.31).—Alkyl thioethers and polysulphides (b.p. preferably $\ngtr$ that of $Pr^a{}_2S_2$) are used, alone or mixed with other rubber solvents, for the prep. of rubber doughs and solutions. The mixture obtained by limited dehydrogenation of the mercaptans from sour petroleum oils is convenient. The solutions in these S compounds are less viscous than those of the same concn. in CS_2. D. F. T.

Improving the properties of rubber. W. A. Gibbons, Assr. to United States Rubber Co. (U.S.P. 1,995,847, 26.3.35. Appl., 8.3.30).—The physical properties of rubber (especially reclaimed or spray-dried rubber) before and after vulcanisation are improved by incorporating during the early stages of mastication a H_2O-sol. material, *e.g.*, an org. acid (salicylic, $CH_2Cl{\cdot}CO_2H$, $C_{10}H_7{\cdot}SO_3H$, etc.) or a hydrolysable salt such as NH_4 lactate or $ZnCl_2$, capable of decomp. alkali proteinates and soaps, the quantity added being at least sufficient to bring the p_H of the H_2O extract to neutrality. D. F. T.

Preservation of rubber. Wingfoot Corp. (B.P. 442,001, 27.4.34. U.S., 13.7.33).—Rubber is vulcanised in presence of a *tert.*-diarylalkylamine (free from $C_{10}H_7$ groups) in which the total no. of C atoms present is $\nless$ 14, *e.g.*, NPh_2Bu. D. F. T.

Rubber filaments.—See V. **Insulated Cu wires.**—See XI. **Tung oil derivatives.**—See XII. **Sealing compositions.**—See XIII.

XV.—LEATHER ; GLUE.

Evaluation of enzyme bating materials [for hides and skins] by means of shrunken collagen fibres. J. Nabholz (Collegium, 1936, 13—33).—The time is determined for a 0·01—2% infusion of the bating material at 40° to digest hide fibres 0·02—0·04 mm. thick, which have been shrunken at 80—90°. The optimum p_H is 6·0 for salt-free preps. D. W.

Ageing of pancreatic bating materials [for hides and skins]. V. Kubelka and V. Němec (Collegium, 1936, 34—36).—The materials lose 25—40% of their strength as determined by the casein test on ageing for 1 year, and thereafter remain const. D. W.

Grease stains on leather. VII. Comparison of solvents for removing kidney grease stains. E. K. Moore (J. Amer. Leather Chem. Assoc., 1936, **31**, 4—32 ; cf. B., 1935, 1008).—From a study of the efficiency in grease removal, drying period, cost, toxicity, fire hazard, and residual odour of 54 different solvents, CCl_4 or light petroleum (b.p. 150—205°) is recommended. D. W.

Possible application of histological methods to the leather industry. G. Leplat (J. Soc. Leather Trades Chem., 1936, **20**, 61—69).—A lecture, in which a plea is made for co-operation between histologists and leather chemists. A distinction is drawn between the continuous sheath of the tendon fibre and the discontinuous sheath of the collagen fibre, a special form of ultramicroscope being used for the purpose. This observation explains the differences in acid-swelling observed with these two fibres. D. W.

Gelatin as a stabilising colloid for oil-in-water emulsion systems. L. F. Tice (J. Amer. Pharm. Assoc., 1935, **24**, 1062—1069).—The efficiency of gelatin as a stabiliser depends on its method of prep. Gelatin prepared by acid treatment, having an isoelectric point at p_H 8, requires p_H 3 for the most efficient stabilisation ; corresponding figures for the alkali-treated product are 4·7 and 1. The merits of gelatin and the practical prep. of emulsions are discussed. E. H. S.

Patents.

Tanning of hides and skins. M. M. Merritt, Assr. to Tanning Process Co. (U.S.P. 1,993,298, 5.3.35. Appl., 12.4.34).—Skins are impregnated with a tanning agent or non-tan, *e.g.*, H_2CrO_4, struck out, and kept in an extended condition on a rubber mat while the tannage is completed, *e.g.*, by swabbing with aq. $Na_2S_2O_3$ (*d* 1·2). After piling for 2 hr. or overnight, the skins are dry-drummed. D. W.

Tanning skin substances [white leather]. A. Schubert (U.S.P. 1,997,658, 16.4.35. Appl., 30.8.32).—Skins are tanned at p_H 3·5—5·4 with an aq. product derived on fusion of anhyd. $NaHSO_4$ or $KHSO_4$ with TiO_2 and $NaHSO_3$ (or Na_2SO_3, $Na_2S_2O_3$, or $Na_2S_2O_4$). D. W.

Adhesive [for greasy or waxy paper]. H. J. Wolfe, Assr. to Fort Orange Paper Co. (U.S.P. 1,983,650, 11.12.34. Appl., 25.7.32).—A solution of dextrin, shellac, or a gum (gum arabic 40) and KOH, NaOH, LiOH, or $Ba(OH)_2$ (KOH 34 pts.) in H_2O (75 pts.) is claimed. A. R. P.

Dyeing pelts.—See VI.

XVI.—AGRICULTURE.

Nomenclature of soils. J. A. Prescott (J. Australian Inst. Agric. Sci., 1935, **1**, 155—158).—A brief review of earlier developments. A. G. P.

Nitrification in acid soils. M. M. Alicante (Philippine J. Sci., 1935, **58**, 163—169).—The activity of nitrifying bacteria in the soil is inhibited when the acidity exceeds about 0·5% ; it gradually increases with decrease in acidity until in soil containing 0·005% of acid $>$ 90% of the N added as $NH_4^{\cdot}$ is converted into NO_3'. In nitrification tests in a nutrient solution only a slight amount of nitrification was observed in neutral cultures, but normal production of NO_3' occurred on addition of $CaCO_3$. Since both acid and CO_3'' radicals can co-exist in an acid soil, nitrification can take place to an extent depending on the amount of CO_3'' present. A. R. P.

Nitrification on silty soils of the plateau of the Pays de Caux. C. Brioux and E. Jouis (Ann. Agron., 1935, **5**, 622—631).—Nitrification is appreciable only in soils having $p_H \nless 6\cdot0$. Ammonification is, however, active at p_H 5·0. Appropriate manurial treatment is discussed in the light of these observations. A. G. P.

Determination of nitrogen [in soils etc.] by fumeless digestion. II. Products of oxidative digestion of organic nitrogen: procedure for their inclusion in the determination of total nitrogen. C. R. H. Iyer, R. Rajagopalan, and V. Subrahmanyan (Proc. Indian Acad. Sci., 1936, **3, B,** 35—70; cf. B., 1935, 1009, 1108).—In the H_2SO_4–$K_2Cr_2O_7$–HgO digestion process, loss of N through formation and decomp. of $(NH_4)_2Cr_2O_7$ is obviated by adding $K_2Cr_2O_7$ or, preferably, aq. CrO_3 to the mixture at $> 150°$. NO_3' present in the sample or formed during digestion is retained by means of a condenser. For reducing the digest, Na_2SO_3 with a small amount of Zn avoids the large and variable " blank " given by use of large amounts of Zn alone. The $H_2SO_4 : H_2O$ ratio for digestion should be $\nless 2:1$. A. G. P.

Mineralogical and chemical studies on some inorganic phosphorus compounds in the soil. A. Leahey (Sci. Agric., 1935, **15**, 704—712).—Soil phosphates may be conc. by flotation methods, using Clerici's solution. Apatite and collophane were abundant in certain soils as primary minerals. Amorphous Fe and Al phosphates formed by secondary changes in soil are complex in character and are highly hydrated. A. G. P.

Soil and manganese deficiency. G. W. Leeper (J. Australian Inst. Agric. Sci., 1935, **1**, 161—163; cf. A., 1935, 266).—The nature and availability of Mn compounds in soil are discussed. An application of the quinol test for Mn deficiency is described. A. G. P.

Micro-organisms of the rhizosphere in Batum red-earth soils. A. A. Obrazcov (Compt. rend. Acad. Sci. U.R.S.S., 1935, **4**, 65—69).—The microflora of the rhizosphere of the tea plant comprises the same groups of non-spored metatrophic organisms as occur in the rhizosphere of other herbaceous plants grown in very different soils. Cellulose-fermenting bacteria and fungi predominate. No *Azotobacter* were found. A. G. P.

Short-period fluctuations in the numbers of bacterial cells in soil. C. B. Taylor (Proc. Roy. Soc., 1936, **B, 119**, 269—295).—Total bacterial nos. change significantly in daily and 2-hourly counts in fresh soil, and in daily counts in soils incubated at const. temp. and humidity, and in sterilised and re-inoculated soil. Significant variations are also found in plate counts. The fluctuations are not correlated with temp., pressure, light, or time of day. There is some evidence for a positive correlation with soil-H_2O content, and an inverse relation between total bacterial no. and no. of protozoa. Different groups of micro-organisms seem to exist in unstable equilibrium, affected by temp. and humidity. F. A. A.

Measurements [on soils] with the glass electrode. E. Pfeil (Angew. Chem., 1936, **49**, 57—59).—The quinhydrone and glass electrodes are compared in measurements of soil p_H. In some cases the quinhydrone electrode is unstable, and in these addition of quinhydrone to the glass electrode causes similar potential changes, which are ascribed to oxidation–reduction reactions. The glass electrode gives stable potentials and is the more useful for work with soils. S. M. N.

Effect of sulphur dioxide on wheat development. Action at low concentrations. R. E. Swain and A. B. Johnson (Ind. Eng. Chem., 1936, **28**, 42—47).—The appearance and rate of growth of, and dry wt. of tissue developed by, wheat seedlings were not affected by intermittent treatment with SO_2 at a concn. slightly $<$ that required to produce visible leaf injury. E. C. S.

Nature of rust-resistance in wheat. VII. Analyses of hybrid lines of wheat differing in rust reactions. J. A. Anderson (Canad. J. Res., 1936, **14, C,** 1—10; cf. A., 1935, 269).—Fractionation of the constituents of seedling and mature, infected, and non-infected wheat leaves failed to show any correlation between rust infection and chemical composition. A. G. P.

Rates of dissolution and movement of different fertilisers in the soil and effects of the fertiliser on germination and root development of beans. C. B. Sayre and A. W. Clark (New York State Agric. Exp. Sta. Tech. Bull., 1935, No. 231, 67 pp.).—Application of nearly all sol. fertilisers and some org. forms in a zone immediately above or below seeds inhibits root growth for approx. 14 days. Vertical movement was the most rapid in the case of inorg. N fertilisers. Org. N substances were less mobile. Movement of P fertilisers was very restricted. Lateral movement of fertilisers was small in all cases, $CaCN_2$ being an exception. The bearing of these results on the placement of fertilisers in practice is indicated. A. G. P.

Growth of turnips in artificial cultures. H. Hill and E. P. Grant (Sci. Agric., 1935, **15**, 652—659).—In B-free sand cultures turnips developed leaf injury and a crown root-rot. Progressive additions of B (up to 1·5 p.p.m.) to media caused a corresponding decline in the severity of injury, and an increase in ash content of the dry matter of roots. The B content of roots increased with the amount supplied. A. G. P.

Phosphate fertilisers by the calcination process. Volatilisation of fluorine from phosphate rock at high temperatures. K. D. Jacob, D. S. Reynolds, and H. L. Marshall (Amer. Inst. Min. Met. Eng., 1936, Tech. Publ. 695, 14 pp.; cf. B., 1935, 601).—When phosphate rock is calcined in presence of H_2O vapour F is volatilised and the content of citrate-sol. P_2O_5 increased, the optimum conditions being temp. 1425°, material size 20—80-mesh, SiO_2 content $> 4\%$, when 99% of the F is volatilised and 95% of the P_2O_5 becomes citrate-sol. There is no increase in citrate-sol. P_2O_5 until the F in excess of that corresponding to $Ca_{10}F_2(PO_4)_6$ equiv. to the total P and 1 atom of F from this compound are volatilised; after that it increases in proportion as the remaining F is removed, provided that the temp. is $> 1350°$ and the sample contains $> 4\%$ of SiO_2. The fertiliser efficiency of calcined phosphate rock is $>$ that of superphosphate. D. K. M.

Properties of quenched and unquenched calcium silicate slags, and effects of their admixtures with phosphatic fertilisers. W. H. MacIntyre, L. J. Hardin, and F. D. Oldham (Ind. Eng. Chem., 1936, **28**, 48—56).—Microscopical examinations and chemical studies of two ground Ca silicate slags in the air-cooled and quenched condition indicate that they can be used effectively as a soil amendment and that cured triple superphosphates and their mixtures with $NH_4H_2PO_4$ and K_2SO_4 can be diluted with dry $CaH_4(PO_4)_2$ slags instead of $CaCO_3$ to give dry, non-caking, and non-hygroscopic products. W. P. R.

Influence of urea and cyanamide derivatives on plant growth. S. Tesima (J. Agric. Chem. Soc. Japan, 1935, **11**, 1055—1074).—The influence of urea, dicyanodiamide, and guanidine (I) nitrate, carbonate, hydrochloride, phosphate, and urea phosphate on the growth of rice, barley, radish, etc. is $<$ that of $CaCN_2$ or $(NH_4)_2SO_4$. (I) derivatives have a toxic action. F. O. H.

Boron requirement and boron content of crops. M. P. Löhnis (Chem. Weekblad, 1936, **33**, 59—61).—The presence of traces of B in the H_2O increased the rate of growth of all the crops investigated. The B contents of the grown plants of various ages and of the seeds or fruit were determined. The leguminous plants, tomatoes, and sugar beet contained most B (0·001—0·003%, on the dried plant) and the cereals least (0·00007—0·0002%). The seeds, in general, contain less B. D. R. D.

Use of magnesium compounds in agriculture. M. Javillier (Chim. et Ind., 1936, **35**, 274—284, 533—540).—A review.

Manurial action of magnesium. M. Popp (Landw. Versuchs-Stat., 1936, **124**, 129—152).—Recent work is summarised. A. G. P.

Use of liquid manure and drainage from manure heaps in farm management. H. Rheinwald and G. Preuschen (Landw. Jahrb., 1935, **81**, 691—741).—Methods of distribution for various crops are discussed. A. G. P.

Effect of sodium chlorate used as a week-killer among oil palms. B. Bunting and T. D. Marsh (Malayan Agric. J., 1936, **24**, 22—25).—Two applications of aq. $NaClO_3$ at the rate of 14 lb. per acre, with an interval of a month, had no ill-effects on the palms. In some cases as much as 44 lb. per acre were safely applied during the season. A. G. P.

Use of weed-killers in the control of natural covers [on rubber estates]. C. G. Akhurst (J. Rubber Res. Inst. Malaya, 1935, **6**, 111—120).—Areas of bracken and stag-moss can be eradicated by careful spraying with $NaClO_3$ or arsenical weed-killers, but lalang and other grasses and bush types of covers, also leguminous creepers, are not permanently injured thereby. D. F. T.

Evaluation of rotenone-containing plants. I. *Derris elliptica* and *D. malaccensis*. F. Tattersfield and J. T. Martin (Ann. Appl. Biol., 1935, **22**, 578—605).—Comparative analyses of 7 samples are given. Insecticidal tests made with pairs of samples of material from different species were not paralleled by determinations of rotenone (I) (by current methods), of Et_2O-extractives, or of the OMe content. Tests of pairs of samples from the same species were more closely related to chemical analyses. Determinations of dehydro-compounds (II) or of (I) + (II) were a more satisfactory measure of insecticidal val. whether samples of the same or of different species were compared. A. G. P.

Derris root powder in cabbage-moth control. W. L. Morgan (Agric. Gaz. N.S.W., 1935, **46**, 267—268).—Satisfactory trials are described. A. G. P.

Codling-moth control by non-arsenical sprays. H. Jarvis (Queensland Agric. J., 1935, **43**, 5—8).—Nicotine–white oil preps. gave promising results with codling moth and probably have a repellent action on the fruit fly. A. G. P.

Red spider (*Tetranychus telarius*, L.) on hops and its control. S. G. Jary (Ann. Appl. Biol., 1935, **22**, 538—548).—Spraying the poles with a 5%, high-boiling, neutral tar-oil prep. killed the majority of the mites. Summer spraying of hops with a 1—2% H_2O-white petroleum oil or CaO–S (1 in 60) gave good control. Liver of S and colloidal S were not effective. A. G. P.

Control of flea-beetles in seed beds. F. R. Petherbridge and I. Thomas (J. Min. Agric., 1936, **42**, 1086—1088; cf. B., 1935, 282).—Good control is obtained by the use of derris dust (0·2% of rotenone) or $C_{10}H_8$–SiO_2 (1 : 1) at the rate of 65—85 lb. per acre, applied at suitable intervals from the time the seedlings appear above ground. Powdered quartz gave inferior results. A. G. P.

Control of plum sawfly (with a note on thrips damage). F. R. Petherbridge and I. Thomas (J. Min. Agric., 1936, **42**, 1108—1118).—Spraying with derris when the cots began to split gave better results than did nicotine sulphate–Pb arsenate. The latter when combined with CaO–S caused severe injury to trees. A. G. P.

Chemical method for determining the safeness to foliage of commercial calcium arsenates. G. W. Pearce, L. B. Norton, and P. J. Chapman (New York State Agric. Exp. Sta. Tech. Bull., 1935, No. 234, 15 pp.).—The H_2O-sol. As remaining after removal of free $Ca(OH)_2$ (*e.g.*, by CO_2 under specified conditions) is a measure of the injurious properties of the material. Injury is due to the solubility of Ca–As compounds present and not to decomp. by CO_2. A. G. P.

Physical chemistry of copper [sulphate]–lime fungicides. P. Reckenforder (Z. Pflanzenkr. Pflanzenschutz, 1935, **45**, 341—353).—Adhesiveness of $CuSO_4$–CaO sprays increases with the proportion of CaO used, with a max. corresponding to a ratio of 1 : 1·5 approx. and a ppt. having the composition $CuSO_4,4Cu(OH)_2,3Ca(OH)_2$. The swelling of the dried sediment on remoistening is greater with lower proportions of CaO. The bearing of these results on the fungicidal val. of the preps. is discussed. A. G. P.

Occurrence of copper poisoning in a glasshouse crop. J. Caldwell (Ann. Appl. Biol., 1935, **22**, 465—468).—Under certain conditions small amounts of Cu may induce in cucumber plants symptoms of a disease resembling a virus disease. A. G. P.

Incorporation of direct with protective insecticides and fungicides. I. Laboratory evaluation of water-soluble wetting agents as constituents of combined washes. A. C. Evans and H. Martin (J. Pomology, 1935, **13**, 261—292).—Apparatus for determining spray retention and the angle of contact of spray liquids with standard surfaces is described. Wetting properties are closely correlated with the receding angle of contact of the spray. The area of spread of the liquid is related to the advancing angle of contact and in solutions showing the same angle is greater for spreaders of long-chain structure. The advancing and receding angles of contact of a no. of wetting and spreading agents examined are closely related, excepting in the case of saponins. Spray retention is a function of both wetting and spreading qualities. A. G. P.

Patents.

Cultivation of tobacco. P. Koenig, Assr. to Tabakforschungsinst. f. das Deuts. Reich (U.S.P. 1,997,369, 9.4.35. Appl., 8.6.33. Ger., 8.3.33).—Varieties (including nicotine-poor or -free) of tobacco usually grown for cigars, when grown with $<$ the normal distance between plants and rows (*e.g.*, 30 cm.) produce smaller, lighter leaves suitable for cigarette tobaccos. A. G. P.

Compound for fumigation of soils. M. O. Johnson, Assr. to California Packing Corp. (U.S.P. 1,983,546, 11.12.34. Appl., 23.10.29).—Chloropicrin is injected below the surface of the soil, or, alternatively, a mixture of Na picrate and bleaching powder is dug into the soil. A. R. P.

Production of a soluble, synthetic, basic-slag fertiliser. J. A. Heskett (B.P. 435,763, 23.3.34).—A mixture of phosphate rock, sand, CaO, and, if desired, Fe_2O_3, Al_2O_3, and MgO is fused in a rotary furnace and steam or an oxidising gas is blown through the melt. A. R. P.

Insecticide composition [for eradication of earthworms]. W. P. Flint and G. L. Hockenyos, Assrs. to Monsanto Chem. Co. (U.S.P. 1,982,909, 4.12.34. Appl., 6.12.29).—An emulsion of a toxic agent, *e.g.*, NaF, Na_2SiF_6, or chlorinated derivatives of C_6H_6 or $C_{10}H_8$, and an irritant, *e.g.*, $CH_2Cl\cdot CO_2H$, $COMe\cdot CH_2Cl$, or mustard oil, is claimed. A. R. P.

Treating Fe_2O_3 [for insecticide].—See VII. **[Fertiliser from] sewage treatment.**—See XXIII.

XVII.—SUGARS ; STARCHES ; GUMS.

Hydrolysis of oat hulls with hydrochloric acid. L. C. Bryner, L. M. Christensen, and E. I. Fulmer (Ind. Eng. Chem., 1936, **28**, 206—208).—At any given [HCl] and pressure the yield of reducing sugars from oat hulls reaches a max. and then diminishes. The max. yield, calc. as xylose, is about 40% of the dry husks and is practically quant. During hydrolysis about 2·2% is lost as volatile matter and 5·5% of the lignin is destroyed. A large-scale laboratory apparatus is described which allows samples to be taken while a pressure hydrolysis is in progress. S. C.

Continuous crystallisation in the [sugar-]refining industry. G. H. de Vries (Chem. Weekblad, 1936, **33**, 99—104).—The process is described in detail. D. R. D.

Starch determination with amylase. V. Estienne and F. Gérard (Bull. Assoc. Anc. Etud. Louvain, 1935, **35**, 150 ; Woch. Brau., 1936, **53**, 61—62).—An acidified (AcOH) extract of low-dried malt is fermented with top yeast. Mixed with PhMe, the filtered product (I) can be kept in closed brown bottles for approx. a year. For starch determination the finely-ground material is gelatinised with H_2O (water-bath, followed by autoclave), and an aliquot part of the solution is treated with (I) for 48 hr. at 53—55°. From the reducing sugar (maltose) formed the starch content can be calc., reducing sugars and sucrose originally present being determined independently. I. A. P.

Starch nitrates (" nitrostarch "). W. P. M. Matla (Chem. Weekblad, 1936, **33**, 120—125).—A review. S. C.

Action of amylases on starch.—See XVIII. **Honey.**—See XIX.

Patents.

Mixing of liquids.—See I. **Solvents by fermentation.**—See XVIII.

XVIII.—FERMENTATION INDUSTRIES.

Can a yeast infected by *Sarcina* become *Sarcina*-free as a result of further cultivation ? I. Janensch (Woch. Brau., 1936, **53**, 59—61).—The conditions for *Sarcina* development in the brewery are discussed. A sample of yeast, originally contaminated with *Sarcina*, was found to be pure after use in 2 brews. A probable reason for this unexpected result is indicated. I. A. P.

Influence of the malting and brewing processes on the concentration of growth-promoting substances [for yeast] in wort. N. Nielsen (Compt. rend. Trav. Lab. Carlsberg, 1936, **21**, 185—194 ; Woch. Brau., 1936, **53**, 49—51).—Extracts from coarsely-ground barley contain less growth-promoting substances (*S*) than extracts from finely-ground barley ; the influence of the grind is less important in malt. Increasing extraction concn. gives diminished relative amounts of *S*. A second extraction removes a further small amount of *S* in all cases. During malting the *S* content of the grain appears to show a 50% increase, attained as a result of a steady rise during the flooring period. The increase appears to be real, and not due solely to the greater ease of extraction from malt. During kilning there is a slight loss of *S*. During brewing (Pilsner) the *S* content of wort shows approx. no variation, remaining in approx. const. proportion to the N. The *S* contents of worts (diluted to the same extract concn.) from different barleys and different brewing processes vary only between narrow limits. I. A. P.

Standard bitter hops. W. Schüler (Woch. Brau., 1936, **53**, 58—59).—It is convenient to express the bitter val. ($\alpha + \beta/9$) of hop samples as a % of the bitter val. of a "standard bitter hop" having 6·0% of humulone and 14·4% of C_6H_{14}-sol. resins. Thus, when hops are blended for aroma, flavour, etc., calculation of the bitters for control purposes is facilitated. I. A. P.

Bitterness of beer and the bitter value of hops. J. De Clerck (Bull. Assoc. Anc. Etud. Louvain, 1935, **35**, 127; Woch. Brau., 1936, **53**, 53).—The utility of the expression $\alpha + \beta/9$ as a measure of the potential bittering properties of hops is discussed. I. A. P.

Defect in flavour of bright beer. H. Lüers (Woch. Brau., 1936, **53**, 57—58).—A beer which had been prepared by a process normal to the brewery developed an unpleasant taste. The possibility of biological contamination was excluded, whilst the N content of the malt was approx. normal. The beer, however, showed high p_H, and tests of the types of nitrogenous substances in it showed that proteolysis had been weak and uneven. It appeared that this had reacted unfavourably on the yeast and the fermentation, leading to a beer containing labile materials which, especially in presence of O_2, produced a bad flavour. The probable reasons for the deficient proteolysis are discussed, and a successful method is indicated for avoiding the difficulty. I. A. P.

Sorbitol in pure grape wines. C. Schätzlein and E. Sailer (Z. Unters. Lebensm., 1935, **70**, 484—488; cf. B., 1935, 871).—The presence of small quantities of sorbitol in pure grape wines is confirmed, but the amount is too small to interfere with the usefulness of Werder's test for adulteration with fruit wines. E. C. S.

Calcium gluconate from juice of cull and surplus apples. C. Frost, J. L. St. John, and H. W. Gerritz (Ind. Eng. Chem., 1936, **28**, 75—79).—Of 5 types of organism known to produce gluconic acid (I) from glucose (II), *Penicillium purpurogenum* and *P. citrinum* grew well on cider. With the latter, the yield of (I) from (II) was $>$ 50%, and from sucrose $>$ 40%, of the sugar used. Fructose was not fermented to (I). Addition of neutral salts caused no definite increase in yield. The yields with *P. purpurogenum* were smaller. E. C. S.

Action of amylases on starch. H. C. Gore (Ind. Eng. Chem., 1936, **28**, 86—88).—The methods of determination of diastatic activity by "saccharogenesis" from raw starch, by liquefying power, and by saccharification of Lintner's sol. starch are reviewed. E. C. S.

Proteolytic enzymes of flour. Counting yeast cells in dough.—See XIX. **Distillery wastes.**—See XXIII.

Patents.

Preparation of beers and ales. L. Wallerstein (U.S.P. 1,994,494, 19.3.35. Appl., 17.1.33. Can., 18.1.32).—Activated C ($\not>$ 10 oz. per 31 gals. of wort) selectively removes from pure malt wort substances derived from malt husk which affect unfavourably the flavour of beer, desirable flavours being unaffected. The C may be mixed with kieselguhr, and treatment carried out during mashing or before boiling, the C being then suitably removed. Alternatively, C may be added to the copper, hops being added later without separating the C. Thus beers or pale ales, of superior flavour, aroma, and taste, can be prepared from pure (6-rowed) malt wort, but the usual adjuncts may be employed if desired. I. A. P.

Manufacture of chill-proofed, full-bodied, albuminoid-containing, fermented beverages. H. Heuser, Assr. to United States Process Corp. (U.S.P. 1,995,275, 19.3.35. Appl., 5.12.32).—Addition of proteolytic enzyme antibodies [*e.g.*, yeast antiprotease (I)] to beer stabilises its contained nitrogenous substances by checking proteolytic hydrolysis and reversion, and so maintains the beer in a bright condition for long periods at room temp. or on ice. For prep. of extracts containing (I) yeast is maintained in contact with H_2O at 97° for 10—20 min., whereby enzymes are killed while (I) passes into solution. The mixture is then added to chilled beer (2°) before or after carbonation; filtration follows. The destruction of the yeast-lipase ensures that the beer esters will escape hydrolysis whilst the absence of protease prevents the loss of foaming properties and of palate-fullness. I. A. P.

Manufacture of solvents by fermentation. J. F. Loughlin (U.S.P. 1,996,428, 2.4.35. Appl., 21.9.31).—After anaërobic fermentation of a mash containing sugar and nutrients with, *e.g.*, *Clostridium saccharobutylacetonicum* (cf. U.S.P. 1,992,921; B., 1936, 295), the residual unfermented sugars are converted into EtOH and CO_2 by inoculation with yeast, the development of the yeast being facilitated by aëration with sterile air at the commencement of the yeast fermentation. The final mixed solvents (EtOH, BuOH, $COMe_2$, and/or $Pr^{\beta}OH$) are recovered by distillation. The sugar used is approx. 95% of that taken, with an approx. 37% yield of solvents. Wastage of sugar is thus avoided, and high sugar concn. can be used in the mash, with a consequent saving in power and steam consumption. I. A. P.

XIX.—FOODS.

Effect of harvest conditions on a few quality factors in wheat. C. O. Swanson (Cereal Chem., 1935, **13**, 79—90).—The effect of moisture and temp. during harvest on wheat quality is due to their influence on the rate of biological activity of wheat. The sugar content and diastatic activity are not affected unless the amount of H_2O is sufficient to start germination. The duration of the wet condition as influenced by the conditions of drying is more important than the amount of wetting. Wheat cut at 29% of H_2O was not lowered in test (bushel) wt., but at higher H_2O content there was a slight lowering. The % of yellow berry was apparently more affected by late maturity than by condition of drying. Drying the wheat at high H_2O contents slowly, and at a low temp., produced an increase in diastatic activity, but not in sugar content. The diastatic activities of germ and brush ends of wheat were practically identical. After germination for 72 hr., however, the germ ends and whole wheat increased in sugar content, but no increase occurred in the brush ends. The diastatic activity was increased in all three, but least in the brush, and most in the germ end. E. A. F.

Minerals of wheat. II. Determination of sodium and potassium. M. A. Howe and B. Sullivan (Cereal

Chem., 1936, **13**, 61—66; cf. B., 1927, 590).—An improved method for the direct determination of Na and K on wheat and its milling products is described in detail; these elements were also determined on the ash of wheat products. A small loss of K was observed when ashing the samples at 590° for 16 hr., the greatest loss being in the patent; no loss of Na was observed. The Na and K contents, respectively, of hard spring Marquis wheat and its products (calc. to dry basis) are: patent 0·001, 0·109%; clear 0·002, 0·174%; wheat 0·003, 0·520%; germ 0·004, 1·151%; bran 0·005, 1·539%. E. A. F.

Determination of total phosphorus in flour. E. A. Kocsis and I. Hegedüs (Z. Unters. Lebensm., 1935, **70**, 474—475).—Simmich's method (A., 1935, 1215) is applied to the ashed material. The results are slightly $>$ those obtained by Spaeth's and Neumann's methods. E. C. S.

Microscopical detection of aleurone granules in flour by staining. B. Broda (Z. Unters. Lebensm., 1935, **70**, 470—473).—On account of their Mg content, the globoids of the aleurone layer are stained by quinalizarin, Titan-yellow, or azo-blue in alkaline solution, and they can be recognised with ease under the microscope. Of the cereals, maize and rice contain the fewest globoids. In barley they are very numerous and are characteristically arranged in several layers. Cereal flour is readily distinguished from potato, sago, banana, maranta, and tapioca flours by this means. E. C. S.

Proteolytic enzymes of [wheat] flour. A. K. Balls and W. S. Hale (Cereal Chem., 1931, **13**, 54—60). —The autolysis of the protein in white flour, whole-wheat flour, bran, and germ was investigated, using techniques described previously (B., 1935, 520, 695). The activation of wheat proteinases by org. thiol compounds (*e.g.*, by cysteine or glutathione), which are reducing systems, furnishes an explanation of the action of oxidising (*e.g.*, in ageing or bleaching) and reducing agents on flour. A theory of the effect of proteinases on the flour proteins during dough fermentation is advanced. E. A. F.

Selenium in proteins from toxic foodstuffs. I. Occurrence and nature of the selenium present in a number of foodstuffs or their derived products. K. W. Franke and E. P. Painter (Cereal Chem., 1936, **13**, 67—70).—A modification of the Horn (A., 1934, 313) codeine sulphate test for Se has been tested on 48 cereal grains (including wheat, maize, barley, oats, and rye), and found to be reliable as a negative test. Se in affected foods is present in the protein fraction; little, if any, is present as metallic Se or as an inorg. salt. When toxic proteins (*e.g.*, wheat-gluten) are hydrolysed most of the Se remains in the solution in some org. compound(s). Some Se appears to be in a very labile form, readily split by alkalis. E. A. F.

Evaluation of whole, crushed, and rough-ground oats. R. Steinhardt (Landw. Versuchs-Stat., 1935, **124**, 87—127).—Grinding improves the digestibility of the protein, but does not affect that of fibre, N-free extractives, or crude ash. Grinding is of val. only for animals unable to masticate well. A. G. P.

Bleaching and treatment of flour. L. Larsen (Tids Kjemi, 1936, **16**, 18—20).—A review. M. H. M. A.

Physico-chemical properties of wheat and flour. P. Potel (Ann. Agron., 1935, **5**, 691—703).—Differences in the plastic properties of doughs resulting from treatment with oxidising or reducing agents are not entirely explained by changes in the oxidation-reduction potential of wheat or flour. Fatty constituents are not concerned in these effects. Wheat germ contains a H_2O-sol. substance which tends to lower the plasticity of dough. A. G. P.

Mechanism of dough fermentation: method for counting yeast cells in a fermenting [wheat-flour] dough. A. G. Simpson (Cereal Chem., 1936, **13**, 50—54).—The obscuring of the field by starch granules in the Turley method (B., 1924, 993) of counting yeast cells in fermenting doughs is overcome by neutralising the digested dough suspension with alkali, boiling to gelatinise starch, cooling, and digesting with diastatic malt extract. E. A. F.

Collaborative study on the use of the wheat-meal "time" test with hard and soft wheats. E. G. Bayfield (Cereal Chem., 1936, **13**, 91—103; cf. B., 1935, 697).—The wheat-meal fermentation time test is inferior to the baking test, when conducted so as to bring out the characteristics of the flour used, for determining the strength of Canadian hard red spring, Kansas hard red winter, and N. American soft winter wheat. When properly standardised, however, the test will prove useful to the wheat breeder. E. A. F.

Baking quality of [wheat] flour as affected by certain enzyme actions. Relative starch-liquefying power of the diastatic agents investigated. J. W. Read and L. W. Haas (Cereal Chem., 1936, **13**, 14—37; cf. B., 1934, 697).—Bucky (*i.e.*, tough and wiry) doughs were considerably improved by addition of small amounts of certain plant proteases (*e.g.*, malt diastase or flour extract, taka-diastase) in the form of an azo-enzyme ppt. to the sponge, the doughs being more lively and working better, and the loaves of good vol., texture, and grain. The amylolytic activity of the diastatic agents investigated exerted no beneficial effect. Excessive doses of amylases (or proteases) gave sticky doughs. The dextrinogenic (α-amylase) and saccharogenic (β-amylase) activities of the preps. investigated are tabulated. The α- and β-components of taka-diastase could not be satisfactorily separated by Ohlsson's procedure (A., 1927, 277). E. A. F.

Period of lactation and direct titratable chloride value of milk. P. F. Sharp and E. B. Struble (J. Dairy Sci., 1935, **18**, 527—538).—Direct titration of milk with $AgNO_3$ (K_2CrO_4 as indicator) yields vals. which increase with the dilution of the milk and with decrease in the amount of indicator used. Acidity $<$ that required to coagulate casein has no effect on the end-point. Morning and evening milk and that from different quarters of the udder yield almost identical vals. In mastitis-infected cows the first and last milks drawn have high Cl' and p_H and low titratable acidity, vals. for middle portions approaching normal: wide variations occur in different quarters. The $[Cl']$ of milk in the first few days of lactation declined considerably, but subsequently increased, especially during the latter part of the period. Gestation tends to negative this effect. A. G. P.

Differential antirachitic acitivity of vitamin-*D* milks. R. W. Haman and H. Steenbock (J. Nutrition, 1935, **10**, 653—666).—Irradiated milk, cod-liver oil, and irradiated cholesterol have the same efficiency per unit vitamin-*D* for chicks. Yeast milk has approx. 10% efficiency, the difference being associated with the butter-fat fraction. A. G. P.

Formation of aroma-giving constituents in butter. A. I. Virtanen and J. Tarnanen (Suomen Kem., 1936, **9**, **B**, 2).—The amount of Ac_2 in the starter or ripened cream is almost nil. Ac_2 is formed after air or O_2 is passed through the culture during the ripening process. Ac_2 is not formed by an oxidation–reduction process between 2 mols. of CHAcMe·OH, but is produced only when O_2 acts as a H acceptor. To ensure the max. amount of Ac_2 the cream must be ripened under as aërobic conditions as possible, and the churning carried out with a max. amount of air. J. N. A.

Creatine test for acetylmethylcarbinol plus diacetyl in butter cultures. B. W. Hammer (J. Dairy Sci., 1935, **18**, 579—581).—The creatine–NaOH test is adapted for this purpose. A. G. P.

Relationship between moisture and quality in New Zealand cheese. P. O. Neale (New Zealand J. Sci. Tech., 1935, **17**, 568—571).—The moisture in fat-free substance of cheese is a reliable index of quality. Standard vals. are 54·5 for summer, 55·5 for spring, and 56·0% for autumn-made cheese. Lower vals. are associated with bad flavour and weak body, and higher vals. with hard chalky bodies. A. G. P.

Bacteriology of cheese. II. Effect of *Lactobacillus casei* on the nitrogenous decomposition and flavour development in Cheddar cheese made from pasteurised milk. C. B. Lane and B. W. Hammer (Iowa Agric. Exp. Sta. Res. Bull., 1935, No. 190, 339—376 ; cf. B., 1935, 825).—Effects are examined of various strains of *L. casei* on the N fractions of serum from cheeses made from raw and pasteurised milks. Cheese from inoculated pasteurised milk was more uniform in flavour than that from uninoculated raw or pasteurised samples. Some strains of the organism produced a butter-like flavour, and in such cases Ac_2 was present. A. G. P.

Bacteriology of Swiss cheese. III. Relation of acidity of starters and the p_H of the interior of cheeses to their quality. W. C. Frazier, W. T. Johnson, jun., F. R. Evans, and G. A. Ramsdell (J. Dairy Sci., 1935, **18**, 503—510 ; cf. B., 1935, 874).—Changes of p_H during the making of cheese with starter cultures of *Lactobacillus helviticus*, and of *Str. thermophilus* are examined in relation to the preliminary culturing of the starters and to the quality of the finished cheese. A. G. P.

Effect of interior temperatures of beef muscle on the press fluid and cooking losses. A. M. Child and J. A. Fogarty (J. Agric. Res., 1935, **51**, 655—662).—The ratio of press fluid to dry matter in muscle heated to 58° is > in that heated to 75°. With rising interior temp. the H_2O content of the fluid increases and its total and coagulable N content decrease. An inverse relation exists between the % of press fluid and total cooking losses in muscle heated to 75°. No such relationship was apparent in that heated to 58°. A. G. P.

Nutritive value of animal tissues in growth, reproduction, and lactation. III. Value of beef heart, kindey, round, and liver after heating and after alcohol extraction. W. H. Seegers and H. A. Mattill (J. Nutrition, 1935, **10**, 271—288).—Differences in the val. of extracted and non-extracted meats is attributable solely to the removal of nutrients not adequately supplied by cod-liver oil and yeast supplements. The proteins of beef liver are modified by extraction with EtOH. Prolonged extraction (130 hr.) renders liver incompetent to support growth. Heating at 100° for 2 weeks decreases its ability to support rapid growth, although its digestibility and biological val. were not appreciably changed. Round, heart, and kidney were more resistant to high temp. A. G. P.

Determination of volatile basic nitrogen as an index of freshness of fish. F. Lücke and W. Geidel (Z. Unters. Lebensm., 1935, **70**, 441—458).—The minced muscle is distilled for 25 min. with MgO and H_2O, the volatile bases being absorbed in $0·1N·H_2SO_4$ and determined by titration with NaOH. Herring, cod, shellfish, Norway haddock, ling, etc. when fresh give 20 mg.-% of volatile basic N. On keeping, this increases, at first slowly. At 30 mg.-%, the fish are still wholesome, but their keeping quality is much reduced. At 50 mg.-% they are completely spoiled. The method may also be applicable to preserved fish. E. C. S.

Chemical determination of the quality of canned green peas. Z. I. Kertesz (New York State Agric. Exp. Sta. Tech. Bull., 1935, No. 233, 26 pp.).—Of the characteristics examined, the EtOH-sol. solids give the most suitable measure of the maturity and quality of the peas. A. G. P.

Efflorescence of concrete flooring under stored cacao beans. F. E. Nottbohm and F. Mayer (Z. Unters. Lebensm., 1935, **70**, 499—505).—The efflorescence consists of $Ca(OAc)_2$. The AcOH is presumably formed by oxidation of EtOH produced by fermentation of the pulp. Its presence in the fat prejudices judgments of rancidity based on the determination of volatile acidity. E. C. S.

Determination of the volatile sulphur content and pungency of onions. H. Platenius (J. Agric. Res., 1935, **51**, 847—853).—Onion oil, assumed to be of const. composition, is distilled into aq. Br and the S subsequently determined as SO_4''. A. G. P.

***Cryptocarya latifolia* nuts from South Africa.** Anon. (Bull. Imp. Inst., 1935, **33**, 451—453).—The kernels (moisture-free) yielded 64·2% of fat having d_{15}^{100} 0·8647, m.p. (open-tube method) 26·0°, n^{40} 1·4585, acid val. 56·5, sap. val. 213·0, I val. (Wijs, 3 hr.) 75·2, unsaponifiable matter 1·4%, sol. (and insol.) volatile fatty acids 11·1 (0·3)%, solidifying point of fatty acids 39·5°, but owing to its dark colour it would be suitable only as a low-grade, soap-making oil. The residual meal, although having a good nutrient val., is intensely bitter in taste and contains alkaloids. It is thus unsuitable as cattle fodder. D. A. C.

Cold storage of Cox's orange pippin, 1935, with special reference to internal breakdown, water-core, and bitter-pit. L. W. Tiller (New Zealand J. Sci. Tech., 1935, **17**, 536—540).—Growth conditions affecting storage properties are examined. A. G. P.

Present status of gas-storage research [on fruit], with particular reference to studies in Great Britain and preliminary trials at the Central Experimental Farm, Canada. C. A. Eaves (Sci. Agric., 1935, **15**, 542—556).—Current work is reviewed. The effects of temp. and gas concn. on the quality of stored strawberries and raspberries is examined. A. G. P.

Extending the use of melons by frozen storage. R. B. Harvey, W. B. Combs, R. H. Landon, and A. M. Child (Fruit Products J., 1936, **15**, 146—148).—The most suitable varieties of melons for freezing whole and diced, the methods of freezing, and recipes for their use are given. E. B. H.

Sources of vitamin[-C]. XVII. Apple jam enriched with concentrated pine-needle extract. N. Jarussova (Z. Unters. Lebensm., 1935, **70**, 538—540; cf. A., 1935, 1287).—Apple jam, itself having no antiscorbutic effect with guinea-pigs in doses up to 6 g., when enriched with 10% of the concentrate was effective in 3·8-g. doses. E. C. S.

Composition of commercially canned tomato juice. C. F. Poe (Fruit Products J., 1936, **15**, 132—133).—Analyses of 19 samples are given and the average results for 2 seasons compared. E. B. H.

Luminescence phenomena in raisins. Melanoidins and flavins in ultra-violet light. W. Diemair and F. Arnold (Z. Unters. Lebensm., 1935, **70**, 480—484; cf. B., 1935, 376).—The ultra-violet fluorescence of extracts of dried grapes is attributed to substances formed by interaction between certain NH_2-acids and hexoses, and to the flavin pigments of the grape. E. C. S.

Control of the natural and synthetic honey trade. G. Büttner (Z. Unters. Lebensm., 1935, **70**, 475—480).—Except in rare instances, natural honey contains no SO_4'', so that it can usually be distinguished from synthetic honey, which may contain as much as 36 mg.-% of SO_4''. It is suggested that $\not>$ 50 mg.-% of SO_4'' might be added to synthetic honey to enable it to be more readily identified. E. C. S.

Protection of roasted coffee from uptake of water and loss of aroma by suitable wrapping material. F. Sprinkmeyer (Z. Unters. Lebensm., 1935, **70**, 489—499).—Wrappings which prevent uptake of H_2O also prevent loss of aroma. Only a limited no. of the materials examined were found to be suitable, viz., certain brands of waterproof Cellophane, Al sheet, and parchment paper waxed on both sides with $\not<$ 4 g. of odourless and tasteless paraffin, m.p. 50—60°, per sq. m. E. C. S.

Nutritive value of mushrooms. F. W. Quackenbush, W. H. Peterson, and H. Steenbock (J. Nutrition, 1935, **10**, 625—643).—Mushrooms are relatively good sources of vitamin-B_1 and -B_2. The protein is probably incomplete. No evidence of the presence of a toxic factor was obtained. A. G. P.

Nutritive value of the grain of Canary grass. F. Rogoziński and Z. Głowczyński (Bull. Acad. Polonaise, 1935, **B**, 111—122).—In composition and digestibility Canary grass resembles the more familiar cereal grains. It is somewhat deficient in $Ca^{\cdot\cdot}$, $Na^{\cdot}$, and Cl', and the protein has a somewhat lower biological val. than that of wheat. A. G. P.

Composition of pampas grass (*Cortaderia argentea*). F. B. Shorland and S. G. Brooker (New Zealand J. Sci. Tech., 1935, **17**, 528—530).—Analyses and food vals. are given. The utility of the grass as a high-carbohydrate fodder and for papermaking is indicated. A. G. P.

Pampas grass as fodder. R. E. R. Grimmett (New Zealand J. Sci. Tech., 1935, **17**, 531—535).—The culture and management of the grass as a fodder crop are discussed. A. G. P.

Lespedeza hay for dairy cattle. W. B. Nevens (J. Dairy Sci., 1935, **18**, 593—598).—The hay contains less fibre, protein, total ash, and Ca and is less palatable than lucerne, but on a wt.-for-wt. basis produced similar effects on milk yields and live-wt. increases in cattle. A. G. P.

Vitamin-*A* content of pasture plants. II. Timothy (*Phleum pratense*, L.) and red-top (*Agrostis alba*, L.) under pasture conditions and green-fed. E. Woods, F. W. Atkeson, H. Wellhousen, and R. F. Johnson. **III. Lucerne (*Medicago sativa*, L.) and smooth brome (*Bromus intermis*, Leyss).** E. Woods, F. W. Atkeson, A. O. Shaw, I. W. Slater, and R. F. Johnson (J. Dairy Sci., 1935, **18**, 547—556, 573—578; cf. A., 1933, 323).—Vals. obtained were: timothy 220 ± 13, red-top 308 ± 10, lucerne 269 ± 17, and soft brome 396 ± 27 rat units per g. A. G. P.

Vitamin-*D* studies in cattle. I. Antirachitic value of hay in the ration of dairy cattle. II. Vitamin-*D*-sparing action of magnesium. C. F. Huffman and C. W. Duncan (J. Dairy Sci., 1935, **18**, 511—526, 605—619).—I. The vitamin-*D* requirement of growing cattle varies considerably with the individual and increases with age or size. Three distinct conditions of the blood may be associated with rickets in calves, viz., (i) low Ca, low P, (ii) low Ca, normal P, (iii) normal Ca, low P.

II. Addition of $MgCO_3$ to a rachitogenic ration delayed the onset of clinical rickets, favoured the maintenance of normal plasma-Ca, and improved the utilisation of Ca and P. A. G. P.

Mineral content of German fodders, and influence thereon of manuring and source. H. Wolff (Landw. Versuchs-Stat., 1936, **124**, 153—240).—Chemical analyses and nutrient vals. of some leguminous fodders are recorded, and discussed in relation to growth conditions. A. G. P.

Conservation of green fodder by the Virtanen process. W. Steiner (Landw. Versuchs-Stat., 1935, **124**, 1—86).—Experimental data show the superior nutrient val. of A.I.V. silage as compared with that produced without additions of acid. Losses of nutrient matter during the process are also smaller. Favourable effects on milk yields are recorded. A. G. P.

Relative merits of steamed and raw potatoes in the feeding of fattening pigs. J. K. Thompson and J. Hargrave (J. Min. Agric., 1936, **42**, 1123—1127).—Steamed potatoes gave the better results at a lower cost.
A. G. P.

Nutritive value of the proteins of maize-gluten meal, linseed meal, and soya-bean oil meal. K. L. Turk, F. B. Morrison, and L. A. Maynard (J. Agric. Res., 1935, **51**, 401—412).—Data for digestibility, N retention, and biological val. demonstrate the superiority of soya-bean oil meal. A. G. P.

Relative protein efficiency and vitamin-B_2 content of common protein supplements used in poultry rations. H. S. Wilgus, jun., L. C. Norris, and G. F. Heuser (J. Agric. Res., 1935, **51**, 383—399).—Data for numerous materials are given. Variations in efficiency are influenced by methods of manufacture.
A. G. P.

Grinding.—See I. **Esterification of pectin substances.**—See V. **Action of dil. acids on Al.**—See X. **Lard. Vitamin-*A* in liver oils.**—See XII.

Patents.

Treatment of milk. E. Lundstedt, Assr. to Pfister Chem. Co., Inc. (U.S.P. 1,998,141, 16.4.35. Appl., 8.8.33).—Ordinary whole milk is cooled to < 15° (optimum temp. 0—5°) and vigorously agitated. By this treatment the curd tension of the milk is lowered by over 60%. Subsequent homogenisation is sometimes necessary, as a slight separation of fat ("feathering") may occur during the treatment. E. B. H.

Stabilised C_2HCl_3.—See III. **Irradiating milk.**—See XI.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Application of the dielectric constant to the examination of pharmaceutical products. B. van Steenbergen (Pharm. Weekblad, 1936, **73**, 244—273).—The measurement of ε with the Ebert–Stoll apparatus and its application are described (cf. B., 1935, 957). Additional data are given for the examination of oils and solvents, including various alcohols used in pharmacy. The method is particularly suited for the examination and detection of adulteration in essential oils, measurement of ε being 10 times more accurate than that of n by the Zeiss refractometer. Additional apparatus is described for following the progress of distillation and for measuring the sedimentation of powders by means of ε. S. C.

Determination of pyrethrins in drugs, extracts, and preparations. D. Mann (Chem.-Ztg., 1936, **60**, 147—149).—A description of published methods.
R. S. C.

Antianæmic substances of liver. I. Relationship between chemical properties and clinical value of technical liver extracts. O. Schales (Ber., 1936, **69**, [*B*], 359—366).—Examination of technical liver extracts shows wide diversity in the % of dry matter, which is, however, without clinical significance. The presence or absence of glucose appears immaterial and the % N is not diagnostic. Possibly the f.-p. depression may be a useful guide as the active principle is of high mol. wt. and large depression indicates a high content of impurities of low mol. wt. such as inorg. salts, simple NH_2-acids, and sugars. A better basis of judgment is secured by bringing the EtOH content of the extract to 70% and weighing the ppt. which is clinically inactive (it invariably contains leucine). The EtOH content of the filtrate is increased to 90%, whereby the active fraction is pptd.; in this, ash and N are determined. In normally active extracts the N content of this fraction is 7—11%, whereas in highly active extracts it is 12·5—13·3%. The wt. and N content of this fraction are therefore regarded as criteria of the clinical val. of the extract. The residue obtained by evaporating the filtrate from this fraction contains the components which are without antianæmic action, but which influence the blood circulation. Flavins, histamine, choline, and nucleic acids are present. A modified micro-method for the determination of N is described.
H. W.

Determination of the constituents of ergot by different methods. F. Schlemmer, P. H. A. Wirth, and H. Peters (Arch. Pharm., 1936, **274**, 16—40).—The absorption spectra of ergoclavine, sensibamine, ergotoxine, ergotinine, and ergotamine (max. at 3180, min. at 2720 Å.) and of the coloured solutions obtained with p-$NH_2\cdot C_6H_4\cdot CHO$ and vanillin (max. at about 5450 and 5750 Å., respectively) are detailed. Structural differences cause only slight variation in intensity and none in the type of the absorption. Quant. absorption measurements agree approx. with determination of total alkaloid content by a modified $K_2Cr_2O_7$ method. The total alkaloid content of 20 South German ergots is given with details of origin, soil, etc. R. S. C.

Pharmaceutical analysis: determination of morphine in aqueous dialysed extracts of unripe poppy heads ("paverisat Bürger"). C. A. Rojahn and W. Fachmann (Arch. Pharm., 1935, **273**, 515—521).—Morphine in these extracts is determined by 10 different methods; the most concordant results are those obtained by Schulek's method (B., 1932, 287) and by a $BaCl_2$ pptn. method employing Baggesgaard-Rasmussen's $CHCl_3$–$Pr^{\beta}OH$ extraction mixture (B., 1932, 48; 1933, 811). The latter method, with its stages of extraction etc., is described in detail. Pharmacological tests on mice give results of the same relative orders of magnitude as those by the new method.
E. W. W.

Opium assay. J. Rosin and C. J. Williams (J. Amer. Pharm. Assoc., 1935, **24**, 1053—1062).—Improvements in the U.S.P. X CaO method for morphine determination in opium are suggested; 0·5 g. of NH_4Cl is used and the temp. of pptn. is kept at < 10°.
E. H. S.

Flue-cured tobacco. Natural ageing of flue-cured cigarette tobaccos. L. F. Dixon, F. R. Darkis, F. A. Wolf, J. A. Hall, E. P. Jones, and P. M. Gross (Ind. Eng. Chem., 1936, **28**, 180—189).—The ageing under industrial conditions of six main types of flue-cured tobacco has been studied over a period of 30 months. The very small amounts of moulds and bacteria present at the outset continually diminish. The H_2O content increases to a max. when ageing is complete. The sugar content shows the largest decrease, and small amounts of HCO_2H, AcOH, MeCHO, NH_3, and CO_2 are formed continually. The continuous fall in the contents of nicotine and NH_2-acids accounts for the total loss of N_2. The total acids and p_H also diminish. Ageing is due, not to the activity of moulds or bacteria, but to chemical reaction between sugars and NH_2-acids with the formation of melanoidins. The aroma of cured tobacco is very similar to that of the melanoidin produced by condensing alanine with glucose. S. C.

Genesis of linalool in coriander oil. Composition and structure of components of oil from flowering *Coriandrum sativum*. A. J. Carlblom (J. pr. Chem., 1936, [ii], **144**, 225—241).—The oil obtained in 0·1% yield by steam-distillation of the green tops of *C. sativum* has d_{20}^{20} 0·8524, n_D^{20} 1·4555, α_D +2·55°, and consists of 95—96% of aldehydes and a little hydrocarbon [from which myrcene (I) is isolated]. Fractionation of the oil gives material, b.p. 85—88°/10 mm., which is unsaturated (Br ; H_2), has the composition $C_{10}H_{18}O$, and is oxidised ($KMnO_4$, aq. Na_2CO_3) to $H_2C_2O_4$, n-C_7H_{15}·CO_2H (main product), and n-C_9H_{19}·CO_2H ; it is, therefore, a mixture of decaldehyde (II) and Δ^{α}-decenaldehyde (III) (cf. B., 1930, 302). Successive oxidation of a fraction, b.p. 92—94°/7 mm. (which gives an oxime, b.p. 133°/9 mm., m.p. 51°, a semicarbazone, m.p. 157°, and a dinitrophenylhydrazone, m.p. 112°), with Ag_2O and $KMnO_4$–aq. Na_2CO_3 affords $H_2C_2O_4$, AcOH, an *acid*, $C_{10}H_{20}O_4$, m.p. 124°, and *n*- and *iso*-octoic acids (the α-Br-derivatives of which are converted by EtOH–KOH into the Δ^{α}-olefinic acids and these oxidised to *n*- and *iso*-hexoic acid, respectively) ; (III) and η-methyl-Δ^{α}-nonenaldehyde (IV) are thus present. The above mixture of (II) + (III) is reduced (H_2, Pd, Ni) to a product consisting largely of (II) ; when kept, this deposits cryst. *material*, m.p. 73°. (III) and (IV) cannot be regenerated from the cryst. $NaHSO_3$ compound ; addition to the double linking probably occurs. There is no genetic relationship between (II)—(IV) and linalool (V) (which is the main product from the ripe seeds). (V) may arise by hydration of (I). H. B.

Cinnamon-leaf oil from the Seychelles. W. Holdsworth-Haines (Perf. Essent. Oil Rec., 1936, **27**, 52—55).—The oil is very uniform in properties, has " phenolic contents " of 89—92%, and by the cohobation method of distillation is obtained in a yield of 8 litres/ton. Dry steam gives a yield of 11·1—11·5 litres/ton. The characteristics of the leaves, the prep. of the oil, and the Export Ordinance are given. E. H. S.

***Æolanthus gamwelliæ* oil from Northern Rhodesia.** Anon. (Bull. Imp. Inst., 1935, **33**, 449—451).—The oil from the fresh flowers (yield 1—1·7%) has $d_{15\cdot5}^{15\cdot5}$ 0·8901—0·8915, α_D —0·43° to —0·66°, n_D^{20} 1·4730—1·4750, acid val. 0·9—3·9, ester val. 27·0—39·8 (after acetylation, on aldehyde-free oil, 251·0—270·4), aldehydes and/or ketones (bisulphite method) 2—7%, solubility in 70% EeOH at 15·5° 1 : 1·6 vols. The oil, which contains principally geraniol, has a pleasant odour but its commercial val. is considered to be inferior to that of geranium oil. D. A. C.

Vitamin-*A* in liver oils.—See XII. **Camphor.**—See VI. **Vitamin-*D* milks. S content of onion oil. *Cryptocarya latifolia* nuts.**—See XIX.

Patents.

Manufacture of wound plaster. Sander's Chem. Products, Ltd. From E. Sander (B.P. 441,988, 21.8.35).—Films, plasticised by, *e.g.*, o-$C_6H_4(CO_2Bu^{\beta})_2$, of polymerides of vinyl alcohol or acrylic acid or their esters, and with a rough surface, are prepared, using a matt surface for drying. The adhesive is applied to the roughened side. E. J. B.

Preparation of vanillin. Jemac A.-G. (B.P. 442,061, 17.5.35. Switz., 17.5.34).—An oil containing eugenol, *e.g.*, cinnamon-leaf, 74, is heated rapidly with KOH 107, H_2O 24·5, and a suitable paraffin hydrocarbon 120 (to facilitate stirring and uniformity of heating) to $>$ 225° (244°) in $<$ 24 min. The product is poured into H_2O 100, the oil removed, and the aq. residue of K *iso*eugenate oxidised by $PhNO_2$ 128, soda 84, and H_2O 30 pts. by wt. at 115—145°, with controlled continuous reduction of the H_2O content from 3 times to one tenth of the amount of oil used, the speed of the distillation being crit. On acidifying the reaction liquid vanillin is obtained comparatively pure in good yield, and economies of time and materials are effected. E. J. B.

Condensation of aromatic amines and CH_2O.—See XIII. **Tobacco.**—See XVI.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Advances in emulsion technique. E. Fuchs (Phot. Ind., 1935, **33**, 191—192).—A review. Ch. Abs. (*e*)

Spontaneous re-ripening of [photographic] plates freed from [ripening] nuclei. Lüppo-Cramer (Phot. Ind., 1936, **34**, 200).—Various emulsions tested showed that 3 months after treatment with CrO_3, which removes ripening nuclei, the sensitivity is to a great extent regained, without formation of fog. The process is considered as similar to normal after-ripening on storage, as the excess of bromide has been washed out in the treatment. J. L.

Fine-grain developers. A. Schilling and H. Dehio (Phot. Ind., 1936, **34**, 167—172).—The relative sensitivities, gamma vals., and graininess (measured by enlargement tests and with a photoelectric granulometer) of an emulsion have been determined with varying development times, for four types of fine-grain developer, and an ordinary metol–quinol developer. Two classes of fine-grain developers are distinguished : (*a*) giving retarded under-development, with lowered γ ; (*b*) comprising p-$C_6H_4(NH_2)_2$ or " Atomal " (Agfa), giving true fine grain without reduction of γ. J. L.

Fine-grain development. A. Seyewetz (Bull. Soc Franç. Phot., 1935, **22**, 269—272).—Fine-grain developers (I), *e.g.*, Micros, Super-Micros, produce a finer grain than does ordinary developer (genol–quinol) (II), for the same γ val. of the image. Development with diluted (II) for extended periods does not produce as fine a grain as (I). J. L.

Temperature and formation of the latent image. S. E. Sheppard (Z. wiss. Phot., 1936, **35**, 15—32).—Theoretical. The negative temp. coeff. of the formation of the latent image at low intensity levels (Webb, J. Opt. Soc. Amer., 1935, **25**, 4) is ascribed, not to a chemical process, but to combination of the thermal loosening of the lattice with breaking of the lattice by the primary action of light. The influence of temp. is discussed at length, particularly in connexion with the fact that the ratio of Ag atoms formed to the no. of quanta absorbed diminishes with fall of temp. The reciprocity failure deviations are considered to be due, not to a secondary chemical reaction, but to the time available for Ag atoms to unite with a cryst. nucleus. J. L.

Action of oxidising agents on the latent image. H. ARENS (Z. wiss. Phot., 1936, **35**, 1—14).—The action of varying concns. of $K_3Fe(CN)_6$ solution on the latent image in photographic emulsions with varying exposure and development times has been studied, and characteristic curves are given showing abs. and relative reductions of densities obtained. The abs. decrease rises to a max. and decreases after, even in the solarisation region; the relative decrease, in most cases, diminishes steadily. Density–development time curves for oxidised emulsions are similar to curves in the solarisation region for untreated emulsions. Oxidation does not affect the development time required for each grain, and it seems that the latent image is either entirely destroyed or completely unaffected in individual grains. J. L.

Retardation of reduction [of photographic images] by substances hindering crystallisation. A. STEIGMANN (Phot. Ind., 1936, **34**, 198—200).—The effects of cystine (I) and related compounds, and also of (I)-like extract from gelatin, in retarding reduction of $AgNO_3 + NH_3$ solutions, with and without the presence of egg-albumin, have been examined. In presence of a protective colloid, (I) has a coagulating action (although when alone it acts as a protective colloid). The gelatin extract ("Gradationskörper") produces the greatest effect. J. L.

Analysis of Al alloys.—See X.

PATENTS.

Production of coloured colloid layers. B. GASPAR (B.P. 441,983, 10.8.34. Ger., 10.8.33).—Insol. dye compounds are formed in photographic emulsions by double decomp. of dyes with salts of weak org. acids, *e.g.*, $(PrCO_2)_2Ba$, guanidine adipate, which are indifferent to the emulsions. The products need not be removed from the layer. J. L.

Colour photography. L. D. MANNES and L. GODOWSKY, JUN. (U.S.P. 1,997,493, 9.4.35. Appl., 24.1.22).—Two or three emulsion layers, sensitised to different portions of the spectrum, are superimposed on the same side of a support. Suitable filter dyes may be incorporated. After exposure, the layers may be developed simultaneously and toned separately by controlled diffusion, or developed and toned each separately. For three colours, after total development, the top two may be toned (or dyed), the top layer then re-sensitised with dichromate, and the bottom image printed on it by exposure through the back of the support, the top new image being then suitably dyed. Positives are prepared from negatives by a similar process. J. L.

(A) Photographic printing. (B) Photographic printing of lenticular colour-record film. (C) Printing of component colour pictures on the lenticular films. I. G. FARBENIND. A.-G. (B.P. 435,813, 435,929, and 435,994, [A] 29.3.34, [B] 27.3.34, [C] 19.3.34. Ger., [A] 29.3.33, [B] 28.2.33, [C] 18.3.33).—Various mechanical and optical devices are claimed. A. R. P.

XXII.—EXPLOSIVES; MATCHES.

Laboratory preparation of explosives. I. Tetryl. C. L. TSENG and T. C. LIN (J. Chem. Eng. China, 1935, **2**, 128—132).—Van Duin's procedure (*A*) for the laboratory prep. of tetryl is preferred to Langenscheidt's method (*B*), as in *B* if the temp. rises above 55° failure results. Method *A* is amended by washing the final product successively with $18N$-H_2SO_4, H_2O, and EtOH, as the heat evolved by washing direct with H_2O is injurious. Purity of the xylidine used has little effect on the yield and purity of the product. C. I.

Chemical and physical tests on pentrite. H. MOLINARI and G. C. SATTA (Chim. e l'Ind., 1935, **17** 472—476).—Published data on the properties of pentrite are reviewed and indicate that it is sufficiently stable to be produced and handled on a large scale. Its advantages as an explosive are discussed. D. R. D.

Nitrostarch.—See XVII.

PATENTS.

Striking material for matches. R. S. PULLEN, Assr. to PULLENLITE Co. (U.S.P. 1,984,316, 11.12.34. Appl., 19.10.31).—An abrasive paint for the striking surface of match-boxes consists of celluloid 1—2, $COMe_2$ 16, red P 1·5, $FeSO_4$ powder 1·5, shellac 0·25, rosin 0·25, and powdered glass 1 pt. A. R. P.

Cellulose nitrate.—See V.

XXIII.—SANITATION; WATER PURIFICATION.

Approximate formula for an apparatus for the conductimetric determination of carbon monoxide and dioxide (and benzine vapour) in air. K. V. GORBATSCHEV (J. Appl. Chem. Russ., 1935, **8**, 1508—1513).—CO_2 in air is determined by measuring the conductivity change of standard aq. NaOH in equilibrium with the given sample of air, and CO and org. vapours are determined similarly by combustion, followed by absorption of CO_2. In all cases the CO_2 content (vol.-%) is given by $Kn(i_1 - i_3)/(i_1 - i_2)$, where K is const. for a given apparatus, n is the [NaOH], i_1 and i_2 are its conductivity vals. before and after saturation with CO_2, and i_3 is the conductivity found in the given test. R. T.

Reversible indicator for detection of small quantities of hydrogen sulphide in the atmosphere. J. BELL and W. K. HALL (Chem. & Ind., 1936, 89—92).—The conditions under which Na nitroprusside can be used are described. C. W. G.

Determination of total oxidising power, nitrite, ozone, and total chlorine content of ordinary and fœtid air. II. Determination of nitrite [ozone, and total chlorine] in air. H. CAUER (Z. anal. Chem., 1935, **103**, 385—416; cf. A., 1936, 177).—For the determination of NO_2', all oxidising agents other than NO and NO_2 are destroyed by passing the air through a furnace (at 200—220°) packed with fresh Al shavings. The issuing gases are passed through a washing tower containing acidified KI, and the oxidising power is then determined as described previously. O_3, in absence of free Cl_2, is determined similarly by the liberation of I from neutral KI, in presence of NaOAc as buffer against NO_2'. H_2O_2 could not be detected. Cl_2 is absorbed in 0·2—0·27*N*-KOH, the KOH subsequently neutralised with 2*N*-HNO_3, and Cl' titrated with $AgNO_3$ by Mohr's method, in presence of NaOAc. J. S. A.

Industrial disinfectants. J. Gibson (Chem. & Ind., 1936, 107—112).—A lecture, dealing with the properties and use of coal-tar disinfectants and of Cl_2 and with methods of testing germicidal efficiency. A. G. P.

Compound solution of cresol. Variation of phenol coefficient when different oils are used for saponaceous base. P. L. Burrin, A. G. Worton, and F. E. Bibbins (J. Amer. Pharm. Assoc., 1935, **24**, 1077—1079).—Maize and soya-bean oils are as efficient as is linseed oil for making disinfecting cresol–soap solutions. Coconut oil is superior to linseed oil and the product has a higher PhOH coeff. Sesamé and arachis oils are unsatisfactory. E. H. S.

Use of the Barcroft differential manometer in the determination of the oxygen absorption of sewage. W. R. Wooldridge and A. F. B. Standfast (Biochem. J., 1935, **30**, 141—148).—The absorption of O_2 from air by sewage and sewage effluents can be followed manometrically by using the Barcroft respirometer. The amount absorbed is usually greater when measured in this way than when determined by the usual test for biochemical O_2 demand, and there appears to be no liberation of gas other than CO_2. C. J.

Oxidation of sludge and sludge–sewage systems. W. R. Wooldridge and A. F. B. Standfast (Biochem. J., 1935, **30**, 149—155).—Using the Barcroft respirometer technique, it is shown that, although the ultimate O_2 absorption val. is scarcely influenced, the presence of a proportion of activated sludge greatly increases the initial rate of oxidation of crude sewage and sewage effluents, marked differences in the O_2 demands of various sewages being demonstrated in a few hr. C. J.

Factors that influence the rate of activated-sludge and sewage oxidations. W. R. Wooldridge and A. V. B. Standfast (Biochem. J., 1935, **30**, 156—162).—The rate of oxidation of sewage increases with rise of temp. from 18° to 37°. For efficient operation of an activated-sludge plant it is advisable to keep the p_H between 6·0 and 9·0; the oxidation is inhibited at p_H 4·0 and 12·0. CO_2 is evolved during the process; the ratio $CO_2 : O_2$ is $< 1·0$, but appears to increase as oxidation proceeds. An excess of sewage org. matter is inimical, but the effect may be overcome by reaëration or thorough washing of the sludge. C. J.

Possible dangers to health in drinking water from reservoirs. A. F. Meyer (Chem.-Ztg., 1936, **60**, 165—168).—Industrial pollution in a catchment area is more dangerous than domestic pollution. A wooded area is best. Peat moors are detrimental as they introduce humus, S, and acidity. They are sometimes isolated from the H_2O by a layer of $CaCO_3$. Neutralisation plants are expensive. Sediment deposited from such H_2O should be periodically cleaned out. Streams feeding the reservoir should be arranged for max. aëration. A small reservoir in front of the main one greatly helps bacterial purification. Filtration is general [in Germany], and Cl_2 plants are usual but only brought into action if required. C. I.

Problems of river pollution. A. Parker (Chem. & Ind., 1936, 187—192).—A discussion of various trade effluents.

Necessity of electrical p_H measurements in water and sewage work. L. W. Haase (Chem. Fabr., 1936, **9**, 67—69).—The colorimetric determination of p_H of coloured, practically unbuffered solutions such as those dealt with in H_2O analysis is unreliable. A portable potentiometer, using a quinhydrone electrode and graduated directly in p_H, is described. J. S. A.

Distillery wastes. Chemical and filtration studies. C. R. Hoover and F. K. Burr (Ind. Eng. Chem., 1936, **28**, 38—41).—The cost of treatment with chemical coagulants is out of proportion to the benefit secured. Clarified grain-type wastes and relatively clear apple-brandy and molasses-EtOH wastes, when diluted to $\ngtr$ 2000 p.p.m. biological O_2 demand, have this val. reduced by 90% by passing through a 10-foot-deep trickling filter at the rate of 10^6 gals. per day. Experiences with coke breeze and sand filters are also recorded. E. C. S.

Chemicals from the Dead Sea.—See VII.

Patents.

Sewage treatment. Soc. de Recherches et d'Exploit. Pétrolifères, Assees. of R. and M. Cambier (B.P. 442,337, 23.4.35. Fr., 23.4.34 and 28.3.35).—Settled sewage is agitated by compressed air (approx. 1·6 cu. ft. per gal.) in presence of grains of activated C, so that the rubbing action produced constantly renews the surface and prevents clogging of the particles. After a short contact the liquor is coagulated and clarified; the effluent is suitable for discharge to a stream, and the sludge may be used as fertiliser without fear of atm. nuisance. C. J.

Sewage-sludge treatment. A. J. Fischer, Assr. to Dorr Co., Inc. (U.S.P. 1,997,252, 9.4.35. Appl., 2.1.31).—Digestion is accelerated and rendered more complete by addition of a small quantity of a chemical, *e.g.*, $NaNO_3$, which decomposes with concomitant oxidising and neutralising effect. C. J.

Sewage-sludge digestion. Dorr Co., Inc. (B.P. 442,458, 27.9.34. U.S., 30.12.33).—A covered rectangular tank is divided longitudinally into zones through which the sludge passes in succession. Inoculation takes place at the entrance and separation of H_2O in the final zone. In all zones except the last the sludge is maintained in circulation by means of vertical paddles carried by a longitudinal horizontal shaft. The paddles are long enough to break the surface, act as scum-breakers, and carry the heating pipes. C. J.

Halogens from fluids.—See VII.