

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

OCT. 13 and 20, 1933.*

I.—GENERAL; PLANT; MACHINERY.

Handling high pressures in chemical synthesis.

R. V. KLEINSCHMIDT (Chem. Met. Eng., 1933, 40, 361—364).—Soft Fe and Cu are suitable gasket materials for high-pressure joints, but Cu cannot be used where temp. variations are encountered. The use of soft Fe in grooves is indicated. Joints in which rubber packing is pressed outward by the fluid pressure against the gasket are satisfactory, but not at higher temp. The use of two valves in series enables the second valve to be closed under favourable circumstances. Flow-control valves are often fitted with a coil of small high-resistance tubing to dissipate the energy of expansion. The use of valves utilising the principle of the labyrinth packing gland is suggested. Compressors should be designed for the particular gas with which they have to deal. In the design of converters provision should be made for (1) an outer curtain of incoming gas to act as an insulating medium, (2) a counter-current heat exchanger with preferably small tubes of considerable length, (3) generally concurrent heat transfer from the catalyst bed to render the bed thermally stable and to prevent too great a range of temp. in the bed. D. K. M.

Classification of industrial furnaces. I. M. RAFALOVITSCH (Feuerfest, 1933, 9, 99—105).—A scheme based on the method of heat transfer, temp. distribution, source of heat, mutual relation of heat source and charge, etc. is put forward. A. R. P.

Inorganic heat carrier for super-temperature heating. T. KAYSER (Chem. Met. Eng., 1933, 40, 353—354).—The carrier is a mixture of NaCl, AlCl₃, FeCl₃, m.p. 150°, sp. heat 0.7, d 1.96—2.00. When it is heated in the open at high temp. (but not in closed systems) NaCl and AlCl₃ volatilise. The carrier has no corrosive action on Fe. Its use in the range 400—800° is indicated. D. K. M.

Mean temperature difference and heat-transfer coefficient in liquid heat exchangers. A. P. COLBURN (Ind. Eng. Chem., 1933, 25, 873—877).—Theoretical. Where the over-all coeff. of heat transfer, U , varies throughout a heat exchanger and is a linear function of temp., the heat transfer rate equals the logarithmic mean of $U_1\Delta t_2$ and $U_2\Delta t_1$, where the subscripts indicate terminal conditions. Examples are given for the cooling of NH₂Ph with H₂O, for the heating of heavy and medium oils, and for heating oil with steam. H. J. E.

Technological classification of chemical reactions and its significance for the teaching of chemical technology. W. J. MÜLLER (Chem. Fabr., 1933, 6, 333—336).—A lecture, discussing mainly the

teaching of chemical engineering. Reactions are classified according to the phases taking part therein and are illustrated with reference to technical processes.

E. S. H.

Thermal insulation. E. GRIFFITHS (J. Soc. Arts, 1933, 81, 911—926, 930—943, 945—961).

Determining Tl in flue dust.—See VII. **High-Cr cast Fe for apparatus.**—See X.

PATENTS.

Dry kiln. J. F. COBB (U.S.P. 1,891,060, 13.12.32. Appl., 7.7.27).—A kiln having transverse reversible circulation is described; the fan or fans may be run at variable speed. B. M. V.

Kiln for drying lumber and other substances. J. I. STEEL, Assr. to MOORE DRY KILN Co. (U.S.P. 1,890,756, 13.12.32. Appl., 1.2.29).—A kiln with transverse circulation in either direction and provision for admission of fresh air is described. B. M. V.

Means for heat-treating material. F. C. GREENE (U.S.P. 1,890,662, 13.12.32. Appl., 2.2.28).—Calcination is effected in an apparatus similar to that described in U.S.P. 1,890,661 (B., 1933, 820), except that the heating jacket is not supplied with external heat, but is open to products of combustion from the central chamber, into which air is forced at the point where the calcine is withdrawn, the fuel being mixed with the charge. B. M. V.

Heat-treating apparatus. G. SCHWAB, Assr. to A. C. NOLTE (U.S.P. 1,890,431, 6.12.32. Appl., 7.9.29).—A no. of stationary retorts are suitably arranged for cyclic treatment involving heating and cooling but not quenching; there are as many charges of goods always present as there are stages in the treatment, which, e.g., may comprise: several stages of preheating by heat from other retorts, a stage of combustion heating, a stage of cooling slowly without heat exchange, and several stages of quicker cooling by giving up heat to other retorts. B. M. V.

Apparatus for heat treatment of coal or other solid material. GAS CHAMBERS & COKE OVENS, LTD., A. H. LYMN, and F. RITSON (B.P. 395,052, 29.1.32).—The walls of the chambers of the apparatus are formed of courses of interfitting refractory blocks (A), certain of which are provided with ledges for supporting bridge tiles (B) in the flues between the chambers. Each ledge is so placed that the B cover laterally the joint between two adjacent courses of A. One edge of each tile is bevelled, and a wedge-shaped block is provided to be dropped into the space between the bevelled edge and the wall of the chamber after the expansion of the material on heating up has taken place. A. B. M.

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

Pulverising and grinding machines. L. ST. J. COLLEY (B.P. 395,788, 12.2.32).—A disintegrator of the intercalating ring-and-beater type is provided with oval recesses in the fixed rings which guide the material back into the path of the beaters, fine material being drawn away in air currents through holes in the recesses. B. M. V.

Roller mill. P. O. DIEDERICH, ASST. to AMER. MACHINE & FOUNDRY CO. (U.S.P. 1,889,777, 6.12.32. Appl., 26.4.28).—Easily removable material guides for a twin roller mill for inks etc. are described. B. M. V.

Drying devices for separated coarse material in ball or tube mills. L. MELLERSH-JACKSON. From F. KRUPP GRUSONWERK A.-G. (B.P. 395,912, 21.10.32).—In a grinding system with air separation, the oversize is dried by contact or heat exchange with hot air either in the mill or in a separate dryer. The feed material may be preheated. B. M. V.

Apparatus for drying and conveying ground material in ball mills and similar plant. F. WIESNER (F. WIESNER & V. MALIK) (B.P. 396,608, 22.12.32. Czechoslov., 24.12.31).—A ball mill is provided with a multi-drum dryer in an earlier part of the same shell. B. M. V.

Separation of mixtures of solid materials. F. J. MEUNIER (B.P. 395,739, 15.12.31).—A pneumatic shaking table, e.g., for the cleaning of coal, of which the deck is divided into sections is provided with means for withdrawing the lower stratum between the sections, comprising tapering channels on the deck which, as they become narrower, also become deeper, but at no point are they as deep as the total thickness of the bed of material. The combined width of the entry end of the channels is equal to the width of the table, and at the deeper (narrower) end the shale etc. passes through slots in the table under control of a rocking shutter. B. M. V.

Apparatus for separation of materials of differing densities. GEN. ELECTRIC CO., LTD. From T. CHANCE (B.P. 396,558, 5.8.32).—Electro-hydraulic methods of operating, in correct sequence, the valves of a lock for discharging refuse from a sand pulp are described. B. M. V.

Density-demonstrating apparatus. P. E. KLOPSTEG, ASST. to CENTRAL SCIENTIFIC CO. (U.S.P. 1,891,049, 13.12.32. Appl., 27.9.29).—A Jolly balance is used with specimens of const. vol., so that the readings may directly indicate d . B. M. V.

Machines for testing abrasive qualities of materials and for testing lubricants. TIMKEN ROLLER BEARING CO. (B.P. 395,976, 9.2.33. U.S., 12.3.32).—An idle roller, or a block, is held against a driven roller by means of weighted levers. B. M. V.

Moisture-measuring device. C. B. LIMBRICK (U.S.P. 1,890,545, 13.12.32. Appl., 23.8.30. Can., 9.9.29).—When the electrical conductivity of materials is affected by moisture it is measured by a device comprising, *inter alia*, a containing vessel for the material, and an insulated electrode therein included in the grid circuit of a valve and a current indicator in the plate circuit. B. M. V.

Apparatus for determining the moisture content of flour, corn, beet pulp, tobacco, etc. C. H. W. LONG (B.P. 396,098, 29.1.32).—A weighed quantity of the material is placed in the dielectric space of a condenser inserted in one of two resonantly tuned valve circuits, and the other circuit is again brought to the resonance point by adjusting a variable condenser provided with a suitable dial. [Stat. ref.] B. M. V.

Detection, measurement, and recording of solid particles [suspended] in non-solid [transparent] media. E. B. MOSS, and CAMBRIDGE INSTRUMENT CO., LTD. (B.P. 396,390, 1.2.32).—A beam of light is conc. and localised by a condensing lens and passed through another comparatively large lens (A) into a light-sensitive device (B); actually the whole of the direct beam is prevented from reaching B by small stops on the axis before and after A , but part of any light diffused by solid particles in the beam will pass through the outer parts of A , reach B , and affect it according to the amount of dust. B. M. V.

Centripetal separator. W. C. LAUGHLIN, ASST. to L.A.B. CO. (U.S.P. 1,885,735, 1.11.32. Appl., 16.6.30).—The material, e.g., paper pulp, is caused to flow downwards, then upwards, with slow rotation, the heavy impurities being removed from the centre of the bottom and the light from the top. B. M. V.

Means for separating fluids of different specific gravities. L. M. JACKSON (U.S.P. 1,886,686, 8.1.32. Appl., 4.12.30).—A floating tank (A) is confined within a fixed tank, the whole being maintained full of liquid; the supply is to the interior of A , and when the wt. of this increases owing to accumulation of heavy liquid (e.g., H_2O from oil) it sinks and automatically opens a draw-off valve in a flexible bottom outlet connexion. B. M. V.

Sedimentation apparatus. C. H. SCOTT, ASST. to DORR CO., INC. (U.S.P. 1,888,743, 22.11.32. Appl., 23.2.32).—A rotating sludge rake is entirely supported and driven from a central pier which also embraces an uprising feed-pipe; the rim of the tank is used for no other purpose than overflow. B. M. V.

Distributor for extraction apparatus. M. GROSSMANN, ASST. to JENAER GLASWERK SCHOTT & GEN (U.S.P. 1,887,126, 8.11.32. Appl., 28.5.30. Ger., 8.6.29).—A laboratory apparatus in which gas may be bubbled through a liquid is described. B. M. V.

Filter presses. ENZINGER-UNION-WERKE A.-G. (B.P. 396,612, 30.12.32. Ger., 9.1. and 1.11.32).—A form of ribbing for a filter plate having supply and discharge ports within the rim of the plate is described. B. M. V.

Filtering or straining apparatus. W. R. BELDAM (B.P. 396,156, 22.3. and 1.4.32).—A scraper for a filter is composed of a wire closely wound on a suitably grooved mandrel. B. M. V.

Apparatus for clarifying liquids. A. H. ZEITZ (U.S.P. 1,890,712, 13.12.32. Appl., 7.10.29).—In a sedimentation tank having a conical bottom, the sludge is worked to the apex by radial, inwardly directed jets on the tank floor. An axial feed conduit rises through

the bottom and the clear overflow is at the circumference. B. M. V.

High-output ultra-filters. E. HAAS (B.P. 395,871, 7.7.32).—A layer of filter material is placed between porous plates and the sandwich clamped between end-plates suitably grooved to permit entry and exit of the fluid. The use of soot, NiO, S powder, Ag grains, Ni powder, and/or Zn powder as the middle medium is claimed. B. M. V.

Vacuum still. J. H. HILLS, Assr. to BOUSMAN MANUF. Co. (U.S.P. 1,890,152, 6.12.32. Appl., 20.9.29).—A vac. still is provided with a mechanical vac. pump for normal operation and a steam ejector for creating the vac. The feed liquid is regulated by a float in a H₂O-gauge chamber and is preheated in a coil within the vapour pipe between the evaporator and condenser. The steam is supplied mainly to a calandria, but partly also to agitating jets in the liquor space. B. M. V.

High-vacuum distillation systems. C. R. BURCH, F. H. PREECE, and ASSOCIATED ELECTRICAL INDUSTRIES, LTD. (B.P. 396,205, 9.6.32).—In the vac. distillation of, e.g., easily decomposed oils or waxes, any uncondensed matter is distilled in the presence of steam and under high vac., the latter being maintained by means of a dry pump and by freezing the condensable matter in one of a pair of surface condensers cooled by a vaporising refrigerant while the other is thawed by the same refrigerant, while still hot, after recompression. B. M. V.

Distillation or deodorisation of liquids at low pressure. W. J. TENNANT. From N. H. S. VAN REESEMA (B.P. 396,095, 29.1.32).—Glycerin or other matter is distilled in the presence of steam and under high vac., the latter being maintained by means of a dry pump and by freezing the condensable matter in one of a pair of surface condensers cooled by a vaporising refrigerant while the other is thawed by the same refrigerant, while still hot, after recompression. B. M. V.

Cleansing and sterilising of filter mass. ENZING-ER-UNION-WERKE A.-G. (B.P. 396,255, 1.11.32. Ger., 22.12.31, 18. and 22.1.32).—A filter mass for, e.g., beer is mechanically cleaned outside the filter, returned to the filter, and sterilised *in situ* by continuous circulation of a chemical disinfectant, or by plain H₂O raised to a sterilising temp. before passage through the filter, and is afterwards cooled. B. M. V.

Concentration of liquors in multiple effect. A. R. JAHN (B.P. 395,957, 19.1.33).—A multiple-effect system in which the liquor travels through the effects in the same order as do the vapours is described. The uncondensable gases are withdrawn from the condenser by a steam ejector, the mixture passing to the last calandria and being withdrawn thence by another ejector and delivered to the first calandria. B. M. V.

Crystalliser. COMP. DE PROD. CHIM. ET ELECTRO-MÉTALLURG. ALAIS, FROGES ET CAMARGUE (B.P. 396,613, 31.12.32. Ger., 2.1.32).—In a crystalliser comprising a trough-like vessel in which a hollow drum (A) conveying a cooling medium is rotated, A is surrounded by attached helical blades for agitation and conveying of crystals, and with loose rings of larger diam. to break off crystals from A. B. M. V.

Conversion of milky liquids, solutions, dispersions, and emulsions into powder form by spray-

drying. M. J. STAM (B.P. 396,579, 13.10.32).—An apparatus in which liquid is centrifugally sprayed into hot gas is constructed in annular bulbous form, the liquid and gas moving concurrently for a controllable period of time. B. M. V.

Liquid-treating apparatus. C. J. RODMAN and R. P. DUNMIRE, Assrs. to BUCKEYE TWIST DRILL CO. (U.S.P. 1,890,265, 6.12.32. Appl., 28.9.29).—Electrical controls are described for a system in which oil or other liquid is heated and is sprayed with sudden reduction of pressure into a vac. vessel. B. M. V.

Apparatus for treating water or other liquids utilising a regenerating process. AKTIEB. FILTRUM (B.P. 396,104, 23.1.33. Ger., 1.2.32).—In, e.g., the regeneration of a base-exchange H₂O softener the salt solution is admitted in such a way as to put the H₂O, and later itself, in rotation so as to give even distribution. B. M. V.

Measurement of viscosity [of oils etc.]. C. D. MILLER (U.S.P. 1,889,996, 6.12.32. Appl., 19.3.24).—The pressure drop under const. laminar flow is measured. The liquid may be pumped at a const. rate into a tank having an outlet of sufficient length and bore to ensure stream-line flow, and the head to which the liquid accumulates in the tank may be measured by a H₂O column for abs. viscosity and a column of the liquid itself for kinematic viscosity. B. M. V.

Filtration of gases. SOC. ITAL. PIRELLI (B.P. 395,918, 31.10.32. Italy, 3.11.31).—The use of fibrous material other than vegetable wools together with powdered talc, ground cork, and/or ebonite dust, the mixture being in the form of a very loose mass obtained by agitation, is claimed. B. M. V.

Scrubbers for use in the treatment of gases. LONDON POWER CO., LTD., and S. L. PEARCE (B.P. 396,489, 19.3.32).—In an apparatus comprising a no. of superposed rows of inclined plates or boards, the baffles are provided with a flange or fillet extending above the upper edge and the outer corner is rounded so that H₂O dripping on the flange from the baffle above will be led to the underside of the next below; the lower edges may be serrated to ensure even drip. B. M. V.

Apparatus for washing and otherwise treating gases with liquids. J. J. COS (B.P. 396,648, 28.2.33).—The gases, e.g., flue gases containing lampblack, are passed in contact with a no. of rods arranged radially and in spiral formation on a rotating shaft and dipping in liquid. The spiral formed by the rods embraces at least 360°. B. M. V.

Apparatus for affecting the physical condition of gases. H. V. DALGLIESH, Assr. to F. L. BROWNE and N. J. JEWETT (U.S.P. 1,890,497, 13.12.32. Appl., 23.9.30).—Gases are put in a condition of persistent turbulence by passing them through apertures 0.1 in. diam. in a plate 0.625 in. thick, the area of the apertures being 62.5% of the plate. B. M. V.

Paper pulp extractor.—See V. H₂O-softening substances.—See VII. Tunnel kilns.—See VIII. Rotary kilns.—See IX. Sugar crystalliser.—See XVII. Indicating the presence of chemical substances.—See XXI.

II.—FUEL; GAS; TAR; MINERAL OILS.

Influence of grain size on oxidation and spontaneous ignition of bituminous coal. K. PETERS and W. PICKER (*Angew. Chem.*, 1933, 46, 498–503).—Comparative experiments were made with a Ruhr "fat" coal ground to a grain size of 0.5–0.6 mm. (500–600 μ) and to μ -size (cf. B., 1932, 1063). Bright coal and durain from the same seam were examined separately. Six weeks' oxidation at 110° of coarse "fat" coal, μ "fat" coal, μ bright coal, and μ durain caused gains in wt. of 4, 5½, 7, and 6%, respectively, with corresponding losses in calorific val. (*A*) of 12, 14, 21, and 17%. The fineness of division did not affect the determination of *A*. Spontaneous ignition was observed in a Kreulen apparatus (B., 1930, 847). μ Coal ignited at 70° < the temp. at which 500 μ coal ignited.

G. M.

Colloidal dispersion of coal. J. M. PERTIERRA (*Anal. Fis. Quím.*, 1933, 31, 271–288).—The dispersion of coal (volatile matter 2.43, ash 4.17%) in a primary tar (*A*), phenols (*B*), anthracene oil (*C*), and a petroleum fuel oil (*D*) at the respective b.p. and at high temp. has been studied. *D* has but little action on the coal, whereas with *C* 94.7% of the coal disperses at 240 atm. max. pressure and 390–400°, within 1 hr.; the product has *d* 1.128. With *A*, 87% of the coal disperses, the concn. of the product being about 10%. The degree of dispersion increases with increase in mol. wt. of *B*. Details are given of the viscosities, surface tensions, and osmotic pressures of the dispersions, and the theoretical aspect of the work is discussed. H. F. G.

Commercial active charcoals. I. Elementary analysis and decolorising power. L. W. JIRAK (*Angew. Chem.*, 1933, 46, 513–517).—The contents of ash, C, H, N, and O have been determined for different commercial active charcoals used for decolorisation, medicine, adsorption, and gas masks. Experiments on the decolorisation of 0.1N-I in aq. KI show that the deviation from Freundlich's formula increases as the activity of the C increases.

E. S. H.

Distillation of Spanish lignites. Sulphur balance. C. L. S. AVECILLA and L. M. PUJET (*Anal. Fis. Quím.*, 1933, 31, 210–223).—Preliminary data are given relating to the analysis and results of low-temp. distillation of a no. of samples of lignite from different districts. On the whole the semi-cokes obtained should be of val. for domestic purposes. A drawback is the high S content (5–6% in many cases) of the lignite.

H. F. G.

Gasification of fuels in oxygen to produce gas of high calorific value. DRAWE (*Gas- u. Wasserfach.*, 1933, 76, 541–545).—Small-scale experiments on the complete gasification of brown coal briquettes by an O₂-steam mixture show that on raising the pressure from 1 to 20 atm. inside the retort a gas of higher calorific val., with less O₂ consumption, is obtained. The two CO₂-free gases consisted, respectively, of CO 55.2, 29.7; H₂ 41.7, 37.8; CH₄ 3.1, 32.5%, and had calorific val. 3255, 5160 kg.-cal./cu. m. A larger-scale unit giving similar results is described. The purification of the gas is simplified as CO₂ and part of the H₂S are removed by H₂O at the working pressure

(20 atm.) and, on cooling, a larger % of tar and benzol separates out.

R. N. B.

Hydrogenation of a lignite. J. M. PERTIERRA (*Anal. Fis. Quím.*, 1933, 31, 53–58).—An account of the results obtained with a Spanish lignite by distillation at 360–550° and by hydrogenation in presence of 15% of Fe₂O₃ at 440–480° under high pressure. From 40 to 53% of the lignite was transformed under the latter conditions.

R. K. C.

Determination of flame temperature during expansion in explosion motors. A. DONCESCU (*Compt. rend.*, 1933, 197, 298–300).—An optical device is described whereby the temp. of the exploding gases is determined at any position of the piston. Plotted against distance moved by the piston, the curves are convex towards the distance axis.

C. A. S.

Extraction of pure phenols from tar oils by liquid ammonia. R. JARRY (*Compt. rend.*, 1933, 196, 1675–1676).—The liquid NH₃ extract of tar oil is freed from hydrocarbons by agitation with a hydrocarbon (C₄H₁₀). (Cf. B., 1932, 408.)

A. C.

Petrol from coal. ANON. (*Nature*, 1933, 132, 160–161).—A discussion of the projected technical hydrogenation at Billingham.

L. S. T.

Characteristics of Rumanian petroleum. E. SEVERIN (*Petroleum*, 1933, 29, No. 28, 13–16).—Data are given relating to the occurrence, production, and properties, e.g., distillation ranges, wax content, aromatic hydrocarbon content, etc., of petroleum from the Rumanian oil fields.

A. B. M.

Eastern Galician petroleum. H. ARCTOWSKI and I. GOTTLIEB (*Inst. Geophys. Univ. Lwów*, 1933, Comm. Nos. 71–76, pp. 170–185, 186–217, 218–241, 242–260, 261–264, 265–292).—The topography of the wells from various districts and the physical consts. of the petroleum (I) are given, and a theory of the origin of (I) in certain of these localities is advanced.

R. T.

Hydrogenation and desulphurisation of a petroleum fraction. J. M. PERTIERRA (*Anal. Fis. Quím.*, 1933, 31, 289–310).—The fraction used was a gas oil (*d* 0.8471) of which 3% had b.p. < 200°, 77.4% 200–300°, and 19.4% > 300°. Hydrogenation at 440–480°/85–100 atm. has been carried out in presence of Mo oxide and sulphide, Cu chromite (*A*), and active C. With *A* 3.4% of H₂ is absorbed within 30 min., as compared with 60 min. in the case of the others. The most volatile product (yield 84.5%, with Mo sulphide) had *d* 0.8072 and 37.9% boiled at < 200° and 42% at 200–300°. The total S in the product is considerably < that of the original gas oil, but the H₂S content is 3–4 times as great.

H. F. G.

Determination of active sulphur in benzene. E. DITTRICH (*Brennstoff-Chem.*, 1933, 14, 281–283).—Methods of determining active S in benzols, which depend on the iodometric determination of H₂S, may fail with benzines owing to the presence in the latter of constituents which react with I. This difficulty can be avoided by the following procedure: 100 c.c. of benzene are shaken with 2–3 c.c. of Hg and filtered. The ppt., excess Hg, and filter-paper are heated with 50–60 c.c. of conc. HCl and 1–2 g. of Al foil, and the gases evolved,

after being washed by passing through hot H_2O , are passed into aq. NH_3 . A standard solution of $CuSO_4$ is then added to the latter from a burette until the solution is faintly blue, and the excess Cu therein is determined colorimetrically. The active S content of the benzene can then be calc. A. B. M.

Behaviour of active sulphur in benzene towards metals. E. DITTRICH (Brennstoff-Chem., 1933, 14, 283—284; cf. B., 1933, 453).—Four benzenes obtained by the pressure hydrogenation of tars or tar oils have been treated with Cu or Ag powder (1 g. in 100 c.c.). After stirring for $\frac{1}{2}$ hr. at room temp. only 10–35% of the active S was removed; at 50–100°, however, 75–100% was removed. The action of alcohols in accelerating the reaction is attributed to the reduction of peroxides in the benzene which otherwise have an inhibiting effect thereon. A. B. M.

Testing fuels, solvents, etc. for corrosive sulphur by means of copper. Modified method for a qualitative test for corrosive sulphur and for the determination thereof. H. KIEMSTEDT (Brennstoff-Chem., 1933, 14, 284—286; cf. B., 1932, 921).—The Hg method determines only elementary S. Cu reacts with S, H_2S , and, in the presence of elementary S, with mercaptans. A Cu-strip method is described wherein a sample of motor spirit, in which the Cu strip is immersed, is heated at a const. temp. by means of a surrounding jacket containing the vapour of a suitable boiling liquid, e.g., CCl_4 . The corrosive S is estimated by comparing the corroded strip with a series of standards. Peroxides interfere with the test; if they are present a small quantity of a suitable reducing agent, e.g., quinol, is first added to the spirit. A. B. M.

Action of metals on the sulphur compounds in crude benzene from the low-temperature carbonisation of brown coal. II. Alkali metals. H. HOFMEIER and S. WISSELINCK (Brennstoff-Chem., 1933, 14, 286—288; cf. B., 1933, 453).—By treatment of the benzene with Na, K, or, preferably, a liquid Na-K alloy, up to 28% of the S therein was removed. Part of the S was thereby removed in the form of a sludge insol. in H_2O , EtOH, or benzene. By prolonged heating with the alloy in a sealed tube at 140° 50–75% of the S was removed. A solution of EtSH (A) in S-free benzene was treated with Na, Ag, or Cu. Although considerable interaction occurred between the metals and A, even treatment with excess of Na failed to remove A completely. The surface of the metal probably became covered with a layer of the reaction products which inhibited further reaction. A. B. M.

Reactions of organic sulphur compounds. II. J. J. HERRERA and L. BERMEJO (Anal. Fís. Quím., 1933, 31, 267—270).—The Na nitroprusside test is recommended for examination of petroleum oils. The presence of 0.0001% S as mercaptans can be recognised. PhSH gives a positive test when aq. NH_3 is used for neutralisation instead of NaOH (cf. A., 1933, 964).

R. K. C.

Knocking of motor fuels. J. P. KOETTNITZ (Chem.-Ztg., 1933, 53, 613).—Evidence is given which indicates that knocking is due to the detonation of a small quantity of liquid fuel in the cylinder. A. R. P.

Polymerisation of light hydrocarbons from petroleum tar to viscous oils and naphthalene. E. PYHÄLÄ (Mat. grasses Pétr. Dériv., 1932, 23, 9312—9315, 9340—9341; 24, 9452—9456; Chem. Zentr., 1933, i, 877—878).—Light oils from cracked petroleum, after separation of C_6H_6 and PhMe, afforded an emulsion of impurities from which, by polymerisation, highly viscous lubricating oils were obtained. The procedure is described. The formation of $C_{10}H_8$ was also investigated. A. A. E.

Demulsification of mineral lubricating oils. L. HEMMER (Ann. Off. nat. Combust. liq., 1932, 7, 589—634, 859—877; Chem. Zentr., 1933, i, 1056).—The speed of demulsification increases with the degree of refining and diminishes with rise of p_H up to 11. The influence of neutral salts and the significance of surface tension are considered. A. A. E.

Oxidation of paraffin to fatty acids at atmospheric pressure. H. PFLUGK (Braunkohlenarch., 1932, No. 37, 1—36; Chem. Zentr., 1932, ii, 3959—3960).—The optimal temp. for air oxidation is 160°; the yield of fatty acids increases to a limit with increase in the air-current velocity, and is favoured by a low H_2O content (1.2%). The product contains H_2O_2 , per-acids, and peroxides. 2 H of the paraffin mol. are oxidised to H_2O_2 with formation of unsaturated hydrocarbons, which by further oxidation undergo fission with formation of fatty acids. Anhydride formation occurs, and the H_2O_2 leads to the formation of peroxides and per-acids. Me groups are oxidised with formation of alcohols, which with the acids give esters. Cracking of the paraffin does not occur under the conditions described. Oxidation takes place best in acid media. A. A. E.

Ageing of fresh and used transformer oils in relation to sludge formation. K. O. MÜLLER, F. CONSOLATI, F. FRANK, and G. MEYERHEIM (Erdöl u. Teer, 1932, 8, 525—527, 540—542, 557—559; Chem. Zentr., 1933, i, 1055).—The increase in the rate of sludge formation as a function of the period of heating in presence of a Cu wire at 115° is the same for all oils and is an arithmetical progression. Different curves are obtained according to the character, refinement, and age of the oils. Two ageing conditions are differentiated. A. A. E.

Viscosity of cresols.—See III. **Emulsions for roads.**—See IX. **Coal-tar disinfectants.**—See XXIII.

PATENTS.

Combustible paste. A. A. EPSTEIN, Assr. to CONSOLIDATED PATENTEES CORP. (U.S.P. 1,888,820, 22.11.32. Appl., 13.11.30).—The paste comprises a mixture of Mg stearate 1 pt. by wt., EtOH 2 pts. by vol., and flame-modifying ingredients, e.g., turpentine and powdered charcoal. B. M. V.

Manufacture of binder material for coal, coke, and the like. L. and F. C. KERN (U.S.P. 1,885,839, 1.11.32. Appl., 18.6.30).—Coal shale is finely ground and cleaned and the gangue material digested with hot HCl; the resulting liquor is a viscous solution of the chlorides of the metals in the gangue (Al, Ca, Mg, Na, Fe) and is suitable for use as a binder of pulverised coal. B. M. V.

Coal binder and method of applying the same.

J. A. ERICKSON, ASSR. to VIKING MANUFG. CO. (U.S.P. 1,887,183, 8.11.32. Appl., 25.6.32).—Briquettes are made from a mixture of coal 10 pts. and hydraulic cement < 1 pt. by vol. moistened with a hygroscopic salt solution. B. M. V.

Composition for treating coal or other fuel.

F. L. MENNIE (B.P. 395,282, 31.1.33).—A mixture of KMnO_4 3%, KClO_3 15%, NaClO_3 15%, and NaCl 67% is dissolved in H_2O (1 lb. in 8 gals.) and sprayed on to the coal (2 tons) to improve its burning qualities. A. B. M.

By-product coke oven. P. M. PINCKARD (U.S.P. 1,888,012, 15.11.32. Appl., 24.6.30).—A horizontal retort is provided with a no. of stand-pipes through which the coal is charged; they are connected at an intermediate height to each other and to a longer stand-pipe at the end forming the gas offtake. B. M. V.

Operation of by-product coke-oven plants. S. P. MILLER, ASSR. to BARRETT CO. (U.S.P. 1,888,465, 22.11.32. Appl., 21.10.27).—From coke-oven gases pitch and entrained solids are separated at high temp. in the collector main and in an electrostatic separator or pitch-spray scrubber, the collected matter being returned to the ovens with fresh coal. Tar is substantially eliminated, its volatile constituents being subsequently condensed as oil. B. M. V.

Step-grate producers. WOODALL-DUCKHAM (1920), LTD., and J. W. REBER (B.P. 394,737, 19.1.32).—The fuel chamber is subdivided into compartments transversely of the grate by one or more vertical partitions which form abutments suitable for determining the depth of the fuel bed when the producer is only partly charged. A. B. M.

(A) **Charging of coke ovens.** (B) **Apparatus for producing gas and coke.** R. M. FOLSOM, ASSR. to NEW ENGLAND FUEL & TRANSPORTATION CO. (U.S.P. 1,886,948—9, 8.11.32. Appl., [A] 4.5.27, [B] 2.7.28).—(A) Pulverised coal is dropped into a horizontal retort which is hot enough to cause evolution of sufficient gas to keep the coal really fluid, so that it acquires a level surface even though charged through only a central aperture in the roof of the retort, the length of the retort being 3 times the height. (B) A retort for operation as above has the charging opening elongated but still short in comparison with the retort, which is tapered at the ends. B. M. V.

Vertical retorts for carbonisation of coal and the like. F. J. WEST, E. WEST, and WEST'S GAS IMPROVEMENT CO., LTD. (B.P. 395,092, 12.3.32).—The retort has carbonisation (A), intermediate, and cooling (B) zones, B being provided with steam inlets. The lower part of B can be cut off from the remainder by a valve and constitutes a coke-discharge chamber the capacity of which is one half or other aliquot part of that of the whole B, which is proportioned to hold the coke from a complete charge in A. A. B. M.

Apparatus for carbonising coal and like material.

F. C. GREENE (U.S.P. 1,890,661, 13.12.32. Appl., 15.10.28).—Coal for low-temp. carbonisation is pushed

in an annular layer up the interior of the cylindrical wall of a vertical retort which is heated externally around the upper part to initiate coking. The pushing mechanism comprises a helix on the outer surface of an internal rotating chamber (A), in which the coke travels downwards, transmitting the exothermic heat of the later stages of the reaction to the coal through the wall of A. B. M. V.

Purification of gases containing hydrogen sulphide. T. COXON, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 395,028, 13.11.31).—The gases are scrubbed with an alkaline suspension of $\text{Fe}(\text{OH})_3$, which is regenerated by aëration. A portion of the liquor is withdrawn continuously or intermittently from circulation and treated with FeSO_4 . The pptd. Fe compounds are separated and returned to the circulating system, whilst the clear liquor after separation from the ppt. is discarded. A. B. M.

Manufacture of carburetted air gas. C. O. WANNACK, ASSR. to S. H. G., INC. (U.S.P. 1,888,059, 15.11.32. Appl., 14.6.28).—Air under pressure is bubbled into a portion only of the petrol, and when that is practically completely volatilised more is admitted and so on. The reduction of pressure in a gas-storage compartment due to consumption regulates the admission of air and hence of petrol. B. M. V.

Detecting the presence of inflammable constituents in gas mixtures [containing oxygen]. A. N. ERICKSON, ASSR. to UNION CARBIDE CO. (U.S.P. 1,889,890, 6.12.32. Appl., 8.7.27).—The gas is passed into one of a pair of compartments in which are visibly glowing electric filaments, the heating current of the one in air (or standard gas) free from combustible being increased to give equality of brightness. B. M. V.

Disposal of coal-tar pitch. J. M. WEISS, ASSR. to BARRETT CO. (U.S.P. 1,890,349, 6.12.32. Appl., 26.9.27).—Coke-oven tar is distilled until the residual pitch is hard enough to be ground at atm. temp. (m.p. < 107°). The ground pitch is added to coal in the proportion of ≥ 15 pts. of pitch to 100 pts. of coal and the mixture is coked. A. B. M.

Treatment of hydrocarbon oils. M. SMITH, ASSR. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,889,388, 29.11.32. Appl., 5.12.31).—Oil vapours (mostly petrol) are treated with H_2 or gas containing H_2 , preferably under pressure, in presence of a chromite of a metal (e.g., Cd), to convert the S into H_2S , unsaturated compounds being simultaneously converted. B. M. V.

Oxidation of asphaltic oils. T. H. DOWLEN, ASSR. to RICHFIELD OIL CO. OF CALIFORNIA (U.S.P. 1,886,380, 8.11.32. Appl., 30.10.29).—Petroleum residuum is continuously treated with steam and air in a no. of oxidising vessels divided into compartments, and is passed through intermediate cooling coils to remove exothermic heat. The vessels may be under pressure or vac. and the external heat necessary to start the reaction may be continued throughout. B. M. V.

Refining of petroleum oils. F. W. HEATH, ASSR. to SHELL DEVELOPMENT CO. (U.S.P. 1,888,382, 22.11.32. Appl., 22.10.30).—Cracked and other petroleums are treated first with $\text{Na}_3\text{Fe}(\text{CN})_6$ to oxidise the phenols and other

impurities that cause sourness and discoloration, and finally with acid. B. M. V.

Refining of liquid hydrocarbons. (A, B) E. B. MILLER and (B) G. C. CONNOLLY, Assrs. to SILICA GEL CORP. (U.S.P. 1,886,260—1, 1.11.32. Appl., [A] 3.3.25, [B] 17.6.31. Renewed [A] 8.4.32. Russia, [B] 22.3.26).—(A) The oil is treated with a hard absorbent (SiO_2 gel) containing $\geq 3\%$ of acid and capable of absorbing 10 (or 21) % of its own wt. of H_2O at 22 mm./30°. (B) Light hydrocarbons containing unsaturated compounds are treated with conc. H_2SO_4 (0.1—0.5% of the oil) in a series of steps with settlement of sludge, and the acid hydrocarbons are treated with solid absorbent having Cu and Fe oxides associated therewith at 65—260°. B. M. V.

Refining of hydrocarbon oil. J. C. MORRELL and J. L. ESSEX, Assrs. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,890,229—30, 6.12.32. Appl., [A] 9.1.28, [B] 5.11.28).—Vapour-phase cracked hydrocarbon distillates are treated with, or distilled in the presence of, (A) $\text{Na}_2\text{B}_4\text{O}_7$, (B) a mixture of $\text{Na}_2\text{B}_4\text{O}_7$ and absorbent clay, to remove gummy compounds and oily polymericides. H. S. G.

Motor fuel. C. T. RICHMAN, Assr. to W. C. KUHN and P. J. SMITH (U.S.P. 1,891,181, 13.12.32. Appl., 28.10.30).—EtOH, approx. 130° proof, or other alcohol 63 pts. and pyroligneous acid 1 pt. may have camphor, a vegetable or fish oil, and glycerin added. B. M. V.

Production of motor fuels [of high anti-knock value]. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 395,192, 14.9.32. Holl., 22.9.31).—The heavy-metal salts of the condensation products of primary amines with compounds which, besides one CO group, contain one or more O-containing radicals in the mol., e.g., hydroxyaldehydes, di- and tri-ketones, etc., with or without other substances such as compounds preventing deposition of metal on engine valves and/or other anti-knock media, are added to motor fuel. Examples of suitable salts are the Cu, Ni, and Co compounds of salicylaldehyde with NH_2Me or $\text{NH}_2\cdot\text{C}_6\text{H}_5$, protocatechualdehyde with NH_2Et , etc. (Cf. B.P. 370,287; B., 1932, 539.) H. S. G.

Treatment of motor fuel. C. D. LOWRY, JUN., and C. G. DRYER, Assrs. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,889,835—6, 6.12.32. Appl., [A] 18.12.31, [B] 11.3.32).—0.01—0.05% of (A) an oily distillate, (B) the distillate boiling at 240—280° to 300°, of hardwood tar is added to a cracked gasoline to prevent deterioration. H. S. G.

Artificially coloured motor fuel. J. HYMAN, Assr. to PURE OIL CO. (U.S.P. 1,891,093, 13.12.32. Appl., 25.9.29).—A normally fugitive dye is rendered permanently stable by the addition of an aromatic OH- or NH_2 -compound to reduce the activity of per-acids in the petrol either by reduction or salt formation. B. M. V.

Treatment of spent adsorbents. I. K. FULLER, Assr. to CONTACT FILTRATION CO. (U.S.P. 1,890,255 and 1,890,284, 6.12.32. Appl., 27.9.29).—Clay is reactivated without burning (A) by successive treatment with two solvents, one (petrol) for oil, the other (benzol, COMeEt)

for adsorbed material; and (B) by a double treatment with the oil solvent only. B. M. V.

Heat treatment of coal. Separation of solid materials. Testing lubricants. Liquid-treating apparatus. Viscosity of oils. Washing gases [containing lampblack].—See I. Acids from petroleum hydrocarbons. Polymerisable compounds.—See III. Bitumenised fibres. Consolidated lignin.—See V. Indicating the presence of chemical substances.—See XXI.

III.—ORGANIC INTERMEDIATES.

Properties, constitution, and analysis of ternary mixtures: water-methyl alcohol-formaldehyde. G. NATTA and M. BACCAREDDA (Giorn. Chim. Ind. Appl., 1933, 15, 273—281).—Vals. of d and n for the above ternary system containing up to 50 wt.-% CH_2O are plotted on a triangular diagram, which can be used for determining rapidly the amounts of MeOH and CH_2O in solutions. For ternary mixtures rich in MeOH the vals. of n do not obey an additive or a Lorenz-Lorentz expression. It is probable that in the absence of MeOH the CH_2O is present in solution as $\text{CH}_2(\text{OH})_2$, but in the presence of MeOH as $\text{OMe}\cdot\text{CH}_2\cdot\text{OH}$. O. J. W.

Sensitiveness of the iodoform reaction. I. M. KORENMAN (Z. anal. Chem., 1933, 93, 335—343).—Optimal conditions for the detection of EtOH, MeCHO, COMe_2 , and lactic acid by the CHI_3 reaction have been determined with respect to temp. and concn. of KOH and I. Under such conditions 1 pt. of EtOH in 23,000 and 1 pt. of COMe_2 in 8,000,000 can be recognised. F. L. U.

Measurement of the viscosity of cresols. J. SCHEIBER (Angew. Chem., 1933, 46, 503—505).—Measurements of the viscosity (η) of the three cresols [*o*- (I), *m*- (II), and *p*- (III)] at 20.2°, 35°, and 40°, by a capillary viscosimeter, agreed well with figures published by other observers. (II) shows irregularities. In binary mixtures at $> 35^\circ$ the cresols do not affect each other, but at 20.2° variations occur which are greatest in the system (II)-(III), although these have similar association factors. In ternary mixtures the effect on η of the addition of (I) is independent of the ratio (II):(III) present in the mixture. A viscosimetric method, involving a rapid predistillation, for determination of (I) in commercial tricresol is described. Determination by fractional distillation is not reliable. G. M.

Manufacture of pentaerythritol. H. MOLINARI (Giorn. Chim. Ind. Appl., 1933, 15, 325—328).—In the condensation of CH_2O and MeCHO to form pentaerythritol (I), either NaOH or CaO is a satisfactory condensing agent. With the former, lower temp. and special steel plant are required, decantation of the product is unnecessary, and the process is simpler and more rapid. With CaO, condensation is easier, separation of the crude (I) simpler, and Cu plant may be used. Each process is described in detail. (Cf. A., 1933, 486.) T. H. P.

Phenols from tar oils. Reactions of org. S compounds. C_{10}H_8 from petroleum tar. Oxidation of paraffin to fatty acids.—See II.

PATENTS.

Manufacture of acetaldehyde from acetylene. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 393,690, 20.1. and 24.8.32. Addn. to B.P. 313,864; B., 1929, 708).—The process of the prior patent is effected under increased pressure (< explosion pressure) with addition of H_2O insufficient to destroy the acid reaction (e.g., for $ZnCl_2$ the limit of dilution is 7:1), but enough to lower the b.p., preferably to at least 4° below the b.p. of the corresponding saturated solution.

C. H.

Dehydration of organic liquids and apparatus therefor. I. G. FARBENIND. A.-G. (B.P. 394,086, 15.3.32. Ger., 30.3.31).—Vapours of org. liquids, e.g., C_5H_5N , $EtOH$, or Pr^sOH , are dried by passing them over anhyd. $CuSO_4$ (dried at $< 160-180^\circ$) in amount sufficient to give $CuSO_4 \cdot \frac{1}{2}H_2O$.

C. H.

Purification and preservation of ether. S. PALKIN and H. R. WATKINS (U.S.P. 1,893,870, 10.1.33. Appl., 21.5.28).— Et_2O containing aldehydes, peroxides, etc. is distilled from a vessel containing asbestos impregnated with alkaline pyrogallol and the distillate is preserved in containers containing the same deoxidant.

A. R. P.

Preparation of mixed ethers [from olefines]. N. V. DE BATAAFSCHE PETROLEUM MAATS., Assees. of K. EDLUND and T. EVANS (B.P. 393,753, 8.6.32. U.S., 29.6.31).—"Tertiary" olefines (i.e., olefines giving *tert.* alcohols on hydration) react with alcohols at $< 150^\circ$ (75°) in presence of catalysts (H_2SO_4 , $ArSO_3H$, $AlCl_3$) to give ethers. "Secondary" olefines present are unattacked at this temp. The products are solvents and thinners for varnishes etc. *iso*Butylene gives with the respective alcohols Me , Pr^s , Bu^s (b.p. $113-8^\circ$), *iso* C_5H_{11} (b.p. 140°), and *sec.*- Bu (b.p. $114-115^\circ$) *tert.*- Bu ethers. Other products described are: Pr^s *tert.*- C_5H_{11} ether, b.p. $114-115^\circ$; Me *tert.*- C_6H_{13} ethers, b.p. 113° ; glycol mono- and di-*tert.*- Bu ethers, b.p. 152.5° and 171° respectively; glycol Me (b.p. $131-132^\circ$), Et (b.p. 147.5°), *n*- Bu (b.p. $83.4^\circ/20$ mm.), and *tert.*- Bu ethers; propylene glycol mono-*tert.*- Bu ether, b.p. $151-153^\circ$; glycerol α -mono-*tert.*- Bu (b.p. $93-94^\circ/5$ mm.) and α -di-*tert.*- Bu (b.p. 221° , or $81-82^\circ/3.5-4$ mm.) ethers; diglycol mono-*tert.*- Bu ether, b.p. $73^\circ/2-3$ mm.; glycol mono-*tert.*- C_5H_{11} ether, b.p. $50-55^\circ/3$ mm.

C. H.

Manufacture of cyclic di-ethers [from aldehydes and glycols]. H. DREYFUS (B.P. 393,608, 30.11.31).—The condensation of aldehydes or ketones with glycols etc. is effected in presence of > 2 mols. of H_2O per mol. of aldehyde or ketone; e.g., 50% aq. CH_2O is heated with glycol and H_2SO_4 in a closed vessel at 140° .

C. H.

Manufacture of benzyl ethers. IMPERIAL CHEM. INDUSTRIES, LTD., A. W. BALDWIN, and A. DAVIDSON (B.P. 393,937, 2.12.31).—An alcohol $> C_{10}$ is etherified with a CH_2Ph halide in presence of Al powder and an acid-binding agent ($CaCO_3$). The cetyl (b.p. $340-356^\circ/15$ mm.), dodecyl (b.p. $190-202^\circ/11$ mm.), and oleyl ethers are described. The products are suitable for sulphonation to give wetting agents (cf. B.P. 378,454; B., 1932, 1072).

C. H.

Production of acids from petroleum hydrocarbons. H. A. BRUSON, Assr. to RESINOUS PRODUCTS & CHEM. CO. (U.S.P. 1,882,762, 18.10.32. Appl., 10.10.29).—Non-aromatic petroleum hydrocarbons are condensed with phthalic (or other polycarboxylic) anhydride in the presence of anhyd. $AlCl_3$ at $70-90^\circ$ until HCl ceases to be evolved, the resulting Al salt is decomposed by boiling with Na_2CO_3 , and the free acid is liberated by addition of dil. H_2SO_4 . The acids have the general formula $C_6H_4(COR) \cdot CO_2H$ and are waxy solids forming sol. alkali soaps, insol. heavy-metal soaps suitable as driers, and viscous Et , Bu , and bornyl esters suitable as plasticisers for nitrocellulose.

A. R. P.

Manufacture of β -alkoxyethyl esters of fatty acids [softeners for cellulose derivatives]. J. R. BUCKLEY, Assr. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,869,660, 2.8.32. Appl., 6.12.30).—Fatty acids $> C_7$, e.g., stearic, oleic, palmitic, and lauric acids, are esterified with a glycol monoalkyl ether. β -Ethoxyethyl stearate has m.p. 18.5° , b.p. $> 325^\circ$.

C. H.

Production of substitution products of acid nitriles [alkylation etc. of acetonitrile and derivatives]. K. ZIEGLER (B.P. 393,955 and Addn. B.P. 394,087, [A] 14.12.31, Ger., 18.12.30; [B] 16.3.32, Ger., 7.5.31).— $MeCN$, or its mono- or di-substitution derivatives, is treated with an alkyl, alicyclyl, or aralkyl halide and (A) $NaNH_2$ or (B) $LiNH_2$, $Ca(NH_2)_2$, $NaNHR$, $Mg(NHR)_2$, etc. From CH_3Et_2CN , b.p. $144-145^\circ$, are prepared the C_3H_5 (b.p. $78^\circ/9$ mm.), CH_2Ph (b.p. $152-153^\circ/14$ mm.), *cyclohexenyl* (b.p. $129^\circ/12$ mm.), Bu (b.p. $86^\circ/11$ mm.; amide, m.p. $70-71^\circ$), Pr^s (b.p. $71-73^\circ/12$ mm.), and $C_3H_5 \cdot CH_2$ (b.p. $106-107^\circ/26$ mm.) derivatives. Other compounds described (b.p. in parentheses) are: $CETPr^s \cdot CN$ ($85^\circ/13$ mm.), $CMe_2(C_3H_5) \cdot CN$ (150°), $CET_3 \cdot CN$ ($62^\circ/10$ mm. or $173-176^\circ/760$ mm.), $C(C_3H_5)_3 \cdot CN$ ($93-94^\circ/12$ mm.), $CMe(CH_2Ph)_2 \cdot CN$ (m.p. $101-102^\circ$), $CET(C_3H_5)_2 \cdot CN$ ($83-84^\circ/12$ mm.), $CPr^s(C_3H_5)_2 \cdot CN$ ($86-96^\circ/12$ mm.), diocetylhexonitrile ($191-193^\circ/0.03$ mm.), $CHBu_2 \cdot CN$ ($97-100^\circ/12$ mm.), stearonitrile (m.p. 42°), $CH_2Ph \cdot CH_2 \cdot CN$ ($123-124^\circ/11$ mm.), $CH_3EtBu \cdot CN$ ($68-70^\circ/12$ mm.), $CETBu_2 \cdot CN$ ($110-120^\circ/12$ mm.), $CH_3EtPr^s \cdot CN$ ($156-158^\circ$), $CMe_2(CH_2 \cdot CH_2 \cdot CH_2Cl) \cdot CN$ ($103-104^\circ/16$ mm.), $CET_2(CH_2 \cdot CH_2 \cdot NEt_2) \cdot CN$ ($129-130^\circ/17$ mm.), $CMe_2(CH_2 \cdot CH_2 \cdot CH_2 \cdot OMe) \cdot CN$ ($67^\circ/14$ mm.), $CH_3Et(CH_2 \cdot CH_2 \cdot OPh) \cdot CN$ ($170-171^\circ/14$ mm.), $CET(CH_2 \cdot CH_2 \cdot OPh)_2 \cdot CN$ ($200-209^\circ/0.4$ mm.), $CET(CH_2 \cdot CH_2 \cdot OPh)(CH_2Ph) \cdot CN$ ($170-175^\circ/0.4$ mm.), $CMe_2(CH_2 \cdot CH_2 \cdot S \cdot C_6H_4Me) \cdot CN$ ($186-188^\circ/14$ mm.), and $CH_3Et(CH_2Ph) \cdot CN$ (m.p. 57°). 4-Cyano-5-methylcyclohexene, b.p. $95^\circ/28$ mm., from the amide, m.p. $156-157^\circ$, gives a 4- CH_2Ph derivative, b.p. $184-187^\circ/12$ mm., and 2-cyano-3-methyl-1:4-endomethylene- Δ^5 -cyclohexene a 2- Bu derivative, b.p. $135-136^\circ/12$ mm. Other starting materials are: $CH(C_3H_5)_2 \cdot CN$, b.p. $73-74^\circ/12$ mm., $CHPr_2 \cdot CN$ b.p. $183-184^\circ$, $CH_2Bu^s \cdot CN$, b.p. $154-157^\circ$, $CHMePr \cdot CN$, b.p. 146° , $CMePr_2 \cdot CN$, b.p. $68-70^\circ/10$ mm., $CHMe(CH_2Ph) \cdot CN$, b.p. $130-135^\circ/17$ mm., $CETPr^s(C_3H_5) \cdot CN$, b.p. $80-81^\circ/10$ mm., $CH_2(CHMeEt) \cdot CN$, b.p. $152-153^\circ$.

C. H.

[Manufacture of] liquid or plastic preparations for treatment of fibrous materials [wetting, cleansing, foaming, or dispersing agents]. H. T.

BÖHME A.-G. (B.P. 393,769, 7.7.32. Ger., 6.8.31).—Glucosides from fatty alcohols $> C_5$ or cyclic alcohols and sugars or polymeric carbohydrates are added, with or without soaps, dispersing agents, salts, or org. solvents, to liquid or plastic preps. used in treatment of textiles, leather, etc. Lauryl glucoside (from acetobromoglucose, lauryl alcohol, and boiling quinoline) is added to Turkey-red oil for wool-scouring, or with Na_2SO_4 and Na lauryl sulphate to a Sirius-blue G dye-bath for cotton.

C. H.

Manufacture of assistants [wetting, foaming, cleansing, and dispersing agents] for the textile and allied industries. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 394,043, 15.1.32).—Esters, $R \cdot SO_3H$ or their salts, where R is the residue of a mono- or poly-hydric aliphatic or alicyclic alcohol $> C_5$ (preferably $> C_6$) or of a polyhydric alcohol partly etherified having $> C_5$, are halogenated. In the examples, ROH = octadecyl, cetyl, oleyl, lauric, or naphthenic alcohol, or stearylene glycol.

C. H.

Manufacture of products suitable for use as washing, wetting, emulsifying, dispersing, peptising, foaming, cleansing, etc. agents. DEUTS. HYDRIERWERKE A.-G. (B.P. 394,196, 6.10.32. Ger., 6.10.31).— α -Halogeno-ethers are treated with *tert.* bases to give quaternary halides having at least 1 hydrocarbon radical $> C_7$. Examples are products from: NEt_3 and $C_{18}H_{37} \cdot O \cdot CH_2Cl$, b.p. $200^\circ/2-3$ mm.; C_5H_5N and CH_2Cl ethers of C_{16} , C_{18} , and C_{20} alcohols from sperm oil; laurylpiperidine and CH_2Cl lauryl ether; octadecylpiperidine and $CHPhCl \cdot OEt$; dicyclohexyl-laurylamine and $CH_2Cl \cdot OBu$.

C. H.

Manufacture of aromatic amines and coloured pigments. I. G. FARBENIND. A.-G. (B.P. 394,027, 22.12.31. Ger., 24.12.30).—The processes of B.P. 274,562 and 279,283 (B., 1927, 742; 1928, 8) are effected in presence of PbO or a Pb salt; e.g., Fe powder and $PhNO_2$ are added to boiling aq. $FeCl_2$ and $PbCO_3$ to give NH_2Ph and a blue-black pigment.

C. H.

Treatment of polymerisable unsaturated compounds. H. A. BRUSON, Assr. to RESINOUS PRODUCTS & CHEM. Co. (U.S.P. 1,892,101, 27.12.32. Appl., 24.4.31).—Indene, isoprene, turpentine, cracked gasoline, etc. polymerise when heated with 10–30% of benzenediazonium fluoborate. The PhF formed vaporises away.

S. M.

Manufacture of dry diazo preparations. SOC. CHEM. IND. IN BASLE (B.P. 393,830, 14.10.32. Switz., 17.10.31).—The H_2O is removed from (stable) diazonium salts by means of an org. entraining liquid, e.g., PhMe or PhCl. Examples include: diazonium chloride from 4-chloro-2-aminodiphenyl ether; 4-nitrotoluene-*o*-diazonium chlorobenzenedisulphonate; Mg diazonium chlorobenzenedisulphonate from 4-chloro-2-aminodiphenyl ether.

C. H.

[High-mol. alcohols from] reduction of fats etc.—See XII.

IV.—DYESTUFFS.

Reduction products of vat dyes. E. HERZOG (Rév. Gen. Mat. Col., 1933, 37, 284–285).—Aq. solutions of the leuco-derivatives (L) of most indigoid vat dyes are yellow, a few are orange to brown, and those derived

from acenaphthenequinone are violet; all these solutions become colourless when acidified. The L can be extracted from aq. solution by means of Et_2O or $EtOAc$, for which purpose two pear-shaped glass vessels connected at their narrow ends by a special stop-cock may be used. The L of Ciba Violet dyes and certain blue dyes not included in the thioindigo series give extracts having the same colour as does the fully oxidised dye although their aq. solutions are yellow. The L of all thioindigoid dyes give yellow extracts strongly fluorescent (green) in ultra-violet light; this changes instantly to blue on acidification. Leucoindigo fluoresces only when acidified. The L of anthraquinone dyes may be violet, blue, brown, and grey, but nearly all become carmine when acidified (the dye is then present in a colloidal form) and then fluoresce feebly in ultra-violet light. The fluorescence is more evident on dyed fabric.

A. J. H.

Determination of direct and acid dyes by means of aryl-substituted guanidines. S. R. TROTMAN and H. HORNER (J. Soc. Dyers and Col., 1933, 49, 256–257).—The cheaper diphenyl-, *o*-ditolyl-, and triphenyl-guanidines are not such satisfactory precipitants as the alkaloids (especially cinchonine) previously mentioned (cf. B., 1933, 421).

A. J. H.

PATENTS.

Manufacture of condensation products [(A) pyrimidones, (B) pyridones] of the anthraquinone series [wool dyes]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 393,631–2, 9.12.31).—A 1-aminoanthraquinone-2-sulphonic acid carrying a substituted NH_2 -group in position-4 is condensed (A) with $CO(NH_2)_2$, an alkylurea, or a urethane, or (B) with an alkyl malonate, preferably in a suitable solvent (PhOH) at $150-200^\circ$ in presence of (A) a salt (NH_4Cl), (B) an alkaline condensing agent (NaOAc). The 4-substituent may be $NHMe$, $NHPh$, $NH \cdot C_6H_4Cl$, $NH \cdot C_6H_4 \cdot NHAc$, or $NH \cdot C_6H_{11}$, and other substituents (6-Cl, 5- SO_3H) may be present. The products dye wool (A) violet, (B) ruby-red to violet.

C. H.

Manufacture of dyes [having soap-like properties]. F. B. DEHN. From DEUTS. HYDRIERWERKE A.-G. (B.P. 393,966, 11.9.31).—The OH or NH_2 of suitable dyes or their intermediates is esterified or acylated with a soap-forming acid. Examples are: *N*-stearoyl-H-acid coupled with a diazo compound; *p*-aminotetradecylsulphonanilide \rightarrow coupling component; aminoazobenzene condensed with lauric acid; rosanilinetrisulphonic acid or Neutral-red base with lauric acid; aminophenonaphthazoxonium chloride with palmitic acid; fluoresceintetrasulphonic acid with myristic acid; benzoflavine base with lauric acid; Alizarin-saphirol-B with lauric acid.

C. H.

Manufacture of azo dyes [for acetate silk]. SOC. CHEM. IND. IN BASLE (B.P. 393,873, 8.12.32. Switz., 21.12.31).—A *m*-aminophenol having free 4- and 6-positions is coupled *para* to the OH with a diazo compound free from *o*-OH, and the product is acylated. E.g., NH_2Ph or $p-MeO \cdot C_6H_4 \cdot NH_2 \rightarrow m-C_6H_4(NH_2) \cdot OH$, acetylated gives green-yellow on acetate silk.

C. H.

Manufacture of [*o*-hydroxyazo] dyes containing chromium. SOC. CHEM. IND. IN BASLE (B.P. 393,785,

27.7.32. Switz., 29.9.31).—A diazotised halogeno-*o*-aminophenolsulphonic acid (e.g., 4-chloro-) is coupled with 1:5-naphtholsulphonic acid and the product is chromed. C. H.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

New stripping agent for coloured rags. L. G. LAWRIE and J. G. EVANS (Paper-Maker, 1933, 86, ts 142—144, 154—156).—The use of Decamine (*A*) for stripping fast colours from dyed cotton rag materials is described. The rags are boiled for 1—2 hr. with 2% of *A* (on the wt. of material) in presence of alkaline $\text{Na}_2\text{S}_2\text{O}_3$; in some cases subsequent slight bleaching is also necessary. The colour of the product is very much better than that without *A*. The addition of Lissapol-A is sometimes desirable. The chemical properties of the cotton are not affected even by excess of *A*.

H. A. H.

Influence of chemical concentration in the alkaline [wood]-pulp[ing] processes. M. N. BRAY and C. E. CURRAN (Paper Trade J., 1933, 97; T.A.P.P.I. Sect., 52—57).—Semi-scale experiments show that increasing the concn. of the reagents (NaOH or NaOH and Na_2S) materially increases the rate of delignification of the wood (Loblolly pine, Douglas fir, and Northern white pine), but also causes more rapid decomp. of the resulting cellulose. Under conditions necessary for the production of strong sulphate pulp, concn. has little influence on either strength or colour, but decreased concn. increases the yield of screened pulp. For the production of bleachable sulphate pulp, a low concn. is beneficial to strength and bleachability. H. A. H.

Free sulphur dioxide in spent sulphite liquor. G. SOLTAU (Papier-Fabr., 1933, 31, 416—417).—>1% of residual free SO_2 may be obtained from the spent liquor by extracting in a closed vessel on discharging the digester. This will represent a considerable saving in the consumption of S. D. A. C.

Microstructure of wood fibres. D. KRÜGER (Zellstoff u. Papier, 1933, 13, 373—376).—A survey of recent work, in which the theories and diagrams of Freudenberg and Lüdke are discussed. D. A. C.

Microscopical differentiation between soda (sulphate) and sulphite pulp by the aid of primary and secondary fluorescence. F. NOSS and H. SADLER (Papier-Fabr., 1933, 31, 413—416).—Bleached and unbleached sulphite and easy-bleaching and strong soda pulps when stained with dil. solutions of eosin or rhodamine dyes give widely varying fluorescent colours in ultra-violet light. The brightness and shade of colour are governed by the amount of dye absorbed by the pulp, which varies with the degree of cooking. A microscopical method for the determination of these four pulps is described. D. A. C.

Esterification of cellulose and cellulose esters.
V. Mechanism of nitration and properties of the product. M. ISHIWARA (J. Cellulose Inst., Tokyo, 1933, 9, 171—179).—The process of diffusion of the mixed acid into the cotton hair plays an important rôle in nitration, and the composition of the acid inside the hair changes with time and differs from that of

the bulk. Higher temp. or greater % H_2O results in a nitrate of lower viscosity, but the effect of higher temp. is less after nitration than before. A. G.

Weatherproof transparent films. M. HALAMA (Zellstoff u. Papier, 1933, 13, 393—394).—Viscose film may be made H_2O - and weather-proof by covering with cellulose acetate or nitrate wax lacquers, a no. of recipes for which are given. D. A. C.

Chemical determination of wool in papers. W. BRECHT and E. HELMER (Zellstoff u. Papier, 1933, 13, 331—335, 386—389).—The alkali (I) and acid (II) methods are described. Since the N content of different wools is const., the Kjeldahl method (III) furnishes a very accurate, though complicated, means for determining wool in all papers free from animal size. Method (I) is rapid, but reliable only to 3% owing to the variable solubility of different vegetable fibres in NaOH . Method (II) is accurate for all papers except those containing groundwood, for the high solubility of which in 80% H_2SO_4 correction factors have to be applied. Methods (II) and (III) give concordant results, those of (III), however, being on an average 0.32% higher. D. A. C.

Opacimeter [for paper].—See XI. **Rubbered fabric.**—See XIV. **Cellulose hydrolysis.**—See XVII.

PATENTS.

Cleaning of wool and other allied fibres. R. L. BROWN, Assr. to FITGER CALIFORNIA CO. (U.S.P. 1,894,154, 10.1.33. Appl., 15.9.32).—Unwashed fleece and pulled wools are cooled to congeal the natural grease and then mechanically cleaned, while at the low temp., to remove foreign matters and part of the grease. F. R. E.

Manufacture of artificial wool. G. M. ROSSATI (U.S.P. 1,889,377, 29.11.32. Appl., 6.10.31. Ger., 9.10.30).—Vegetable fibres of the *Tiliaceae* family, e.g., jute, are delignified by treatment with cold conc. aq. NaOH for 30 min., dehydrated in a centrifuge, dried in a heated tumbler, washed with cold H_2O , and again dehydrated. They are then bleached (alkaline), washed, dehydrated, neutralised with dil. acid, again washed and dehydrated, impregnated with sulphonated fatty acid, e.g., from wool grease, and finally dried as before. F. R. E.

Production of consolidated lignin. F. BERGIUS, F. KOCH, and E. FAERBER, Assrs. to HOLZHYDROLYSE A.-G. (U.S.P. 1,890,491, 13.12.32. Appl., 25.1.30. Ger., 23.1.29).—The dry, granular, porous, brittle, deacidified, pure lignin residue from the hydrolysis of vegetable material with conc. HCl , with or without particles of coal or other non-binding fillers, is compressed in a mould without added binding agent. The product, which may be carbonised if desired, consists of coherent units suitable as fuel or as building materials. F. R. E.

Production of cellulose. S. E. SEAMAN, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,891,337, 20.12.32. Appl., 9.1.30).—Vegetable fibrous material is cooked with NH_4HSO_3 and H_2SO_3 and, after at least partial bleaching, the bisulphite liquor is removed, and the cellulose is recooked with aq. NH_3 and an NH_4 salt (sulphite, sulphate, carbonate, or sulphide). F. R. E.

Production of fibre or pulp. H. S. HOOPER, Assr. to PENOBSCOT CHEM. FIBRE Co. (U.S.P. 1,887,241, 8.11.32. Appl., 10.2.31).—The material is digested first with aq. Na_2CO_3 (10% of Na_2CO_3 on the wt. of wood at 166° for $\frac{1}{2}$ –1 hr.) and then, after removal of the spent liquor (from which NaOAc may be recovered), the cook is completed in a NaOH or NaOH – Na_2S liquor containing, e.g., 15% of NaOH on the wt. of wood, at 171° for about 4 hr. CO_2 liberated in the first stage should be relieved from the digester. D. J. N.

Acid process of fibre liberation. G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,880,042, 27.9.32. Appl., 26.10.29).—Easy-bleaching sulphite pulp of improved strength and tear-resistance is obtained by partly cooking the chips in an ordinary sulphite liquor containing combined SO_2 and completing the cook (preferably after washing the partly digested pulp) in a liquor containing substantially only free SO_2 (3–6%) at $< 121^\circ$. D. J. N.

Processing of cellulose fibre. Pulp-refining process. G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,880,046–7, 27.9.32. Appl., 6.9.30).—The pulp is digested at $> 150^\circ$ (200°) in an aq. solution or suspension of compounds (salts or oxides) which, though substantially neutral, act as buffers against the formation of acid, particularly at high temp. Such compounds include Na_2SO_3 , CaSO_3 , phosphates, CaCO_3 , Ba(OH)_2 , Al(OH)_3 , ZnO , silicates, formates, etc. Digestion in 1% aq. Na_2SO_3 for 2 hr. at 200° is suitable. (B) An aq. solution of a volatile alkali is used as the refining agent at temp. preferably $> 150^\circ$. Digestion with 0.5% aq. NH_3 for 3 hr. at $200^\circ/\text{200 lb. per sq. in. (gauge)}$ is instanced. Both processes give products of high α -cellulose content. D. J. N.

Pulp refining and bleaching process. Producing white wood pulp for high-grade paper manufacture. G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,880,040 and 1,880,049, 27.9.32. Appl., [A] 6.5.27, [B] 16.5.31).—(A) Pulp produced by alkaline processes, e.g., kraft pulp, is bleached to a full white without degrading the cellulose by subjecting it to a series of hypochlorite bleaching treatments in the presence of free alkali and washing the pulp after each such treatment with hot, preferably alkaline, H_2O . When the pulp bleaches with difficulty, the temp. during bleaching may be gradually raised to, e.g., 43° , or the first bleaching treatment may be followed by digestion with dil. aq. NaOH . (B) Kraft pulp is bleached without materially altering its α -cellulose content or affecting its strength or tearing resistance by treating it first with hypochlorite or aq. Cl_2 (4–8% of Cl on the wt. of pulp) at, e.g., 10 – 38° for 2–6 hr. and then, after washing, digesting it at 40 – 70° for 1–4 hr. in an alkaline liquor containing 2–4% of alkali (calc. as NaOH) and consisting of NaOH or Na_2CO_3 – Na_2S . The pulp is finally bleached under alkaline conditions in three stages with intermediate washing. D. J. N.

Bleaching of pulp and the like. C. B. THORNE (B.P. 395,512–3, 8.7.32. [A] Can., 17.9.31, [B] U.S., 21.9.31).—(A) A low-density pulp suspension ($< 15\%$ consistency) is mixed with a bleaching agent and allowed to flow by gravity in a shallow unagitated stream

through a gently inclined conduit of relatively great length. (B) Apparatus for carrying out the process of (A) is described. D. J. N.

Preparation of refined [uniformly] bleached pulp. H. A. HELDER, Assr. to CHAMPION FIBRE Co. (U.S.P. 1,890,179, 6.12.32. Appl., 15.6.28).—Raw fibrous material is incompletely digested and, after screening, the pulp is mechanically disintegrated to reduce it to its ultimate fibres and is finally bleached. F. R. E.

Manufacture of cellulose esters. C. F. BOEHRINGER & SOEHNE, G.M.B.H. (B.P. 396,309, 7.2.33. Ger., 8.2., 16.6., and 28.12.32).—The catalyst used for esterification is an aliphatic sulphonic acid containing < 1 further inorg. acidic atom or group, e.g., $\text{CHX(SO}_3\text{H)}_2$ ($\text{X} = \text{Cl}$ or NO_2), $\text{CH(SO}_3\text{H)}_3$. F. R. E.

Manufacture of [nitrogen-containing] cellulose derivatives. H. DREYFUS (B.P. 394,722, 6.1.32).—A cellulose derivative containing an unsaturated grouping, e.g., cellulose crotonate or cinnamate, allylcellulose, is treated, at $<$ room temp. and atm. pressure in an inert medium (C_6H_6), with an org. compound containing < 1 replaceable H atom attached to N, e.g., NH_2Ph , either directly, or after halogenating, and in presence of a weak inorg. base [Ca(OH)_2] or an org. base with no replaceable H atom, e.g., NPhMe_2 . F. R. E.

[Manufacture of] cellulosic compositions. BRIT. CELANESE, LTD. (B.P. 396,344, 18.4.33. U.S., 16.4.32).—Phenol ether sulphonamides, e.g., anisolesulphonamide, are used as plasticisers for org. derivatives of cellulose. F. R. E.

Purification of nitrocellulose. F. OLSEN (U.S.P. 1,893,677, 10.1.33. Appl., 1.3.29).—After removal of spent acid, the nitrated cellulose is drowned in H_2O , beaten, boiled for a short time in H_2O , washed with a solution of an org. amine, e.g., urea, Bismarck-brown, NHPh_2 , to displace the last traces of acids, and finally gelatinised. F. R. E.

Cellulosic compositions of matter containing (A) ethyl cyclopentanonecarboxylate, (B) benzyl-aniline, (C) dibenzylsuccinate, and (D) a lower alkyl ester of malonic acid. (A, B) T. F. MURRAY, JUN., and C. J. STAUD, (C, D) H. B. SMITH, Assrs. to EASTMAN KODAK Co. (U.S.P. 1,880,464–5 and 1,880,506–7, 4.10.32. Appl., [A, B] 12.9.30, [C] 23.8.30, [D] 16.9.30).—Compositions in which cellulose acetate (100 pts.) is plasticised with 10–60 pts. by wt. of the above compounds are claimed. They are suitable for the manufacture of wrapping sheets, photographic film, artificial silk, varnishes or lacquers, etc. S. S. W.

Cellulose organic ester compositions of matter containing an ester of a brominated malonic acid. H. B. SMITH, Assr. to EASTMAN KODAK Co. (U.S.P. 1,880,508, 4.10.32. Appl., 4.11.31).—Compositions of 100 pts. of cellulose acetate with 10–100 pts. of the above malonic ester are claimed. S. S. W.

Drawing of cellulose acetate threads. A. ASCHERL and W. GRUBER, Assrs. to DR. A. WACKER GES. F. ELEKTROCHEM. IND. (U.S.P. 1,892,923, 3.1.33. Appl., 14.11.31. Ger., 21.11.30).—A Cl-substituted aliphatic hydrocarbon, e.g., CH_2Cl_2 , $\text{C}_2\text{H}_4\text{Cl}_2$, which contains

< 3 C atoms and is insol. in the pptn. bath, is added to a mixture of cellulose, H_2SO_4 , Ac_2O , and AcOH , and the acetylated and hydrated product is wet-spun by drawing through a pptg. bath (H_2O or salt solutions), first warm (30–50°) and then cold (10–20°).

F. R. E.

Manufacture of cellulosic material [abrasion-resisting film]. C. HOLZWARTH (U.S.P. 1,888,952, 22.11.32. Appl., 23.10.30).—Unseasoned cellulose ester film, after removal of a portion of the solvent, is impregnated with a colloidal solution of carnauba or similar wax in EtOH (aq. NH_3 2 pts., EtOH 1 pt.), both film and solution being heated to approx. the m.p. of the wax; the treated film is finally dried or seasoned.

F. R. E.

Production of transparent films, sheets, artificial glass, or the like from hydrate cellulose, with or without metal or textile fabric stiffening. K. LORCH, JUN., and E. FARR (B.P. 394,714, 2.1.32).—Cellulose xanthate solution is spread in a thin layer on a continuously advancing support and completely dried by heat; the films etc. are afterwards washed with boiling H_2O and again dried.

F. R. E.

Paper manufacture. G. A. RICHTER, ASSR. to BROWN Co. (U.S.P. 1,880,045, 27.9.32. Appl., 24.5.30).—Powdered cellulose prepared by dry-grinding a substantially pure (lignin-free) pulp in, e.g., a ball mill at 60–70° is used as a filler for paper or as a pigment in the manufacture of coated papers. When used as a filler it is preferably added to the beaten stock as a slurry containing a hydrophilic colloid, e.g., gelatin or resin size, in which case subsequent addition of alum sizes the powdered cellulose. Paper thus made shows enhanced opacity and smoothness.

D. J. N.

Manufacture of paper [containing alkaline filler]. H. R. RAFTON, ASSR. to RAFFOLD PROCESS CORP. (U.S.P. 1,892,471—2, 27.12.32. Appl., 24. and 31.3.30).—(A) When an alkaline filler (I) is present in the furnish and alum is added at the mixing box, the wet "broke" and the solids recovered from the white- H_2O are reintroduced into the cycle at the wet end of the machine. (B) Stock containing (I) can be satisfactorily and uniformly sized by adding, at the mixing box, a proportion (20%) of well-sized pulp (10% of resin) which is free from (I) and contains excess of alum.

D. J. N.

Composition for and method of papermaking. G. A. RICHTER, ASSR. to BROWN Co. (U.S.P. 1,891,730, 20.12.32. Appl., 25.5.28).—The cleaner long-fibre portion of cellulose pulp, e.g., preliberated wood pulp, is separated from the rest and mixed with gelatinised cellulose from this or another operation; after beating, if desired, the mixture is formed into paper.

F. R. E.

[Preventing slime formation in] papermaking technique. P. F. BOVARD and T. D. BECKWITH (U.S.P. 1,884,546, 25.10.32. Appl., 14.11.31).— NH_4Cl inhibits the growth of slime-producing organisms in diluted papermaking stock when added in sufficient quantity to give a residual NH_4Cl content of 0.1–1 p.p.m. Its effectiveness is greatest at pH 5.0–6.8.

D. J. N.

Making and treating paper. F. G. CRANE (U.S.P. 1,889,851, 6.12.32. Appl., 10.1.31).—An opaque paper

equal to coated, but thinner and more flexible, is formed from unsized paper dipped into a bath containing Na_2SiO_3 50, starch 25, glycerin 15, and uncoloured soap 10%, and then into another bath to "convert" a substantial part of the silicate.

B. M. V.

[Manufacture of] paper. E. C. SCHACHT, ASSR. to BEHR-MANNING CORP. (U.S.P. 1,888,409, 22.11.32. Appl., 16.12.31).—A mixture of cellulosic fibrous material (jute, hemp, cotton, wood pulp, etc.) with comminuted cork is sheeted and then saturated with an aq. solution of glycerin or sulphonated castor oil (as plasticiser) and glue (as binder), the glue being subsequently tanned with CH_2O ; the material is finally dried to give a resilient and flexible, oil- and water-proof product.

F. R. E.

Manufacture of artificial leather. G. A. RICHTER, ASSR. to BROWN Co. (U.S.P. 1,891,027, 13.12.32. Appl., 16.3.27. Renewed 25.10.32).—An absorptive paper web composed of loosely felted, uncompacted fibres of refined wood pulp of < 93% α -cellulose content is treated with a volatile liquid of lower surface tension than that of H_2O , e.g., COMe_2 , and dried to enhance its porosity. It is then impregnated with a rubber dispersion, e.g., latex, and dried after coagulation of the rubber, which may be vulcanised if desired.

F. R. E.

Manufacture [from scrap leather etc.] of (A) sized fibrous product, (B) fibrous sheet material. G. F. DAVIS (U.S.P. 1,889,642—3, 29.11.32. Appl., [A] 22.1.31, [B] 19.2.31).—(A) A fluffy mass of finely-shredded tanned leather is suspended in air and sprayed with an aq. sizing material (rosin size, wax or asphalt dispersions, etc.); the fibres, which retain their H_2O -sol. constituents enclosed by the sizing agent, are mixed with H_2O and felted. (B) The sized leather fibre is mixed with cellulose fibre (equal pts. of kraft and mechanical wood pulp) previously beaten in H_2O and sized; the composite fibres are interfelted into sheets.

F. R. E.

Manufacture of a transparent [gelatin] sheet. E. M. KRATZ, ASSR. to MARSENE PRODUCTS Co. (U.S.P. 1,893,172, 3.1.33. Appl., 21.2.25).—Gelatin (3) is dispersed in H_2O (12) and 50% H_3PO_4 (0.036) is added, followed at 42° by 8% sulphonated castor oil (1) diluted with H_2O (10), a blue dye (0.02) to counteract the yellow colour, and 40% aq. CH_2O (0.066–0.26 pt.), and the mixture is spread in thin sheets on an endless belt.

A. R. P.

Building board.—See IX.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Wetting agents in the mercerising bath. J. P. SISLEY (Rev. Gén. Mat. Col., 1933, 37, 340–348).—A review.

[Method for] neutralising Naphthol AS developing baths. H. JÄGER (Textilber., 1933, 14, 401–402).—Excess of NaOH introduced by the naphtholated fabric into the bath containing the diazotised base is progressively neutralised by the addition of NH_4Cl and CH_2O , thus: $4\text{NH}_4\text{Cl} + 6\text{CH}_2\text{O} + 4\text{NaOH} = (\text{CH}_2)_6\text{N}_4 + 4\text{NaCl} + 10\text{H}_2\text{O}$. Coupling may occur between the $(\text{CH}_2)_6\text{N}_4$ and the diazotised base, and in the absence of NaOH acidity may develop; as both

these reactions are comparatively slow they usually have no adverse effect on the development. A. J. H.

[Dyeing and finishing] treatment of special mixture materials. ANON. (Textilber., 1933, 14, 303).—Practical methods, with particular reference to fabrics containing both wool and Vistra (viscose staple fibre), are described. A. J. H.

Stripping agent for coloured rags.—See V.
Determining Cl in bleach liquors.—See VII. Al
bleaching apparatus.—See X.

PATENTS.

Protecting agents for acid and alkaline treatment of animal fibres. A. L. MOND. From I. G. FARBEN-IND. A.-G. (B.P. 396,050, 19.10.31).—The prep. consists of a salt, oxide, or hydroxide of Mg, Zn, or Cd ($>5\%$, calc. as oxide) and a natural or waste org. substance (A) of high mol. wt., viz., a sugar, sol. starch, or other carbohydrate, albuminous compounds and their degradation products, waste liquors from sulphite cellulose, and molasses, together with $\text{NH}_2\cdot\text{CH}_2\cdot\text{CO}_2\text{H}$ to facilitate dispersion of the metallic compound. No metallic ions are detectable in the prep. or its aq. solution, and addition is made under such conditions that the ratio of metallic compound to A is maintained in the acid or alkaline liquor. F. R. E.

Manufacture of mildewproof fabric. W. H. ADAMS, Asst. to EASTERN FINISHING WORKS (U.S.P. 1,890,717, 13.12.32. Appl., 4.9.29).—A fabric is saturated with a protective agent which is repellent to mildews of one group, and dried. Then the opposite faces are treated with two different compositions (which might neutralise each other), these being inimical to other groups of mildews and made up in volatile solvents which will not affect the first impregnation. B. M. V.

Coloured motor fuel.—See II. Benzyl ethers.
Wetting etc. agents.—See III. Bleaching pulp.—See V.

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

Calcination of limestone [in sugar factories]. A. DUMOULIN (Bull. Assoc. Chim. Sucr., 1933, 50, 262—275).—Methods are described for the analysis of limestone, coke, lime, and kiln gases, and for calculating the amount of air required and the composition of the resulting gas. Causes of variation from the calc. composition of the gas are discussed. Limestone should contain $<97\%$ CaCO_3 on dry matter, and $>0.5\%$ H_2O , 0.2% CaSO_4 , 1% SiO_2 , 0.2% of other matter insol. in acid, 0.8% ($\text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3$), 0.8% MgCO_3 , and traces of sulphides. A good coke should contain $1\text{--}2\%$ H_2O , $4\text{--}8\%$ ash, $0.4\text{--}0.7\%$ of volatile matter, $0.5\text{--}1\%$ of total S, and $88\text{--}91\%$ of fixed C, and have a calorific val. of 6500—8000 g.-cal. J. H. L.

Determination of thallium in flue dust and other materials. A. CZERNOTZKY (Z. anal. Chem., 1933, 93, 348—353).—In an aq. H_2SO_4 solution the Fe is converted into a complex compound by sulphosalicylic acid, the liquid made alkaline with NH_3 , and the Tl pptd. as Tl_2CrO_4 . By this method Tl can be accurately

determined in presence of 300 times its wt. of Fe. For residues very poor in Tl pptn. by KI is recommended. F. L. U.

Determination of chlorine in bleach liquors. J. HAUSNER (Chem.-Ztg., 1933, 57, 634).—A standard Sb solution is prepared by dissolving 4.675 g. of K antimonyl tartrate ($\frac{1}{2}\text{H}_2\text{O}$) and 0.14 g. of indigo-carmin in 600 c.c. of H_2O , to which 200 c.c. of conc. HCl are added, and the whole is made up to 1 litre. This solution keeps indefinitely. A known excess is added to the bleach liquor, and after the oxidation of SbCl_3 to SbCl_5 by active Cl excess SbCl_3 is back-titrated with N-bromate. R. H. H.

Determination of nitrogen in calcium cyanamide in presence of nitrate. W. GITTEL (Z. anal. Chem., 1933, 93, 331—332).—The nitrate is first eliminated by treatment with SnCl_2 in aq. HCl, and the cyanamide-N is then determined by Kjeldahl's method. F. L. U.

Respirators.—See XXIII.

PATENTS.

Chamber process of manufacturing sulphuric acid. E. B. MILLER, Asst. to SILICA GEL CORP. (U.S.P. 1,889,973, 6.12.32. Appl., 6.6.24).—Both oxides of N from the leaving gases and SO_2 from poor feed gases are adsorbed in a porous material, e.g., SiO_2 gel, and returned to the chamber system in conc. form together with air. B. M. V.

Activation of clay and manufacture of hydrochloric acid. C. TIETIG (U.S.P. 1,890,474, 13.12.32. Appl., 1.6.31).—Clay is injected by steam into H_2 and Cl_2 burning together. Pure HCl is condensed out of the separated vapours and the clay is re-treated with additional H_2O , with subsequent separation of impure HCl. B. M. V.

Manufacture of hydrogen iodide. P. E. WESTON, Asst. to ROESSLER & HASSLACHER CHEM. CO. (U.S.P. 1,890,874, 13.12.32. Appl., 25.2.30).— $\text{H}_2 + 2\text{I}$ are caused to react directly in a solvent (e.g., H_2O) for either or both at $100\text{--}300^\circ$ (150°) > 200 (700—800) lb. per sq. in. The process is especially suitable for forming dil. aq. HI; presence of Cr_2Cl_6 is advantageous. B. M. V.

Separation of phosphoric acid from mixed rare-earth sulphates obtained in decomposing monazite sands. I. G. FARBENIND. A.-G. (B.P. 395,305, 20.3.33. Ger., 25.4.32).—Monazite sand is decomposed by heating with H_2SO_4 and the strongly acid paste is stirred at 0° into an excess of MeOH, EtOH, or COMe_2 , whereby the rare-earth sulphates remain as a cryst. residue and the H_3PO_4 and excess H_2SO_4 dissolve in the org. solvent. The latter is recovered by distillation after neutralising the acid with CaO. A. R. P.

Purification of nitrogen-hydrogen mixtures for ammonia synthesis. R. S. RICHARDSON (U.S.P. 1,889,934, 6.12.32. Appl., 16.8.29).—Purification is effected by scrubbing with liquid N_2 under pressure and catalytically converting the CO and O_2 in the washed gases into CH_4 and H_2O at a pressure the same as that required for the scrubbing but $<$ that for the synthesis of NH_3 . B. M. V.

Manufacture of calcium chlorate. S. B. HEATH, Assr. to DOW CHEM. CO. (U.S.P. 1,887,809, 15.11.32. Appl., 30.1.30).—In the prep. of $\text{Ca}(\text{ClO}_3)_2$ from its mixed solution with CaCl_2 (cf. Welldon, J.S.C.I., 1882, 40), it is found that the equilibrium mol. ratio of the chlorate is much higher at higher temp. The process claimed comprises salting-out $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ by evaporation at $> 80^\circ$ until the ratio chloride: chlorate is between 2:1 and 1:1, the H_2O being reduced to about 22%; the solution is next adjusted to 28–33% H_2O and $\text{Ca}(\text{ClO}_3)_2 \cdot 2\text{H}_2\text{O}$ crystallised out at $< 67^\circ$ (the saturation point), e.g., 30° , preferably with the aid of seed crystals.

B. M. V.

Production of aluminium hydroxide. U. S. SVENDSEN, Assr. to CLAY REDUCTION CORP. (U.S.P. 1,889,080, 29.11.32. Appl., 7.9.28).—Clay, bauxite, or other aluminous material after reduction of Fe^{+++} by CO is heated at $230\text{--}300^\circ$ with NH_4F sufficient to form $\text{SiF}_4 + 2\text{NH}_3$ and with $(\text{NH}_4)_2\text{SO}_4$ sufficient to form NH_4alum but insufficient to convert other metals into sulphates. On condensation the vapours of NH_3 and SiF_4 react and ppt. SiO_2 , NH_4F crystals are recovered by evaporation, and the NH_3 is used to ppt. $\text{Al}(\text{OH})_3$ and $(\text{NH}_4)_2\text{SO}_4$ from the alum mother-liquor.

B. M. V.

Production of aluminium chloride. W. H. SHIFFLER and W. P. ANDERSON, Assrs. to STANDARD OIL CO. OF CALIFORNIA (U.S.P. 1,887,566, 15.11.32. Appl., 23.5.28).—A coke containing Al_2O_3 is treated in a vertical retort with upflowing Cl_2 and O_2 sufficient to maintain the reaction temp.

B. M. V.

Precipitation of silica from solution in alkali brines. A. H. AVAKIAN (U.S.P. 1,888,484, 22.11.32. Appl., 28.11.30).—The HCO_3 radical is produced in the brine up to a point just short of pptn. of alkali bicarbonates and the pptd. silicate is filtered off or allowed to settle. The carbonation may be effected by CO_2 or NaHCO_3 according to the nature of the brine.

B. M. V.

Manufacture of metallic sulphates [from silicates]. S. S. SVENDSEN, Assr. to CLAY REDUCTION CO. (U.S.P. 1,889,710, 29.11.32. Appl., 5.2.30).—Metallic silicates are heated at $230\text{--}300^\circ$ with NH_4F and the residue is treated with H_2SO_4 or $(\text{NH}_4)_2\text{SO}_4$ enough to combine with the desired metal. Fe may be removed by ferrocyanide. Regeneration of the NH_4F from the volatilised diaminotetrafluoride is mentioned but not claimed.

B. M. V.

Production of sulphates from mixed sulphide materials and recovery of values therefrom. G. C. CARSON (U.S.P. 1,890,934, 13.12.32. Appl., 19.4.30).—A stream of sulphating liquid, at its b.p., is maintained down a gradient and the finely-divided mixed sulphides are added at a point where the acid concn. is sufficient to dissolve one only, the less-sol. sulphide being pushed up the bottom of the conduit by jets of a liquid (H_2SO_4 in part) which also increases the dissolving power. In the case of FeS_2 and CuS , the FeS_2 will float and is removed and converted by heat into FeS ; the CuS is propelled up and dissolved by $\text{Fe}_2(\text{SO}_4)_3$ and H_2SO_4 solution derived from the decomp. of FeSO_4 . The CuSO_4 solution is settled free from gangue and pptd. with FeS , yielding pure CuS and FeSO_4 for decomp. by

heat. If FeS and ZnS are present as well as less-sol. sulphides the former are dissolved together in the dil. zone and passed downwards over a cooled crystallising plane, the crystals afterwards being heated sufficiently to decompose only the FeSO_4 .

B. M. V.

[Production of] trisodium phosphate-sodium nitrate. F. C. BOWMAN, Assr. to A. R. MAAS CHEM. CO. (U.S.P. 1,890,453, 13.12.32. Appl., 24.8.31).—Claim is made for a composition of Na_3PO_4 and 0.08–5.55% of NaNO_3 crystallised together in a non-caking mass; minor quantities of NaOH and NaCl may be present.

B. M. V.

Treating thiocyanates [for preparation of ammonium sulphate]. C. J. HANSEN, Assr. to KOPPERS CO. OF DELAWARE (U.S.P. 1,894,252, 10.1.33. Appl., 29.11.29. Ger., 14.4.28).—Aq. NH_4CNS is heated at $180\text{--}220^\circ$ under pressure with $(\text{NH}_4)_2\text{SO}_3$, NH_4HSO_3 , $(\text{NH}_4)_2\text{S}_2\text{O}_3$, and $(\text{NH}_4)_2\text{S}_3\text{O}_6$ to obtain aq. $(\text{NH}_4)_2\text{SO}_4$ and free S.

A. R. P.

Manufacture of alkali or alkali-alkaline-earth silicates. W. J. TENNANT. From HENKEL & CO. G.M.B.H. (B.P. 395,182, 30.8.32).—Steam is passed through a mixture of SiO_2 -sand and alkali chloride or a mixture of alkali and alkaline-earth chloride heated internally by the passage of a.c. through the molten mixture.

A. R. P.

Production of base-exchanging water-softening substances. F. WATSON. From AKTIEB. FILTRUM (B.P. 395,185, 19.9.32).—Natural zeolitic clay, e.g., natrolite, is treated, with (or without) precalcination at 700° , with aq. Na_2SiO_3 , washed free from sol. salts, treated with aq. CaCl_2 , again washed, and re-treated with aq. Na_2SiO_3 .

A. R. P.

Separation of borax [from shale]. J. R. HUGHES, Assr. to V. C. EMDEN (U.S.P. 1,889,989, 6.12.32. Appl., 9.5.30).—Borax and shale are separated by heating, which, if anything, makes the shale rather harder, and gentle grinding, e.g., in a mill with rubber balls, followed by separation of the finely-pulverised borax from the comparatively unaffected shale by known means.

B. M. V.

Obtaining chlorides of the cerium group free from thorium. I. G. FARBERIND. A.-G. (B.P. 395,300, 9.3.33. Ger., 12.3.32).—A solution of the chlorides of Th and the rare earths obtained from monazite is saturated with HCl gas at 0° to -5° , or, after addition of CaCl_2 , at 20° , whereby ThCl_4 remains in solution while the rare-earth chlorides are pptd. almost completely in a hydrated form.

A. R. P.

Catalyst [for gas-phase reactions]. H. JOSEPH, Assr. to GEN. CHEM. CO. (U.S.P. 1,887,978, 15.11.32. Appl., 23.9.31).—A catalyst suitable for conversion of SO_2 into SO_3 comprises a V compound distributed on a finely-divided carrier containing also Na_2SO_4 and K_2SO_4 in the ratio 0.25–0.50 (0.33):1, the total alkali sulphate being 10–25% of the total wt.

B. M. V.

Manufacture of preparations which give off oxygen. W. ZISCH, Assr. to ROESSLER & HASSLACHER CHEM. CO. (U.S.P. 1,890,875, 13.12.32. Appl., 31.1.29. Ger., 30.1.28).—Alkali peroxides are hydrated with $\frac{1}{2}$ –1 mol. of H_2O without allowing substantial rise of

temp., and are moulded before or after heating to $< 150^{\circ}$. B. M. V.

Purifying gases containing H_2S .—See II. Fertilisers. Insecticide.—See XVI.

VIII.—GLASS; CERAMICS.

Homogenisation of the frit. III. Effect of water content of sand on miscibility and separation. F. ECKERT, S. DEL MUNDO, and F. H. ZSCHACKE (Sprechsaal Keram., 1932, 65, 840—841, 858—859, 875—876, 891—893; Chem. Zentr., 1933, i, 830).—The optimum H_2O content is 5%. Admixture of the sand with Na_2CO_3 diminishes the mixing time. A. A. E.

Thermal expansion of refractories [heated] to 1800° . R. A. HEINDL (Bur. Stand. J. Res., 1933, 10, 715—735).—Linear thermal expansions of 36 different refractories were determined (1) up to 1000° in an oxidising atm., (2) from 1000° to 1800° , where possible in a reducing atm.; (3) from room temp. to 1800° in a reducing atm. The apparatus was calibrated with a bar of artificial graphite several times heated to 1800° , and up to 1000° with fused SiO_2 , the thermal expansion of which is known. The calibration between 1000° and 1800° was then completed by extrapolation. Petrographic analyses before and after heating are given. No apparent difference occurred between an oxidising and reducing atm. up to 1000° except with Cr ores, which gave a high expansion at 700 — 800° under reducing conditions. The greatest total expansion was given by magnesites. Nearly all the materials showed a loss in wt., probably due to volatilisation of SiO_2 . Cr ores showed some reduction to metal. C. I.

PATENTS.

Tunnel kilns. GIBBONS BROS., LTD., and W. E. GIBBONS (B.P. 395,983, 17.2.33).—In a kiln having a firing zone of the muffle type and a preheating zone of the direct-contact type, excessive temp. at the point where the gases enter the tunnel proper is prevented by a special supply of cool air. B. M. V.

Manufacture of unsplinterable composite articles such as safety glass. RÖHM & HAAS A.-G. (B.P. 396,097, 29.1.32. Ger., 29.1.31).—The dissolved gases are removed from the solution of the laminating material before or after application to the surfaces and before the solvent is appreciably removed. Complete removal of the solvent is effected in vac. Suitable apparatus is described. J. A. S.

Continuous manufacture of enamel ware. H. T. BEBB, Assr. to CANTON STAMPING & ENAMELING CO. (U.S.P. 1,890,897, 13.12.32. Appl., 22.1.31).—Carriers on zigzag runways pass in succession through several drying chambers and a fusion chamber. B. M. V.

Earthenware dishes and glaze therefor. H. J. MCMASTER, Assr. to SEBRING POTTERY CO., LIMOGES CHINA CO., CRESCENT CHINA CO., and SALEM CHINA CO. (U.S.P. 1,890,297, 6.12.32. Appl., 7.11.27).—A transparent, non-crazing, yellow glaze is formed from a white glaze by the addition of 1—3% of Na uranate calcined with china clay and flint prior to mixing with the white glaze. The Pb in the latter should increase with the U. A non-reducing atm. should be used when firing. B. M. V.

Manufacture of silicon carbide bodies. CARBORUNDUM CO., LTD. From GLOBAL CORP. (B.P. 396,088, 15.1.32).—The body (e.g., recryst. SiC for electrical resistors etc.) is impregnated with a metallic or other material of high electrical conductivity (e.g., Al, Ni, Fe, Co, Cr, Si, or their alloys) by rapid heating in contact with the material to $< 1900^{\circ}$. [Stat. ref.] J. A. S.

Testing abrasives.—See I. Silicates.—See VII.

IX.—BUILDING MATERIALS.

Setting time of Portland cement. P. SCHACHT-SCHABEL (Zement, 1932, 21, 643—647, 658—661; Chem. Zentr., 1933, i, 831).—The setting time is influenced by the humidity of the air. A. A. E.

Breakdown of emulsions for road construction in contact with Austrian stones. H. SUIDA and G. UBERREITER (Petroleum, 1933, 29, No. 29, 1—6).—A laboratory method of determining the "breakdown val." of a bituminous emulsion in contact with stone is described. The results obtained varied greatly with the types of emulsion and of stone used. The relation of the results to the practical application of the emulsions and stones in road construction is discussed. A. B. M.

Seasoning of Australian timbers. I. C. S. ELLIOT (Comm. Australia, Counc. Sci. Ind. Res., Pamphlet 40, 1933, 53 pp.).—Seasoning characteristics of, and suggested kiln schedules for, 17 species are given, together with notes on drying, drying stresses, and degrade.

PATENTS.

Rotary kiln [for burning cement etc.]. M. VOGEL-JØRGENSEN (B.P. 395,729, 21.1.32).—The kiln is formed with a cylindro-conical enlargement near the upper end containing metallic heat-transmitting and lifting elements that do not extend to a radius $<$ that of the main part of the kiln, thus being protected from the heat radiated from the hotter parts of the kiln. The lifters may be inclined to promote or delay travel of the material, as desired. B. M. V.

Wet treatment of slurry in rotary kilns for cement and similar manufactures. G. COOMANS (B.P. 396,265, 25.11.32. Belg., 11.12.31).—The slurry is injected in one or more jets which strike a series of upward-deflecting surfaces arranged along the kiln in a helicoidal fashion. The spacing and size of the deflectors are arranged to scatter the slurry in proportion to the drying capacity of the kiln at the particular point. J. A. S.

Artificial stone. J. W. WARREN (U.S.P. 1,890,798, 13.12.32. Appl., 5.2.31).—Concrete with coloured voids on the surface or throughout is formed by the addition of lumps of copperas or bluestone just before casting. B. M. V.

Treating amphibolic material for transportation. G. V. WILSON, Assr. to NORRISTOWN MAGNESIA & ASBESTOS CO. (U.S.P. 1,894,250, 10.1.33. Appl., 13.9.30).—Asbestos material is dried to 1.75—2.1% H_2O and compressed hydraulically to 100 lb. per cu. ft. for packing. A. R. P.

Composition for treatment of wood. A. H. KELSALL and O. C. ALEXANDER (U.S.P. 1,890,650,

13.12.32. Appl., 19.3.29).—A penetrating poisonous substance that sets hard comprises rosin 96, wax 64, creosote (optional) 32, CaO 10 pts., castor oil 1 pt. by wt.

B. M. V.

Treatment of cellulosic material [wood for musical instruments]. C. D. AINSWORTH (U.S.P. 1,888,419, 22.11.32. Appl., 14.8.23).—The material is subjected to a high-potential electrostatic field and an ionic discharge *in vacuo* to expel the natural gum.

F. R. E.

Digestion of wood [for preparation of moulded materials]. S. W. PRENTISS, Assr. to POTLATCH FORESTS, INC. (U.S.P. 1,892,409, 27.12.32. Appl., 16.12.31).—Finely-divided wood (100 pts.) is digested with PhOH or a homologue thereof (29), aq. NH_3 (d 0.90) (12), and H_2O (800 pts.) for 4 hr. at 200–300 lb. per sq. in. Then 72 pts. of 40% CH_2O (or other aldehyde) are added and the mixture is refluxed for 1 hr. The resulting product when dried and moulded under heat (150°) and pressure (1000 lb. per sq. in.) is strong, H_2O -resistant, and resembles *lignum vitæ* in many respects.

D. J. N.

[Manufacture of] building board. E. S. SHEPHERD (L. E. SHEPHERD, adtix.), Assr. to A. D. STEWART (U.S.P. 1,891,732, 20.12.32. Appl., 25.1.32).—Raw cereal straw is cut, washed, cooked with H_2O under pressure, and dried. It is then subjected to mechanical shredding, tearing, and beating, and the long individual fibres, which are hard, resilient, and non-moisture-absorbent, are washed to remove liberated gummy materials and felted.

F. R. E.

Lumber kiln.—See I. **Consolidated lignin.**
Bleached pulp.—See V.

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

Metallurgical progress, 1908–1933. W. ROSENHAIN (Inst. Metals, Sept., 1933. Advance copy. 18 pp.).—A review.

New methods in metallurgy [of iron]. PERRIN (Rev. Mét., 1933, 30, 1–10, 71–84).—Intense agitation of molten steel with the refining slags produces a rapid and much more efficient removal of P than does the ordinary procedure. Provided that a suitable basic slag of high fluidity be used, almost complete equilibrium between slag and metal can be obtained; thus with a slag containing SiO_2 3–10, CaO 60–65, FeO 35–20%, with CaF_2 to give the requisite fluidity, the P content of the steel can be reduced to < 0.01% by allowing the molten metal to fall from a considerable height from a reciprocating jet into the molten slag so as to form a quasi-emulsion. This procedure has been adapted with success to the deoxidation of steel; in this case the slag used contains SiO_2 70, Na_2O 25, and CaO 5%, whereby the O content of the steel can be reduced to < 0.02%. A still more fluid slag consists of TiO_2 and CaO (7 : 3); part of the TiO_2 may be replaced by Al_2O_3 or SiO_2 or by a mixture of these. Steel deoxidised in this way requires only a very small proportion of Al after recarburisation, and if about 1.35% Mn be added before the slag treatment no Al is subsequently required for killing the steel. Owing to the intimate mixing of metal

and slag it is possible to introduce alloying elements as oxides into the slag and reduce them to the metal by means of Mn, Si, or C added before the slag treatment or even by the Fe itself. The slag can also be regenerated for use again.

A. R. P.

High-chromium cast iron as constructional material for chemical apparatus. K. ROESCH and A. CLAUBERG (Chem. Fabr., 1933, 6, 317–320).—On a diagram with C content as ordinate and Cr content as abscissa, two almost straight lines joining (a) the points 11% Cr, 0% C and 35% Cr, 3% C, and (b) 15% Cr, 0% C and 35% Cr, 2.2% C, divide the C–Cr–Fe alloys into 3 groups according to their rust-resisting properties. Alloys the composition of which is above the first line are hardenable but rust easily, those with a composition lying between the 2 lines can be made rust-resistant by hardening, and those lying below the second line are rust-resistant without heat-treatment, those with < 1% C being forgeable and those with > 1% C giving clean and sound castings suitable for use in chemical apparatus. The alloy with 30% Cr and 1–1.5% C is resistant to HNO_3 , aq. NH_3 , and aq. NaOH or KOH containing < 35% of alkali at all temp., but is dissolved by HCl and by hot H_2SO_4 ; it is resistant to scaling up to 1230° and has a high creep limit at high temp. The alloy is extensively used for pump parts and for apparatus for high-temp. work.

A. R. P.

Effect of surface finish on fatigue limit of mild steel. J. S. CASWELL (Engineering, 1933, 136, 154–155).—Results from endurance tests on test-pieces with different surface finish showed that fatigue stress limits on specimens ground and polished circumferentially are only of nominal val. and that the stress range in the rotary beam test may not be truly alternating. Greater freedom from scratch effect results from grinding the specimen longitudinally, and, generally, residual scratches should be parallel to the direction of the stresses to be endured. High-C or alloy steels are particularly subject to the influence of surface finish.

C. A. K.

Ageing of metals [steel and nickel] after cold-drawing. J. GALIBOURG (Rev. Mét., 1933, 30, 96–111).—The breaking strain of mild and hard steel wire and of Ni wire between 20° and 400° is the resultant of 3 factors of which the sum is a max. at about 300° and a min. at 100°; these factors are: (a) the decrease in tensile strength (σ) caused by rise in temp., (b) the increase in elastic limit (ϵ) and σ caused by cold-work during the test, and (c) the increase in ϵ and σ by ageing, which is particularly great at 300°. After a series of small elongations at room temp. followed by ageing at 300° the final vals. of ϵ and σ are much > after a smaller no. of greater elongations followed by a similar ageing. A hard steel having an elastic limit of 65 kg. per sq. mm. after annealing showed ageing phenomena after cold-drawing, but the horizontal in the load–elongation curve reappeared after a second drawing operation; when the first drawing was interrupted as this horizontal was reached, and the metal, after removal of load, was resubjected to the same test, two horizontal sections appeared in the curve, at 62.7 and at 74.8 kg. per sq. mm., respectively.

A. R. P.

Quenching structures of steel: sorbitic and troostitic. R. SCHMIDT (Rev. Mét., 1933, 30, 30—40, 54—62).—The formation of sorbite (*S*) and troostite (*T*) during quenching and annealing steel has been studied by thermal, dilatometric, and electrical methods and by micrographic examination. *T* is formed during quenching by the pptn. of ultramicroscopic particles of Fe_3C on nuclei which did not pass into solid solution during annealing; its formation is accompanied by a deflexion in the dilatometric curve at a relatively high temp. If the quenching is relatively mild, e.g., in a bath of molten Sn or Pb, *T* is always accompanied by pearlite (*P*), and if more severe, e.g., in H_2O -glycerin mixtures, by martensite (*M*). Although the *M* is sometimes difficult to identify by micrography its presence in the troostitic structure is revealed by the differential dilatometer. When a steel containing *T* is tempered the dilatometric curve shows a contraction due to coagulation of the Fe_3C , beginning at 400° and finishing at the transformation point of the Fe; the speed of this action increases considerably with rise in temp., but otherwise *T* is modified only slightly by tempering. In micrographs *T* and *M* never show any interpenetration, but there is rarely any sharp line of demarcation between *T* and *P*. These results indicate that *T* is a colloidal aggregate of Fe_3C in ferrite, is chemically analogous to *P*, and has the same physical properties. *S*, on the other hand, is formed by the decomp. of *M* and is an emulsion of Fe_3C pptd. inside the *M* areas; its properties are solely a function of those of the *M* substratum and are therefore dependent on the temp. of tempering. Above 400° the *M* completely disappears, the Fe_3C coagulates, and the *S* becomes globular and acquires the physical properties of *P*. In dil. picric acid *S* and *M* readily become coloured, whereas *T* and *P* are affected only very slightly. A. R. P.

Relation between quenching power and stability during tempering of special steels containing difficultly soluble carbides: vanadium steels. E. HOUDREMONT, H. BENNEK, and H. SCHRADER (Rev. Mét., 1933, 30, 152—170).—The quenching power (*Q*) of steels is reduced by the presence of elements, e.g., V, which have a higher affinity than has Fe for C, since their carbides are generally less sol. in solid Fe than is Fe_3C . At higher annealing temp., however, these carbides retard recrystallisation and thus render the steel insensitive to overheating, but their solubility increases and the crit. rate of cooling to retain them in solid solution is decreased so that *Q* is raised. On subsequent tempering, the steel the carbides are repptd. only at relatively high temp., so that the tempering stability is improved by a type of pptn.-hardening which counteracts the softening due to decomp. of martensite. A. R. P.

Temper-brittleness of steel. E. HOUDREMONT and H. SCHRADER (Arch. Eisenhüttenw., 1933—4, 7, 49—59).—The effect of time and temp. of tempering on the impact val. (*V*) of constructional steels containing a relatively low % of 2 or 3 of the metals, Mn, Ni, Cr, Mo, W, Al, is shown graphically and correlated with the hardness. *V* is considerably reduced not only by furnace cooling after tempering at $< 650^\circ$ (*A*) but also by prolonged tempering within a certain crit. temp.

range (about 500°) (*B*), irrespective of the subsequent cooling rate. Low-alloy steels can be divided into 3 groups according to their sensitivity to temper-brittleness after treatment *A*: (a) sensitive steels suffer a severe fall in *V* after treatment *B*, but *V* is increased by prolonged tempering at about 650° (*C*); (b) slightly sensitive steels suffer a slow continuous fall in *V* during treatment *B* and a relatively rapid fall during treatment *C*, and (c) non-sensitive steels suffer a slow continuous fall in *V* during prolonged annealing at any temp. in the range 500 — 650° . Cr-Mo and Cr-Mo-V steels are classified in group (c). Steels with a high Cr-Ni content containing either Mo or W show no signs of brittleness after *A* but become brittle after *B*, especially those containing W. The above effects are explained on the assumption that a constituent is pptd. from solid solution during tempering; the rate of pptn. and the rate of coagulation of the ppt. determine the behaviour of the steel in the impact test. Nitrides or oxides and perhaps also complex carbides and phosphides probably play an important part in this process. A. R. P.

Structure of phosphate slags and its importance for the production of basic Thomas slag. F. KÖRBER and G. TRÖMEL (Arch. Eisenhüttenw., 1933—4, 7, 7—20).—Recent work on the systems $\text{CaO-P}_2\text{O}_5$ and $\text{CaO-P}_2\text{O}_5\text{-SiO}_2$ is reviewed (cf. A., 1933, 1204, 1217) and its bearing on the production of basic slags in the Thomas converter is discussed. Hydroxy- and halogeno-apatites and $\beta\text{-3CaO.P}_2\text{O}_5$ are all difficultly sol. in citric acid and NH_4 citrate whereas $\alpha\text{-3CaO.P}_2\text{O}_5$ is readily sol.; most basic phosphates have about the same solubility as silicocarnotite (85%) but rapid cooling tends to reduce this somewhat. On addition of raw phosphate rock to molten basic slags the extra P_2O_5 remains insol. and a part of the P_2O_5 in the slag is also rendered insol. If sand and SiO_2 are added together with the rock at the beginning of the blow in the converter, however, good decomp. of the rock is obtained. Phosphatic slags with citric acid-sol. P_2O_5 can be made in this way in the open-hearth furnace. A. R. P.

Prevention of cracking in slag ladles. A. WILHELM (Stahl u. Eisen, 1933, 53, 641—646).—The cracking of cast-Fe slag ladles is attributed to growth due to carbide decomp. and oxidation brought about by rapid and irregular heating to high temp., and to heat stresses accentuated by tensile or bending stresses. Efficient external air-cooling and the avoidance of applied stresses will overcome these troubles; a new type of "basket" ladle in a specially constructed movable supporting carriage is described. A. R. P.

Inclusions in steel. A. PORTEVIN and R. PERRIN (Rev. Mét., 1933, 30, 175—187).—Photomicrographs of various types of inclusions found in plain and special steels are given and their origin is discussed from the viewpoint of the phase rule, assuming that they are viscous slags formed by the reaction of some of the deoxidising elements with the dissolved oxides in the steel; this assumption is shown to accord with the facts, and hence it is possible to determine the nature of the inclusions by a consideration of the nature of the slags in equilibrium with the metal at a given temp. A. R. P.

Formation of inclusions in steel manufacture.

R. PERRIN and A. PORTEVIN (Compt. rend., 1933, 196, 1321—1323; cf. A., 1932, 811; B., 1932, 468, 602).—Defining as endogenous inclusions those produced by chemical action within the metal, e.g., by addition of Mn, consideration of the equilibrium curve of the system Fe-Mn-O shows that no slag results unless the content of Mn or O is $>$ that corresponding to the curve. This enables a determination to be made of the amount of slag inclusion that may be added without causing pptn.; thus the more FeO present the less Mn can be added, and the richer in FeO is any resultant endogenous slag inclusion. Similar treatment serves as regards additions of Si, Al, or Ti (of which much smaller amounts are permissible), or of two or more of these. If the slag is sufficiently fluid equilibrium is established in a few min. The close correspondence between the composition of the metal and of endogenous slag inclusions thus predicted has been experimentally established.

C. A. S.

Corrosion of aluminium-magnesium alloys by sea-water. E. HERZOG and G. CHAUDRON (Compt. rend., 1933, 196, 2002—2003).—Plates 1 mm. thick of various Al-Mg alloys were examined for (a) uniform attack, (b) pitting, and (c) intercryst. attack, when subjected to the action of sea-H₂O accelerated by (1) anodic attack for 4 days, (2) O₂ under pressure for 8 days, (3) alternate immersion and emersion for 5 months. Such alloys containing Si are specially liable to (c), but less so if annealed or if containing Mn. Absence of Si and presence of Cu causes (b). Both Cu and Si should therefore be absent as far as possible. Alloys containing 6% Mg with 0.15% Si annealed at 450°, and 9.5% Mg with 0.2% Si tempered in air at 420°, gave respectively breaking load 30 and 38 kg. per sq. mm., and elongation 28 and 30%.

C. A. S.

Corrosion of metals in salt solutions and sea-water. G. D. BENGOUGH (Chem. & Ind., 1933, 195—210, 228—239).—To obtain comparative results on the corrosion of metals in stagnant solutions (i.e., those in which movement takes place only by diffusion) it is essential to maintain standard conditions. Machined surfaces are preferable to polished or emiered surfaces, suspension of vertical specimens should be made with glass hooks and of horizontal specimens with glass points so that the top of the specimen is 1.5 cm. below the liquid, the size of the specimen should be about 15 sq. cm. and the containing vessel should be of standard size, the apparatus should be supported in such a way as to avoid vibration, and the experiments should be conducted at a const. temp. (20° or 25°) with a const. O₂ pressure. The rate of corrosion of pure Zn in distilled H₂O is extraordinarily small, only 1 mg. being lost in 50 days; in 0.00001 and 0.00005N-KCl the corrosion curve is given by $y = 7.42[1 - e^{-0.133(t-1.18)}]$, where y is the c.c. of O₂ absorbed in t days. Corrosion is governed by the [Cl⁻] in very dil. KCl solutions but the rate of O₂ supply plays an important part in more conc. solutions in which H₂ is evolved to an extent which is the greater the higher is the content of impurity. In conductivity H₂O with free access of O₂ mild steel and pure Fe give corrosion curves of an exponential form, the slopes being determined by the rate of O₂ supply

and the exponential forms of the curves by the formation of mounds of corrosion products over the surface of the metal. In very dil. KCl solutions the fall in corrosion rates with time is not due to diminution in [Cl⁻] as is the case with Zn, nor to any changes at, or reduction in the size of, unattacked areas; the mounds diminish in size with increasing [KCl] and are not formed in any solution when air is substituted for O₂. In 0.1N-KCl the rate of corrosion of steel is linear and depends on the rate of O₂ supply. The O₂ absorption/[KCl] curve has 4 branches governed (starting with very dil. solutions) respectively by the concn. of the solution, the O₂ supply, the nature of the corrosion products, and the solubility of O₂. Corrosion products (magnetite and γ -Fe₂O₃) formed during 2 years in 0.1N-KCl have no appreciable restrictive effect on the rate of O₂ absorption. H₂ is evolved from Fe and steel in all KCl solutions; the rate is greater with steel than with pure Fe and is nearly const. from solutions $>$ 0.001N. Total corrosion and H₂ evolution from ferrous metals are greater in sea-H₂O than in 0.5N-NaCl but are increased more rapidly in NaCl by increasing the rate of O₂ supply. The reactions which occur with Fe and Zn in aq. NaCl are discussed, apparatus for carrying out corrosion tests is described, and a brief account is given of the distribution of corrosion on Zn and mild steel. A. R. P.

Magnetic sands. IV. Catalytic reduction of magnetic sand and other metallic oxides. K. IWASÉ and M. FUKUSIMA (Sci. Rep. Tôhoku, 1933, 22, 301—327; cf. B., 1932, 108).—Alkali and alkaline-earth carbonates, chlorides, or oxides accelerate reduction of titaniferous magnetite (I), Fe₂O₃, NiO, CoO, MnO₂, TiO₂, Cr₂O₃, and ZnO by C at high temp. Mixtures of alkali and alkaline-earth compounds are generally more active than single compounds. With lampblack as reducing agent the activity of the various carbonates on the reduction of (I) at 1000—1100° decreases in the order K, Na, Li, Sr, Ca, Ba; MgCO₃ has practically no catalytic activity. Impregnation of the reducing agent with the catalyst increases the effect of the latter; this accounts for the greater activity of wood charcoal as a reducing agent compared with lampblack when no catalyst is added, the ash of the charcoal providing the catalyst. A. R. P.

Ultra-light alloys of high strength. S. A. POGODIN (Ann. Inst. Anal. Phys. Chem., 1933, 6, 295—310).—A review of the literature of Mg alloys. R. T.

Aluminium apparatus in bleaching [textiles] with hydrogen peroxide. H. TATU (Rev. Aluminium, 1933, 10, 2079—2086).—Under works conditions Al and Mn-Al alloys are absolutely resistant to corrosion by H₂O₂ (12-vol.) solution rendered alkaline (p_H 8—8.4) with Na₂SiO₃; the protective film which forms immediately is adherent and non-porous and does not accelerate decomp. of the H₂O₂. Suitable types of Al apparatus are illustrated. A. R. P.

Ageing of Al-Be alloys after tempering. C. MATIGNON and J. CALVET (Compt. rend., 1933, 196, 1256—1260).—Al-Be alloys (0.83—3.50% Be) reheated to 628° and tempered in cold H₂O age very rapidly: Brinell hardness, resistance to rupture, elastic limit, and elongation change, respectively, by 50, 17, 100—180,

and -7.4 to -15% . About half the change occurs in the first 10 min. Compared with pure Al, the changes are $13-38.5$, $4-12$, $2-8\%$, and almost negligible, respectively. They are inhibited at $< -30^\circ$. C. A. S.

Determination of copper in plating baths by the de Haën-Low method. A. WOGGINZ (Chem.-Ztg., 1933, 57, 613).—The Cu content of acid CuSO_4 plating baths is determined by pptg. the Cu with pure powdered Zn, dissolving the sponge in HCl and H_2O_2 to give a solution $0.1N$ in HCl, decomposing excess of H_2O_2 by boiling, adding KI after cooling, and titrating with $\text{Na}_2\text{S}_2\text{O}_3$. A. R. P.

Electrodeposition of chromium. M. LEMARCHANDS and M. ABRAMOVITCH (Bull. Soc. chim., 1933, [iv], 53, 429–431).— H_2CrO_4 is chemically and economically unsuitable for electrodeposition of Cr. Deposits have been obtained from aq. solutions of $\text{Cr}_2(\text{SO}_4)_3$ containing 71–100 g. Cr per litre at 18° , using 12–28 amp. per sq. dm. and a sol. Cr anode. Cu is the best cathode material. NH_4Cl (0.05%) may be added with advantage. The cathode efficiency is about 25% . E. S. H.

PATENTS.

Open-hearth furnace. N. F. EGLER (U.S.P. 1,890,805, 13.12.32. Appl., 30.4.31).—In a reversing regenerative furnace, part of the downtakes for waste gases is, when reversed and used for hot air, obstructed by a sliding block containing the fuel jet. B. M. V.

Operation of cupola furnaces. S. P. MILLER, Assr. to BARRETT Co. (U.S.P. 1,889,757, 6.12.32. Appl., 18.11.30).—The stack gases are mixed with gas containing $< 25\%$ O_2 and burnt in the furnace. Pitch coke is claimed to be a suitable fuel. B. M. V.

Operation of a cupola furnace. V. S. DURBIN (U.S.P. 1,888,759, 22.11.32. Appl., 4.5.31).—A cupola is provided with tuyères at different levels, the lowest ones being used for the first heat and successively higher ones for subsequent heats without dropping the bottom to remove slag. B. M. V.

Constituting a charge for sintering. J. E. GREENAWALT (U.S.P. 1,888,458, 22.11.32. Appl., 27.4.31).—Material falling from the charge car is divided by fingers so that it forms ridges, from which the coarser material rolls into the corresponding valleys and produces evenly disposed zones of greater permeability to the air blast. B. M. V.

Sintering-machine pallet. H. J. STEHLI (U.S.P. 1,888,296, 22.11.32. Appl., 20.1.30).—Fe is cast around Ni-steel ($3-5\%$ Ni) reinforcing rods, which thereby automatically receive correct heat treatment. B. M. V.

Blast furnace. H. A. STRAIN and G. E. STEUDEL (U.S.P. 1,889,160, 29.11.32. Appl., 21.1.30).—The section of the furnace wall upon which falls the material from the bell slopes inwardly and downwardly. B. M. V.

Air alternator applicable to blast furnaces producing cast iron, smelting furnaces, and the like. E. H. Y EMPARAN (U.S.P. 1,889,476, 29.11.32. Appl., 29.4.29. Spain, 8.5.28).—A rotary valve for causing pulsations of the air supply is described. B. M. V.

Metal-melting furnaces. S. STANWORTH, J. H. CLEGG, and J. STANWORTH (B.P. 395,766, 27.1.32).—A vertical furnace is divided into a melting and a combustion chamber by means of an inclined partition which allows molten metal to pass into the bottom of the furnace and hot gases to pass the upper end of the partition and heat the metal charge. C. A. K.

Protective apparatus for [metal-melting] furnaces. N. B. JONES, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,889,604, 29.11.32. Appl., 15.10.31).—In an electrically heated furnace, special outlets are provided to allow metal from a broken crucible to escape; these have special heaters automatically switched on when the metal escapes. B. M. V.

Continuous hardening, quenching, and drawing furnace. R. E. TALLEY, Assr. to G. J. HAGAN Co. (U.S.P. 1,888,960, 22.11.32. Appl., 13.5.32).—The apparatus comprises two furnaces with a quenching tank between. Electrical controls are provided. B. M. V.

Method and furnaces for heat-treatment of metals. BIRMINGHAM ELECTRIC FURNACES, LTD. From C. I. HAYES (B.P. 392,547, 13.10.31).—Metals are heated successively in separate furnaces at different temp., the atm. being non-oxidising and the same or different in each furnace. They are connected by a passageway which may, if desired, incorporate a quenching tank. [Stat. ref.] B. M. V.

Vessel for fire refining [of metal]. H. H. STOUT, Assr. to COPPER DEOXIDATION CORP. (U.S.P. 1,889,426, 29.11.32. Appl., 26.6.31).—A triple lining comprising (A) an inner basic, (B) intermediate neutral or acid, and (C) outer heat-insulating, layers is so proportioned that the junction between B and C is maintained at a temp. $<$ the m.p. of the metal being treated, and a metallic sheath may be placed there. B. M. V.

Production of (A) ferrochrome and other similar alloys, (B) iron. K. M. SIMPSON (U.S.P. 1,885,380—1, 1.11.32. Appl., [A] 3.5.30, [B] 30.6.30).—The processes are similar and may be carried out in a tunnel kiln. They comprise heating the ore and reducing agent to a temp. not substantially $>$ the m.p. of Fe-Cr so as to prevent reduction of SiO_2 and other components of slag. The material is cooled in the kiln and the slag and metal are separated in the solid state. B. M. V.

Smelting of finely-divided sulphide ores. H. FREEMAN, Assr. to SULPHIDE RESEARCH CORP., LTD. (U.S.P. 1,888,164, 15.11.32. Appl., 15.6.29. Renewed 8.8.32).—The ore, mixed with fuel and flux, is entrained in air and blown downwardly through the roof of a chamber maintained at a sufficiently high temp. by the reaction and combustion of fuel. The air is preheated in a jacket around the stack, and its amount is substantially $>$ sufficient to oxidise the S, metals, and fuel. B. M. V.

Manufacture of wrought iron. J. ASTON and A. H. BEALE, Assrs. to A. M. BYERS Co. (U.S.P. 1,890,637, 13.12.32. Appl., 19.7.28).—Molten steel is poured in granulated condition through a layer of slag at such a temp. that the Fe "balls up," the pot being such that < 1 horizontal dimension of the mass is $>$ the depth. aa 2

The slag is poured off and used for the same purpose in another pot. B. M. V.

Conversion of ferrophosphorus. N. C. LINDBERG, Assr. to VICTOR CHEM. WORKS (U.S.P. 1,888,003, 15.11.32. Appl., 16.12.29).—Ferrophosphorus is briquetted with Na_2CO_3 and a minor proportion of NaOH and then heated to below the fusion temp., yielding an easily leached material. B. M. V.

Casting of steel ingots. A. B. KINZEL, Assr. to ELECTRO METALLURGICAL CO. (U.S.P. 1,888,132, 15.11.32. Appl., 27.10.30).—"Rimmed" metal having a large no. of blowholes around the pipe (reducing the size of the latter) is produced by injecting a non-oxidising gas into the ingot mould, which is artificially cooled. B. M. V.

Case-hardening of metals [with ammonia]. R. J. COWAN, Assr. to SURFACE COMBUSTION CORP. (U.S.P. 1,888,491, 22.11.32. Appl., 27.10.30).—The supply of NH_3 is reduced during the soaking period so that substantially complete dissociation takes place. B. M. V.

Treating metal [steel]. W. O. AMSLER, Assr. to P. R. CARUTHERS (U.S.P. 1,890,485, 13.12.32. Appl., 6.11.29).—Nitrogenous impurities are removed from steel by means of a flux comprising bauxite 0.75, felspar 1, CaO 1%; or Al_2O_3 0.525, SiO_2 0.80, CaO 1.05%. B. M. V.

Determining the contents of a foreign substance [silicon in iron or steel]. B. D. ENLUND, Assr. to H. ENLUND (U.S.P. 1,893,700, 10.1.33. Appl., 5.3.29).—The % Si in solid solution in Fe or steel can be determined by measuring the electrical resistance and comparing the result with a chart prepared from determinations of the resistance of similar steels containing known amounts of Si. A. R. P.

Production of metal-coated iron or steel article. J. L. HERMAN, Assr. to KEYSTONE STEEL & WIRE CO. (U.S.P. 1,890,463, 13.12.32. Appl., 3.4.31).—Fe or steel wire travels vertically out of a galvanising bath through a layer of charcoal or other deoxidant and then through a flue where it receives heat treatment before solidification of the Zn. B. M. V.

Prevention of scaling, corrosion, or like action in metallic bodies. G. S. NEELEY, Assr. to G. WATKINS (U.S.P. 1,891,004—5, 13.12.32. Appl., [A] 12.8.29, [B] 4.2.31).—An external e.m.f. is applied to balance statically that generated in the apparatus, as indicated by zero reading of a milliammeter. Automatic devices for maintaining this balance are described in (B). B. M. V.

Centrifugal mineral separator [and amalgamator]. L. I. LORENTSEN (U.S.P. 1,886,111, 1.11.32. Appl., 15.12.30. Can., 25.11.30).—The ore pulp flows over the centrifugally formed surface of Hg from the bottom of the bowl to the top, and flexible scrapers driven at a different speed agitate the ore while on the Hg. B. M. V.

Flotation method. J. P. RUTH, JUN. (U.S.P. 1,886,979, 8.11.32. Appl., 26.1.31).—If a series of flotation cells are operating with feed < that necessary for max. efficiency, then tailings are returned to the feed to make up the deficiency. B. M. V.

Flotation process. M. SCHIECHEL, Assr. to AMER. LURGI CORP. (U.S.P. 1,889,078, 29.11.32. Appl., 7.2.31. Ger., 19.2.30).—Clogging of microporous tiles etc. used for aerating the ore pulp is prevented by injection of a little H_2O with the air to moisten and expel the capillary-attracted slime. B. M. V.

Treatment [colouring] of magnesium. J. A. GANN and W. H. GROSS, Assrs. to DOW CHEM. CO. (U.S.P. 1,888,457, 22.11.32. Appl., 8.5.31).—Ten examples of etching and colouring solutions for Mg metal are claimed, some of which, e.g., picric acid, effect both functions simultaneously. B. M. V.

Normalising ternary and multiple alloys containing copper and nickel. VEREIN. DEUTS. METALLWERKE A.-G. ZWEIGNIEDERLASSUNG BASSE & SALVE (B.P. 395,720, 21.10.31. Ger., 29.10.30).—Alloys containing < 75% Cu and/or Ni and > 25% in all of one or more of the metals Fe, Cr, Mo, Co, Mn, V, or W are homogenised by working at > 800°, quenched, and tempered at 300–800° to produce pptn.-hardening. A. R. P.

"Copper plating" [of glass mirrors]. W. PEACOCK, JUN., Assr. to PEACOCK LABS., INC. (U.S.P. 1,890,094, 6.12.32. Appl., 21.11.30).—A protective varnish for the reflecting surface of silvered mirrors comprises shellac 1 pt., EtOH 9, leafy Cu about 7 pts. B. M. V.

Carbonisation of metals and alloys. C. V. IREDELL, Assr. to WESTINGHOUSE LAMP CO. (U.S.P. 1,893,286, 3.1.33. Appl., 25.5.28).—A black heat-radiating surface of C is produced on Ni or other metal cathodes for electron-discharge devices by heating the metal at 800° in H_2 to produce a clean oxide-free surface, then introducing the vapour of a hydrocarbon into the H_2 atm. until a sufficiently thick deposit of C is produced. A. R. P.

Metallisation [of plastics]. M. OW-ESCHINGEN (U.S.P. 1,890,645, 13.12.32. Appl., 3.12.29. Austr., 3.12.28).—Articles derived from casein or albumin by condensation are cleaned from fatty substances, immersed in a 3–4% aq. solution of quinol, dried, and then immersed in a solution of a reducible metallic salt. B. M. V.

Core or mould binder, coating, or paste. C. M. SAEGER, JUN. (U.S.P. 1,889,905, 6.12.32. Appl., 17.2.30).—A binder for moulding sand is composed of rubber, a polymerised vinyl derivative (1% of the rubber), a S compound to produce vulcanisation, and volatile solvents for air-drying. B. M. V.

Recovery of tin [from dross etc.]. H. P. BASSETT (U.S.P. 1,890,359, 6.12.32. Appl., 3.9.30).—Dross containing Fe is heated to the m.p. of Sn under a bath composed of high-flash petroleum, an org. reducing agent comprising resin or unsaturated fatty acid, and CaS . B. M. V.

Roasting of plumbiferous sulphide ores. K. W. YOUNG, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 395,760, 23.1.32).—Pyritic ores containing small quantities of PbS are partly roasted in a rotary or shaft kiln and a proportion of the flue gases ($\text{N}_2 + \text{SO}_2$) is introduced back into the combustion zone so as to maintain therein a temp. of 800–900° and a non-oxidising atm.

The speed of the gases is kept at > 20 cm. per sec. so as to volatilise the PbS and carry it out of the furnace. A small proportion of coke may be mixed with the charge to prevent complete oxidation of the sulphides.

A. R. P.

Hard [tungsten carbide] alloys. TOOL METAL MANUFACTURING CO., LTD. (B.P. 395,134, 21.5.32. Ger., 28.8.31. Addn. to B.P. 391,984; B., 1933, 553).—Sintered products comprising an intimate mixture of WC (85), Co (5), TiC (7), and Ti nitride (3%) are claimed.

A. R. P.

Cleaning composition [for aluminium]. H. V. CHURCHILL, ASSR. to ALUMINUM CO. OF AMERICA (U.S.P. 1,890,214, 6.12.32. Appl., 18.5.29).—A H_2O -sol. cleaning powder comprises tartaric, citric, or other solid organic acid 99 and an alkali fluoride (NaF) 1%.

B. M. V.

Chromium plating. E. J. WALTZ (U.S.P. 1,890,633, 13.12.32. Appl., 21.1.29).—The bath contains, per gal., CrO_3 18 oz. and NaCN 1.5 oz.

B. M. V.

Electrolytic deposition of metals [beryllium]. H. S. BOOTH, G. G. TORREY, and M. MERLUB-SOBEI (U.S.P. 1,893,221, 3.1.33. Appl., 26.6.30).—Anhyd. BeI_2 or other Be salt is electrolysed in liquid NH_3 containing a substance, e.g., sucrose, which raises the b.p. to about room temp.

A. R. P.

Electrical contact. Cathodes.—See XI.

XI.—ELECTROTECHNICS.

Composition of grids for positive plates of storage batteries as a factor influencing the sulphation of negative plates. G. W. VINAL, D. N. CRAIG, and C. L. SNYDER (Bur. Stand. J. Res., 1933, 10, 795—808).—It is known that Sb when deposited on the active material of the negative plates of a storage battery increases sulphation. The use of grids of Pb-Sb alloy is, however, general. A series of cells were prepared having grids containing 0—12% Sb, and another series containing up to 2% Cd, and all were tested over 115 cycles. Cells containing 0—3% Sb suffered greater corrosion at the positive plate. No large variation in capacity was found. Rate of sulphation as measured by increase in wt. of negative plates increased with Sb content of positive plates, and the active material contained measurable quantities of Sb in the same proportion. Loss of charge with keeping in open circuit also increased with Sb content. The Pb-Cd series did not give such durable positive plates, but the sulphation of the negative plates was very small.

C. I.

Dynamic photoelectric relative opacimeter. O. MAASS and R. RICHARDSON (Pulp and Paper Canada, 1933, 34, 457—460).—A new instrument for the measurement of "transmittancies" of paper is described, in which light-source variations are automatically compensated by two photoelectric cell systems. It is claimed that by using cells with response curves similar to those of the human eye, colour anomalies are avoided. The range of opacity vals. obtainable is extensive. Some preliminary experimental results are recorded.

H. A. H.

Corrosion current. Determining Cu in plating baths. Cr-plate.—See X. **Ebonite radiographs.**—See XIV. **Determining ash in beet juice.**—See XVII.

PATENTS.

Electric arc furnace. J. T. TERRY (U.S.P. 1,889,907, 6.12.32. Appl., 10.6.31).—In an arc furnace for very high temp. (e.g., for production of W carbides), having one electrode under the boat containing the material, the upper electrode is capable of being moved in a circle around the axis of the lower one as well as being advanced in the usual manner.

B. M. V.

(A) **Polarised electrolytic couple.** (B) **Electrolytic condenser.** S. RUBEN, ASSR. to RUBEN CONDENSER CO. (U.S.P. 1,891,206—7, 13.12.32. Appl., [A] 22.6.27, [B] 19.6.30. Renewed [A] 17.11.31).—Electrodes, one at least of which is film-forming, are separated by an electrolyte absorbed in fibrous material, the electrolyte being a syrupy mass, containing crystals, formed from NH_4 (or Na) borate, H_3BO_3 or other weak acid, and one or more glycerols or glycols. The device described in (A) is suitable for use (several in series) as a lightning arrester.

B. M. V.

[Porous] **electrolytic diaphragm.** W. H. WOOD (U.S.P. 1,890,242, 6.12.32. Appl., 23.6.27).—A rubber or rubber-like matrix is mixed with fibrous material and repeatedly rolled in one direction. A pile of the sheets is formed with the grain parallel, they are caused to cohere, and other sheets are formed by slicing transversely to the grain.

B. M. V.

Electric current rectifier. S. RUBEN, ASSR. to RUBEN RECTIFIER CORP. (U.S.P. 1,890,470, 13.12.32. Appl., 28.7.28).—The positive plate of a dry type of rectifier is formed of an alloy of Cu with 5.25% of Al or Mg and the negative of Cu oxide, sulphide, selenide, or telluride.

B. M. V.

Electrical contact. C. A. LAISE, ASSR. to EISLER ELECTRIC CORP. (U.S.P. 1,891,050, 13.12.32. Appl., 11.9.30).—Claim is made for the use of wrought W having a fine grain, $> 10^4$ grains/sq. mm., produced by heating the metal at 1800—2400° in an inert atm. without subsequent working.

B. M. V.

Production of highly emissive thermionic cathodes according to the metallic vapour process. RADIO-A.-G. D. S. LOEWE, and E. WALDSCHMIDT (B.P. 395,862, 16.6.32. Ger., 20.6.31).—The wire is cleaned in aq. CrO_3 - H_2SO_4 , washed, superficially oxidised in air at 400—500°, passed through fused NaOH at 300—400°, washed again, and provided with a coating of WO_3 by passage through a furnace at 700°. The WO_3 is then reduced to WO_2 in a 1:1-vol. mixture of H_2 and steam at 700°, and finally a coating of Ba is applied by the vapour process.

A. R. P.

Electrode for vapour gas electric devices. W. T. ANDERSON, JUN., and H. D. FRASER, ASSRS. to HANOVIA CHEM. & MANUFACTURING CO. (U.S.P. 1,890,926, 13.12.32. Appl., 16.6.31).—The amount of Hg in an arc electrode is reduced and its heat conductance increased by submerging in it a coil of metal wire or gauze of greater conductivity, the coil touching the walls of the container.

B. M. V.

[Grid with spines for] electric accumulators. CHLORIDE ELECTRICAL STORAGE CO., LTD. From J. A. HAMILTON (B.P. 396,994, 13.12.32).

Separating materials of different densities. Determining moisture. Detecting etc. solid particles. Liquid-treating apparatus.—See I. Detecting inflammable constituents in gases.—See II. SiC [for resistors].—See VIII. Treating wood.—See IX. Determining Si in iron etc. Preventing scaling. Carbonising metals [for cathodes]. Cr-plate. Be.—See X. Rubber insulation.—See XIV. Purifying sugar solutions.—See XVII.

XII.—FATS; OILS; WAXES.

Hydrogenated cacao butter. A. G. AVENT (Food, 1933, 2, 353—354).—Cacao butter partly hydrogenated is less satisfactory than Borneo tallow for increasing the resistance of chocolate to high temp., owing to the greater difference between the physical properties of the former and those of normal cacao butter. E. B. H.

Egg-yolk oil. A. BERNARDI and M. A. SCHWARZ (Annali Chim. Appl., 1933, 23, 290—294).—Extraction of lecithin from dried egg yolks with EtOH leaves a residue of unpleasant odour and taste, used only in soap-making and as cattle food. When pressed, the residue yields an oil which resembles olive oil and can be decolorised, deodorised, and made edible by shaking it for 2 hr. with 12% of carboraffin. The consts. of the various products obtained are given. T. H. P.

Saponification of emulsified oils. P. C. SPEERS, N. A. YAJNIK, D. N. GOYLE, and M. SHAFI (J. Chim. phys., 1933, 30, 414—419).—The velocity of saponification by aq. NaOH of arachis oil, emulsified in H₂O or aq. arachis soap, has been investigated under various conditions. Saponification is favoured by a high degree of emulsification, by a large proportion of oil, by employing the theoretical quantity of NaOH (excess tends to break the emulsion), by a high concn. of soap, and by use of aq. EtOH as solvent instead of H₂O. Dilution with H₂O and addition of NaCl retard saponification. D. R. D.

Fish oils for paint etc.—See XIII. Butter serum. Ester oils.—See XIX.

PATENTS.

Reduction of fats, oils, waxes, fatty acids, and the like [to alcohols]. DEUTS. HYDRIERWERKE A.-G. (B.P. 396,311, 10.2.33. Ger., 22.2.32).—Heavy-metal salts of org. acids which are sol. or swellable in the reaction mixture (e.g., Cu, Zn, Pb, Mn, Co, Ni, and Hg salts of palmitic, stearic, linseed oil, rosin, and naphthenic acids) catalyse the reduction with H₂ at elevated temp. and pressures. S. M.

Distillation.—See I. Wetting etc. agents. Softeners for cellulose derivatives.—See III. Soap-like dyes.—See IV.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Frosting of tung oil and drying of oil by ionised oxygen. E. ROSSMANN (Farben-Ztg., 1933, 38, 1288).—It is shown that O₂ or a gas containing O₂, ionised

by an induction spark or by passage through a gas flame, produces frosting of tung oil films in 1½ min. When the gases are de-ionised by passage through a strong electrical field, or in the complete absence of O₂, the appearance of frosting is retarded or prevented, whilst drying time is lengthened. It is considered that the acceleration of drying oil phenomena produced by ultra-violet light is also to be attributed to gas ionisation. S. S. W.

Fish oils in paint and varnish production. O. F. DENSTEDT and H. N. BROCKLESBY (Biol. Bd. of Can. Fisheries Exp. Stat., Rep. No. 37, 1933; Paint Manuf., 1933, 3, 165—167, 195—197, 205, 227—230).—Fish oil films (I) are marked by high flexibility and elasticity; addition of fish oil thus reduces the brittleness of weathered linseed oil films (II) and also the "chalking" of white-lead etc. (I) are softer and less tough than (II), but these defects are mitigated, and the odour is removed, by refrigerating and filtering or by heat-thickening the oil. The "cissing" tendency is reduced by addition of Co or Pb driers or by slight polymerisation. Blooming is pronounced in stoved polymerised (I) or stoved unpolymerised (I) containing a drier; the bloom is attributed to microscopic crystals, presumably of the free acids, which emerge from the film. The characteristics are given of British Columbia pilchard oil (III) and of its fatty acid content (palmitic 70, stearic 26, arachidic 2, myristic >2%) and graphs show the effect of a Co drier and of anti-oxidants (pyrogallol, quinol) on the rate of absorption of O₂ by (III). It dries more rapidly than linseed oil to form tough, rubbery films. The most satisfactory drier and its amount depend on the pigment present; with white-lead and Zn-white, Co linoleate (0.05—0.10% of CoO) is best. The changes in η , η , I val., and acid val. of (III) when heat-thickened at various temp. (graphed) indicate that much decomp. occurs at 275°; a rubbery gel is produced at 300°. The after-yellowing of white paint films is reduced by using either polymerised or SO₂-treated (III); the latter also increases the hardness. S. M.

High-opacity, non-fattening zinc-white paints. F. SCHMID (Farben-Ztg., 1933, 38, 1241—1242, 1265—1267).—ZnO tends to combine with the free acids in raw linseed oil and to form soaps of swelling tendency, which raise the final oil content of paste or ready-mixed paint, with consequent poor opacity. It is known that ageing of the paste and the use of boiled (preferably aged) oil in place of raw oil give improvement in this connexion, but by the use of raw linseed oil of low free acidity it is possible to produce fluid ZnO pastes containing 15% of oil, whereas a normal ZnO paste containing 25% of oil is stiff. A content of 72—75% of ZnO in the ready-mixed paint is thus made feasible, and tests demonstrating satisfactory hiding and durability of such paints are described. Owing to poor wetting of "low-acid" oils, modification in grinding procedure and/or the use of wetting agents are necessitated. S. S. W.

Determination of adhesive capacity of paint and varnish films. E. K. O. SCHMIDT (Angew. Chem., 1933, 46, 525—529).—A small, weighted block of wood is coated with warm glue on its under side and placed

on the film which is spread on metal or glass etc.; the extruded glue is removed, the film cut around the block, and, after drying, the wt. required to remove the block is measured. Adhesion data so obtained are given for 28 compositions, used for coating duralumin aeroplane parts, after 6 months' exposure. Duralumin surfaces showed 3-fold increased adhesion for weathered nitrocellulose films if rubbed with emery; sandblasting produced > 100-fold increase. S. M.

PATENTS.

Paint and varnish removers containing (A) ketone condensation solvents, (B) furfuraldehyde, (C) activated acetone. B. N. LOUGOVY, Assr. to CHADELLOID CHEM. CO. (U.S.P. 1,884,765—7, 25.10.32. Appl., [A] 26.5.28, [B] 18.6.28, [C] 29.6.28).—Paint removers containing (A) a mixture of liquid alkali-condensation products of COMe_2 , boiling at 60–170°, (B) furfuraldehyde, (C) "alkali-activated" COMe_2 (containing unconverted COMe_2), together, in each case, with other suitable solvents and diluents, wax, wax solvents, etc. as required, are claimed. S. S. W.

Green mineral pigment. H. WOLFF, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,891,210, 13.12.32. Appl., 5.11.31. Ger., 6.11.30).—The pigment comprises Mg_2TiO_4 5–75%, CoCr_2O_4 < 5%, and the remainder chromite of Ni, Zn, or Mg. B. M. V.

Printing ink for photographic film. A. A. SHANNON, Assr. to EASTMAN KODAK CO. (U.S.P. 1,880,502, 4.10.32. Appl., 22.9.31).—Ink for printing on cellulose ester compositions comprises an azo dye, cellulose acetate, and approx. equal vols. of ethylene glycol Me ether and its acetate. S. S. W.

Coating compositions [containing flaky pigments]. E. I. DU PONT DE NEMOURS & CO. (B.P. 396,081, 28.1.32. U.S., 28.1.31).—"Leafing" of flaky pigments in the film and increased durability are obtained by using an oil-modified, rosin-free glyptal resin having acid val. < 15, and η in 75% solution in mineral spirit between M and T on the Gardner-Holdt scale. The η of the resin solution used as vehicle, after incorporation of the drier, should lie between A and F . S. M.

Crystallising lacquer comprising tribromoanisole. R. L. CHURCHILL, Assr. to EASTMAN KODAK CO. (U.S.P. 1,880,419, 4.10.32. Appl., 13.1.32).—Compositions of cellulose acetate (100 pts.) and 2:4:6-tribromoanisole (25–150 pts.) are claimed. S. S. W.

Liming of rosin. E. VAN ROMAINE, H. J. WEILAND, P. O. POWERS, and R. C. PALMER, Assrs. to NEWPORT INDUSTRIES, INC. (U.S.P. 1,884,407, 25.10.32. Appl., 28.10.29).—Wood- or gum-rosin is saponified by CaO , and 0.02–0.1% of a catalyst, e.g., org. carboxylic acids or their derivatives [particularly $\text{Ca}(\text{OAc})_2$], halogens, halogen acids or salts, is incorporated. S. S. W.

Manufacture of [liquid] resinous compositions. BRIT. THOMSON-HOUSTON CO., LTD., Asses. of E. H. JACKSON and H. J. CAMERON (B.P. 396,071, 26.1.32. U.S., 26.1.31. Cf. B.P. 364,304; B., 1932, 272).—Liquid resins, which can subsequently be converted into

the hard, infusible state, are made by heating a phenol and an aldehyde with a substance which maintains in the mass a p_H of 6.5–8.5, e.g., Na_2CO_3 , triethanolamine, and a secondary catalyst, e.g., $\text{Ba}(\text{CNS})_2$, CaBr_2 . S. M.

Manufacture of [aniline-formaldehyde] moulding substances. INTERNAT. GEN. ELECTRIC CO., INC., Asses. of ALLGEM. ELEKTRICITÄTS-GES. (B.P. 395,880, 28.7.32. Ger., 28.7.31).—The resin is made in one process by working up the aromatic amine, aldehyde, accelerator, fillers, etc. between heated rollers without a solvent until the desired consistency is obtained. S. M.

Production of artificial resins from polyhydric alcohols and polybasic acids. R. WEITHÖNER, and GLASURIT-WERKE M. WINKELMANN A.-G. (B.P. 395,894, 14.9.32).—The glycerol is partly substituted by the glyceride of an acid containing > 5 C, e.g., triacetin. Drying oils may also be added to the reaction mixture. S. M.

Polyhydric alcohol-polybasic acid resins. AMER. CYANAMID CO., and T. F. BRADLEY (B.P. 395,899, 24.9.32).—A non-yellowing, rapid-drying resin of light colour is obtained by heating phthalic anhydride and glycerol with 20–60 wt.-% of the fatty acids of walnut oil. The fatty acids may be thickened by preheating. S. M.

[Glyptal] resinous compositions. BRIT. THOMSON-HOUSTON CO., LTD., Asses. of M. M. SAFFORD (B.P. 396,354, 17.5.33. U.S., 25.5.32).—Extrudable, resilient products are formed by working up between hot rollers a mixture of the totally cured resin (3 pts.) [made by the process of B.P. 365,140 (B., 1932, 357)] with the same resin (1 pt.) in the semi-cured or uncured state. The curing of the product is accelerated by ZnO . S. M.

Manufacture of a new polymerisation product and of moulded products therefrom. IMPERIAL CHEM. INDUSTRIES, LTD., and R. HILL (B.P. 395,687, 17.11.31).—A colourless, hard, thermoplastic body is produced when Me α -methylacrylate, obtained by dehydration of Me α -hydroxyisobutyrate, is polymerised in the presence of O_2 or an oxidising agent at 60–100°. S. M.

Roller mill.—See I. Gas black.—See II. Acids from petroleum hydrocarbons. Mixed ethers [as solvents]. Polymerisable compounds. Pigments.—See III. Cellulosic compositions.—See V. Metallising plastics.—See X. Casein solution.—See XIX.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Vulcanisation of rubber. J. BEHRE (Kautschuk, 1933, 9, 119–124; cf. B., 1931, 985; 1932, 197).—Rate of vulcanisation depends not only on the "nerve" of the rubber but also on its content of natural accelerators and fatty acids; for rubber from a single plantation it varies with the month of tapping, probably for a similar reason. In a simple mixture of rubber and S (90:10) it is directly proportional to the "nerve" and content of natural and artificial accelerators and inversely to the content of fatty acid; with a mol. concn., b , of added accelerator (diphenylguanidine, mercaptobenzthiazole, or hexamine) the time of vulcanisation is inversely proportional to bn , where n is a const. A new

physico-chemical view of the action of such accelerators is tentatively given. D. F. T.

Notch strength of rubber mixings. J. TALALAY (Kautschuk, 1933, 9, 82—85, 100—104).—The tear-resistance (I) of rubber, especially if the surface of the sample be notched, is a characteristic of technical importance. The optimum degree of vulcanisation for development of full (I) is generally < that for producing max. tensile qualities; a low temp. of vulcanisation is also favourable. The shape and surface condition of the fillers used have an important influence. Using a modification of the test-piece adopted by Heidensohn (Handb. der Kautschukwiss., 1930, p. 676; cf. also Lefcaditis and Cotton, B., 1933, 318), it is shown that lampblack and ZnO increase the (I) of rubber. A refined clay in vulcanised rubber produces ordinary tensile qualities comparable with those given by C black and superior to those obtained with lampblack and "soft" C blacks, but the clay-compounded rubber gives by far the lowest (I) in notched test-pieces. With the clay also the tear is rectilinear, whereas the C black cause an apparent "knotting" in the rubber. Reclaimed rubber also reduces (I). Anti-oxidants have a beneficial influence on the (I) of rubber on ageing. A relationship exists between the (I) and the resilience, and, in the absence of clay, between abrasion-resistance and tensile strength of mixtures containing amorphous C and ZnO. D. F. T.

Condition of rubber in solutions. II. Influence of temperature on viscosity of solutions of different concentrations. B. DOGADKIN and M. LAVRENENKO (Kautschuk, 1933, 9, 97—100; cf. B., 1932, 120).—Solutions containing > 0.3% of COMe₂-extracted rubber have a relative viscosity (A) independent of the temp., but for 0.3—10% rubber A increases rectilinearly with temp. This difference is attributed to the mol. condition of the dissolved rubber below 0.3%, whereas above this concn. micellar solutions are obtained. Above 10% the rubber forms a continuous phase of the system. D. F. T.

Comparative examination of [rubbered-fabric] materials for collapsible boats. O. MERZ (Kautschuk, 1933, 9, 114—119).—Ten different samples of rubbered-fabric material were examined, particularly as to their relative alteration on ageing. D. F. T.

Radiographic, physical, and chemical examination of some ebonite samples. B. D. PORRITT and J. R. SCOTT (India-Rubber J., 1933, 86, 253—258).—Examination of 23 samples of commercial ebonite shows that it is possible radiographically to reveal the presence of cavities, grit, badly dispersed mineral matter, and probably ebonite dust; radiographs taken edgewise will also distinguish specimens constructed in layers, the material rarely being homogeneous. Indications were obtained also that the presence of ebonite dust can be detected by comparative tests as to the rate of swelling in C₆H₆. D. F. T.

PATENTS.

Rubber mixture for insulation purposes, especially for the insulation of marine communication cables. SIEMENS & HALSKE A.-G. (B.P. 395,908,

15.10.32. Ger., 24.10.31).—The raw rubber is incorporated with cellulose esters of the higher fatty acids, e.g., cellulose laurate, or with cellulose derivatives, e.g., the benzyl compound, without the use of solvents or dispersing agents. A. R. P.

Artificial leather.—See V.

XV.—LEATHER; GLUE.

Chemistry of chrome tanning. E. STIASNY (J. Amer. Leather Chem. Assoc., 1933, 28, 383—402).—A lecture. D. W.

Deterioration of vegetable-tanned leather. W. R. ATKIN and F. C. THOMPSON (J. Amer. Leather Chem. Assoc., 1933, 28, 402—405).—Atkin-Thompson "acid figures" (A) (cf. B., 1929, 865) are shown to be proportional to the Kohn-Crede vals. (B) (cf. B., 1923, 668 A). All leathers with A > 2.5 have B > 3.0, the limit fixed by Bowker and Wallace (cf. B., 1933, 400). D. W.

Analysis of leather—additions and corrections. J. A. WILSON and H. B. MERRILL (J. Amer. Leather Chem. Assoc., 1933, 28, 405—409).—A supplement to the author's book already reviewed (cf. Chem. & Ind., 1932, 708). D. W.

Determination of free sulphur in chrome leather. WILMET and REGLADE (Ann. Chim. Analyt., 1933, [ii], 15, 337—338).—The free S is extracted with CHCl₃, converted into K₂SO₃ etc. by boiling with KOH in EtOH, oxidised (H₂O₂) to K₂SO₄, and pptd. and weighed as BaSO₄. E. C. S.

Glucose [for adhesives].—See XVII. **Soya-bean protein.**—See XIX.

PATENTS.

Manufacture of [fire-resistant] shoe-stiffener material. F. O. WOODRUFF, Assr. to H. H. BECKWITH (U.S.P. 1,893,924, 10.1.33. Appl., 12.8.31).—Such material (e.g., cotton fabric impregnated with nitrocellulose) can be fireproofed, without impairing its capacity for being softened when treated with nitrocellulose solvents, by impregnating it at 100° with an aq. solution containing (wt.-%) Na silicate (d 1.36, 20 pts.) and Na₃PO₄.12H₂O (A) (30 pts.). Other cryst. alkaline salts may replace A. D. J. N.

Wetting agents.—See III. **Scrap leather products.** **Artificial leather.** **Gelatin sheet.**—See V. **Casein solution.**—See XIX.

XVI.—AGRICULTURE.

The absorptive complex of soil and its importance in agriculture. K. GEDROIZ (Ann. Agron., 1933, 3, 172—183).—Discussion of the physical and chemical functions of the complex in soils. A. G. P.

Influence of irrigation on the soil microflora. N. N. SUSHKINA (Trans. Irrigation Comm., Acad. Sci. U.S.S.R., 1933, 1, 87—94).—Saline soils on irrigation can support a microflora of the kind required for agricultural plants. The application of CaCO₃ + (NH₄)₂SO₄ to irrigated land gave rise to intense nitrification. A. M.

Climatic zones and zones of p_H in soils: their relationship with assimilable potassium. J. F. DE

FERRIERE and E. NATIER (Ann. Agron., 1933, 3, 182—209; cf. B., 1933, 162).—Previous observations are extended and the zonal basis of soil classification is considered in relation to requirements of K fertilisers.

A. G. P.

Determination of assimilable potash in Indo-Chinese soils. T. T. KHOI (Ann. Chim. Analyt., 1933, [ii], 15, 340—345).—Aq. NH_3 is to be preferred to NaOH as a precipitant for Fe and Al, but NH_4 salts must be removed by heating to redness before pptn. of K. Alternatively, and especially in the case of soils rich in Fe and Al, NaOH may be used, but the soil filtrate must be treated with H_2O_2 , evaporated to one half its bulk, neutralised with NaOH, and filtered, before pptn. of the Fe and Al.

E. C. S.

Occurrence [and determination] of lead in arable soils. G. BERTRAND and Y. OKADA (Ann. Agron., 1933, 3, 307—309, and Bull. Soc. chim., 1933, [iv], 53, 617—619).—The soil sample is dried at 100—105° and then heated in a muffle furnace at dull red heat, cooled, mixed with HCl, and evaporated to dryness. The residue is extracted with conc. HCl, diluted, and treated with H_2S . The PbS is heated with HNO_3 and H_2SO_4 , and the liquid is evaporated nearly to dryness. After addition of 95% EtOH, the PbSO_4 is collected, purified from CaSO_4 and SiO_2 by repeated extraction with aq. NH_4OAc , the Pb is repptd. as PbS, converted into PbSO_4 as before, and weighed. (Cf. B., 1933, 438.)

A. G. P.

Relation of oxygen pressure and temperature to the influence of ethylene on carbon dioxide production and on leaf elongation in very young wheat seedlings. W. B. MACK and B. E. LIVINGSTON (Bot. Gaz., 1933, 94, 625—687).—Numerous experimental data show that effects of C_2H_4 cannot be correlated directly with the concn. of the gas alone, but are also dependent on a no. of concomitant factors, e.g., O_2 pressure, temp., H_2O and nutrient conditions, light intensity, etc.

A. G. P.

Effects of sulphuric acid delinting on cotton seeds. A. H. BROWN (Bot. Gaz., 1933, 94, 755—770).—The optimum period of acid treatment varied from 5 to 20 min. according to the variety of seed. The treated seed showed the higher % and increased rates of germination.

A. G. P.

Structural and metabolic after-effects of soaking seeds of Phaseolus. W. M. BAILEY (Bot. Gaz., 1933, 94, 688—713).—Soaking the beans in aerated distilled H_2O caused a reduction in rates of germination, no., growth, and wt. of mature plants obtained, and some modification of leaf structure. Soaking resulted in a marked increase in reducing sugars, starch, total carbohydrates, and total solids and a relative decrease in total, org., and NH_2 -acid N, and proteins in the mature plants obtained. Soaking of seeds without aeration causes a steady decline in catalase activity, but with aeration the initial decrease was followed by a much enhanced activity.

A. G. P.

Chemical determination of type in white clover. B. W. DOAK (New Zealand J. Sci. Tech., 1933, 14, 359—365).—A correlation is established between types of New Zealand clovers and the amount of HCN obtained from

samples after digestion in H_2O for 48 hr. at approx. 35°. For this purpose HCN is best determined by distillation and collection in AgNO_3 acidified with HNO_3 .

A. G. P.

Towards better [sugar-beet] crops. H. COLIN (Bull. Assoc. Chim. Sucr., 1933, 50, 241—252).—A general discussion of the prospects of further improvement in beet crops, including a lengthy reference to Mitscherlich's theory that yield per acre is a logarithmic function of growth factors. Crossing of sugar beets with fodder beets is a promising line of investigation, for the special characters of the former predominate in hybrids.

J. H. L.

Reddening of vines. L. RAVAZ, E. DUPONT, and R. CALLAUDAU (Ann. Agron., 1933, 3, 224—231).—The premature red coloration of vine leaves in early autumn is associated with a deficiency of K in the aerial parts of the plants.

A. G. P.

Balancing of manures. G. BARBIER (Ann. Agron., 1933, 3, 333—343).—The importance and evaluation of balanced manures are discussed.

A. G. P.

Manuring and control of the plant-nutrient content of a light sandy soil. K. OPTIZ and K. RATHSACK (Ernähr. Pflanz., 1933, 29, 190—194).—Results of cropping trials and of Neubauer tests are recorded. Discrepancies between results so obtained indicate that the mobilisation of nutrients by weathering and base exchange was considerable, especially in the subsoil.

A. G. P.

Manurial action of magnesium. C. BRIOUX and E. JOUIS (Ann. Agron., 1933, 3, 310—322; cf. B., 1932, 395, 567).—In field trials calcined MgO and a commercial grade of Mg NH_4 phosphate produced small crop increases, in some cases only. Treated plants accumulated the additional Mg principally in the leaves, roots and seed being but little affected. MgO and magnesian limestone tended to produce relatively higher p_H in soil than did CaO. Similar effects on ammonification and nitrification in soils were shown by CaCO_3 and MgCO_3 . The mobilisation of bases in soil following treatment with MgO was > that with CaO. The latter brought relatively the greater proportion of org. matter into solution.

A. G. P.

Potash fertiliser trials with vegetables. J. REINHOLD (Ernähr. Pflanz., 1933, 29, 194—197).—In addition to its action on crop yields K improved the flavour of tomatoes and the colour of red cabbage and carrots. On peat soils the order of efficiency of the fertilisers was K Mg sulphate > 40% K salts > kainit.

A. G. P.

Artificial nutrition of cultivated plants. I (contd.). Nutrient media of stable p_H . C. ZINZADZÉ (Ann. Agron., 1933, 3, 53—72; cf. A., 1933, 437).—The prep. and use of media described previously are detailed.

A. G. P.

Phytopharmacy. M. RAUCOURT (Ann. Agron., 1933, 3, 232—249).—A review of modern research on fungicides and insecticides.

A. G. P.

Some promising fungicides. M. C. GOLDSWORTHY and E. L. GREEN (Phytopath., 1933, 23, 561—562).—Satisfactory dusts and wet sprays may be prepared from finely-ground Cu oxide, silicate, or phosphate.

Suitable adhesive properties are imparted by admixture of bentonite and $\text{Ca}(\text{OH})_2$. A. G. P.

Eradicating weeds with zinc sulphate and by burning in forest nursery seed beds. R. H. WESTVELD (Mich. Agric. Exp. Sta. Quart. Bull., 1933, 15, 254–261).—The germination of weed seeds varied inversely with the amount of ZnSO_4 solution applied within the range of 6–12 g. ZnSO_4 per sq. ft. At the rate of 8 g. per sq. ft. germination of tree seeds was not affected. A. G. P.

Root rot (*Trametes radiciperda*). E. H. VON HOPFFGARTEN (Phytopath. Z., 1933, 6, 1–48).—The disease is most prevalent in soils of p_H 4.6–6.0, and is favoured by freely aerated soils of high N content. Factors influencing the growth of and infection by the organism are examined. A. G. P.

Biology and control of *Sclerotinia sclerotiorum* [Lib.], Masee, in tobacco. K. BONING (Phytopath. Z., 1933, 6, 113–175).—Appropriate cultural treatment should include restricted manuring with N and spraying with Cu preps. A. G. P.

Tracheomycosis. H. AHMET (Phytopath. Z., 1933, 6, 49–101).—Infection of tomato plants in sand cultures by *Fusarium lycopersici* was influenced by the nature of the nutrient medium, in the following order of decreasing sensitiveness: K deficiency, low P, excess N, excess P, excess K, low N. The filtrate from the nutrient medium of infected plants contained toxic material (probably amine) causing wilt in tomato and in cotton. Tests with synthetic amines showed these to be toxic and to cause wilting. Mono- NH_2 -acids, in general, were not toxic, but di- NH_2 -acids caused wilting in growing plants and decreased the germination of seeds. *F. vasinfectum* produces enzymes causing the decomp. of sucrose, starch, and proteins. A. G. P.

Disinfectants.—See XXIII.

PATENTS.

Fertiliser manufacture. C. TYLER and F. W. PARKER, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,894,136, 10.1.33. Appl., 23.4.31).—Superphosphate is mixed with a small proportion of a solution of urea in liquid NH_3 , or of the reaction products of CO_2 and NH_3 , to give a product containing inorg.:org. N = 1–5:1. A. R. P.

Insecticide spray. T. J. HEADLEE and J. M. GINSBURG, Assrs. to TOBACCO BY-PRODUCTS & CHEM. CORP. (U.S.P. 1,891,091, 13.12.32. Appl., 31.1.31).—A combined stomach and contact poison is formed of tannic acid and nicotine chemically combined. B. M. V.

Manufacture of light-density [insecticide] composition of Paris green and calcium arsenate. B. P. WEBSTER, Assr. to CHIPMAN CHEM. CO., INC. (U.S.P. 1,883,188, 18.10.32. Appl., 30.8.30).—A 1:3 mixture of Paris green (I) and $\text{Ca}_3(\text{AsO}_4)_2$ (II) is agitated with H_2O at 37–55° until the free As_2O_3 in (I) is neutralised by the free CaO in (II) to give a powder of such lightness that 80–90 cu. in. weigh 1 lb. A. R. P.

Treating and filling cavities in trees. W. M. RITCHIE (U.S.P. 1,890,019, 6.12.32. Appl., 20.2.31).—Before applying the filler the cavity is treated with S or other germicide and fungicide adapted to remain inert until the growth of fungus starts, air being excluded by the filler. B. M. V.

XVII.—SUGARS; STARCHES; GUMS.

Flocculation and preliming [of beet juice]. R. DUTILLOY (Bull. Assoc. Chim. Sucr., 1933, 50, 260–261).—After flocculation of raw beet juice with hyposulphites, liming is best carried out in two stages, with 0.2–0.3% of CaO at the first stage. The Teatini process employs 0.15–0.35% of CaO for flocculation, but without previous hyposulphite treatment. J. H. L.

Different effects of optimum preliming carried out in different ways. O. SPENGLER, F. TÖDT, and S. BÖTTGER (Z. Ver. deut. Zucker-Ind., 1933, 83, 191–222).—In the preliming of raw beet juice with the optimum amount of CaO (B., 1932, 363, 909, 1131) it is important to avoid even temporary over-preliming of any considerable proportion of the juice, otherwise slow filtration and difficult sweetening-off after the first carbonation will result. If the raw juice and milk-of-CaO are introduced together into the preliming vessel the correct proportions should be maintained at all stages of the filling. If introduced separately the CaO should be added to the well-mixed juice, and never the juice to the CaO, nor should the whole of the CaO be mixed with part of the juice before the rest of the juice is added. J. H. L.

Effect of clarification on quality of raw and plantation white sugars. C. A. FORT and C. F. WALTON, JUN. (Ind. Eng. Chem., 1933, 25, 675–681).—In small-scale experiments in Louisiana treatment of raw juice with 0.3 g. of SO_2 per litre before the usual liming greatly improved the filterability of the raw sugar and slightly improved its colour (C). With 0.6 g. per litre C was much improved. An equiv. amount of H_3PO_4 was not much more effective than SO_2 . In white sugar production raw juice sulphitation to an acidity = 3.5–4 c.c. of 0.1N-alkali per 10 c.c. produced about a 40% improvement in turbidity (T) and C of the sugar, and a further 20% improvement in C was attained by addition of 0.2% of active C to the cold sulphured juice. Removal of the sulphitation ppt. before liming materially improved the sugar. Much better sugar was obtained from crusher- and 1st mill-juice than from 2nd and 3rd mill-juice. After sulphitation, liming to higher p_H vals. than usual resulted in better elimination of T and C, C being measured at a given p_H . The p_H of the clarified juice could safely be carried on at 6.8–7.0 for raw sugar, and at 6.5–6.8 for white sugar when black-strap molasses is to be the by-product. J. H. L.

Determination of ash in beet juice by measuring the electric conductivity. E. SAILLARD and R. SAUNIER (Compt. rend., 1933, 196, 1335–1337).—A curve is obtained by plotting against the amount of ash (determined by analysis) the conductivities (determined with a.c.) of a series of solutions prepared by extracting

cosettes with H_2O and diluting to various degrees. The ash content of another sample is deduced from the conductivity of the extract diluted to the same content of sugar as that of the standard. C. A. S.

Colloids in beet diffusion juice. E. GUNDERMANN (Centr. Zuckerind., 1933, 41, 127—129).—The amount of the colloids present in raw beet diffusion juice was found to vary between 3.5 and 4.7 g. per 100 of polarisation. No correlation existed between time of diffusion or rate of draft on the one hand and colloid content of the juice on the other hand. J. P. O.

Optically active non-sugars in fermented molasses. G. C. KINDT (Ind. Sacc. Ital., 1933, 26, 50—53).—Beet molasses after exhaustive fermentation leaves a liquid which is always levorotatory, its polarisation ranging from -2.2 to -2.7 ; in the case of residues of desugarised molasses the polarisation is -1.6 . J. P. O.

Calibration of diffusion juice measuring tanks. J. HERNYCH (Z. Zuckerind. Czechoslov., 1933, 57, 330—331).—A known amount of pure NaCl (80 times its mol. wt. for tanks of 40 hl.) is added to the tank containing H_2O , and after mixing well 100 c.c. are titrated with 0.1N-AgNO₃, the content in litres being given by $ac/0.05846(k-y)$, where a is the wt. of NaCl in g., c the purity of the NaCl, k the c.c. of 0.1N-AgNO₃ required by 100 c.c. of the dil. solution of salt in the tank, and y the c.c. of AgNO₃ required for 100 c.c. of the H_2O used. J. P. O.

Adsorption of [beet] sugar factory colouring substances and salts by calcium carbonate in neutral aqueous solutions. J. JEBAVY (Z. Zuckerind. Czechoslov., 1933, 57, 325—329).—Laboratory experiments showed pptd. CaCO₃ to adsorb colouring matter and electrolytes from impure sugar solutions, to an extent depending on the method of preparing it. The calcite form of crystal proved to be more active in this respect than the aragonite, and decolorisation was more marked in the case of CaCO₃ pptd. in alkaline compared with neutral solutions. Under otherwise parallel conditions, dil. solutions were more easily decolorised than conc., and solutions of sugars better than dil. molasses. Colouring matters were adsorbed to a greater extent than electrolytes. J. P. O.

Teatini process [for sugar]. PINGRIS-SPRIET (Chim. et Ind., 1933, 30, 41—44).—The essentials of the process are described (cf. B., 1932, 278, 479). The optimum point of flocculation, p_H 10.6—11, is remarkably const. in spite of variations in the character of the beets worked. At no stage in the process is the juice made acid, and statements that the sugar produced is acid are inexplicable except in so far as sucrose itself is acid. In a large French beet-sugar factory the process has reduced the consumption of limestone and coke by half and the consumption of coal from 71 to 59 kg. per m. ton of beets, in addition to a saving in filter cloths. J. H. L.

Working of the calandria vacuum pan. A. L. WEBRE (Int. Sugar J., 1933, 35, 227—229).—4 years' experience with a vac. pan provided with 4 rotors for causing an energetic circulation shows that it produces

commercial sugars lower in colour and higher in polarisation, as compared with the sugar made in a pan not so equipped. It was found possible to boil with reduced steam pressures, so that cheap vapours could be used. Capacity has been greatly increased, and the formation of false grain largely avoided. All the work could be done in the pan itself, thus eliminating the crystallisers. J. P. O.

Reduction of sugar-factory results to a common basis of comparison. N. DEERR (Int. Sugar J., 1933, 35, 214).—Mill extractions and boiling-house recoveries when expressed as % of the material treated do not form an exact basis of comparison, the disturbing influences being the variation in the fibre in the cane as regards milling and differences in purity in the boiling-house. Actually the differences that may arise are such that a factory with an overall extraction of 80% may have performed better than another with one of 85%. It is proposed to eliminate these disturbing influences by the reduction of the milling extraction to a const. fibre, e.g., 12.5%, and by the reduction of the boiling-house extraction to a const. purity in mixed juice, e.g., 85°. It is proposed to express the val. for the "reduced extraction" by e_m 0.125 and that for the "reduced boiling-house extraction" by e_b 0.85. J. P. O.

Comparison of the Scholler and Junien processes for hydrolysis of cellulose. M. JUNIEN (Bull. Assoc. Chim. Sucr., 1933, 50, 224—231).—Scholler's process (B., 1932, 443) requires apparatus of large capacity relative to the material treated, viz., 3.75 cu. m./ton/24 hr. 1000 kg. of wood yield 300 kg. of lignin residue and 10,000 litres of extract containing 40—50 kg. of H_2SO_4 and 400 kg. of reducing sugars of which 320 kg. are fermentable, yielding 198 litres of alcohol. Probably 45% of the fermentable sugar formed is destroyed by the prolonged exposure to acid at high temp., 160—180°. The lignin residue, as fuel, would not raise the steam required by the process. The author has patented a process in which finely-divided wood is heated under pressure with dil. acid, so that only a part of the cellulose is hydrolysed but with a 91% yield of fermentable sugar and with recovery of furfuraldehyde and volatile products from the wood, as well as by-products from the fermentation. The undissolved residue per 1000 kg. of wood consists of 282 kg. of cellulose and 330 kg. of lignin; as fuel it will raise sufficient steam for the process, but if desired the cellulose in it can be saccharified by a second hydrolysis. J. H. L.

Starch production by souring [of grain]. H. KÜHL (Chem.-Ztg., 1933, 57, 633).—Souring by means of wild infections leads to a loss of starch and an objectionable waste liquor. Since swelling of the protein of the grain is induced by traces of lactic acid, cultures of *B. lactis acidii*, *Leichmann*, *B. Delbrückii*, and *B. bulgaricum* are employed, the last named giving a waste liquor suitable for feeding. Whey bacteria are also efficient, the whey itself providing nutrient. R. H. H.

Gelatinisation of potato starch. E. WIEGEL (Z. Spiritusind., 1933, 56, 160).—Potato starch treated for increasing periods with H_2O at temp. well below the so-called gelatinisation point exhibits increasing resistance to the action of hot H_2O . Warm H_2O -treated

starch (I) requires longer heating than untreated starch (II) for dispersion and the viscosity of the paste from (I) is correspondingly < than that from (II).

R. H. H.

Limestone for sugar factories.—See VII. **Sugar-beet crops.**—See XVI. **Test for sucrose in milk.** **Defecation.**—See XIX. **Beet-sugar wastes.**—See XXIII.

PATENTS.

Purification of sugar solutions. C. EBERT, W. B. NEWKIRK, and M. MOSCOWITZ, Assrs. to INTERNAT. PATENTS DEVELOPMENT CO. (U.S.P. 1,889,779, 6.12.32. Appl., 15.6.27).—A starch-converted glucose solution is continuously passed through the cathode compartment of an electrolytic cell to flocculate the impurities. H_2O is passed through the anode compartment.

B. M. V.

Sugar crystalliser. D. A. WALSH (U.S.P. 1,890,632, 13.12.32. Appl., 29.1.29).—The apparatus comprises a crystallising trough with stirrers and a superposed cooling tank, the liquid being circulated by an air-lift.

B. M. V.

Determining moisture in beet pulp.—See I.

XVIII.—FERMENTATION INDUSTRIES.

Institute of Brewing Research Scheme. Determination of nitrogen in yeast and brewing materials. J. S. FORD, A. TAIT, L. FLETCHER, J. SPEIRS, and W. J. MITCHELL (J. Inst. Brew., 1933, 39, 472—486).—Addition of $KMnO_4$ to the digestion mixture is recommended and permits rapid clearing. Contrary to the results of Christensen and Fulmer (I), Thorne, and Case and Price (B., 1933, 203), there is no optimum amount of H_2O_2 necessary for the method of (I), and the results are independent of the amount of H_2SO_4 used. Close agreement is observed between the various modifications of Kjeldahl's method on barleys, malts, worts, and yeasts at various stages of fermentation. The presence of nitrates causes divergencies and these should be removed or the method so modified as to include the NO_3^-N with org. N. The hydrogenation method of Meulen and Peeren may lead to low results due to formation of nitrite. The Kjeldahl-Gunning $CuSO_4$ method with $KMnO_4$ is particularly suitable for yeast. R. H. H.

Determination of colloidal protein in worts by adsorption with active charcoal. P. KOLBACH and R. BUSE (Woch. Brau., 1933, 50, 249—254).—Powdered "Schering-Kahlbaum active C" (4 g.) is added to 100 c.c. of the wort, the whole shaken for 10 min., filtered repeatedly until clear, and the total N in 20 c.c. of the filtrate and in 10 c.c. of the original wort determined (Kjeldahl). The difference between the two results calc. on 100 c.c. gives the N adsorbed by the C and is a measure of the colloidal protein in the wort. Protein decomp. products of low mol. wt. are not adsorbed, and the method is unaffected over the range pH 5—6.

R. H. H.

Analysis of six New York beers. W. H. EDDY (Amer. J. Public Health, 1933, 23, 704).—Figures for total solids, ash, N, $EtOH$, and carbohydrate (as starch) are tabulated. Fe, Cu, Mg, K, Na, and PO_4 were present; As, Cu, Al, and Zn were absent. A. L.

Rôle of protective colloids in the stability of wines. J. RIBÉREAU-GAYON (Compt. rend., 1933, 196, 1689—1691).—In white wines containing Cu and Fe colloidal CuS (I) and $FePO_4$ (II) are formed, flocculation of which is favoured by albuminous substances. In the presence of a trace of gum arabic, (I) and (II) are still formed but are stabilised, the wine remaining clear.

A. C.

Analysis of wines. N. DOS S. BICALHO (Rev. Soc. Brasil. Quim., 1933, 4, 63—73).—Methods in use in the Bromatological Laboratory of the National Dept. of Public Health (Brazil) are described.

E. L.

Titration of reducing sugars. Starch from grain.—See XVII. **Defecation of complex materials.**—See XIX.

PATENTS.

Cleansing filter mass.—See I. **Adenosine-phosphoric acid.**—See XX.

XIX.—FOODS.

Storage of flour. E. B. BENNION (Food, 1933, 2, 351—352).—Storage of flour at 3° prevents growth of insect life without impairing the baking quality of the flour, providing it is exposed to room temp. for 24 hr. before use.

E. B. H.

Baking value of wheats and the Chopin extensimeter. J. DE VILMORIN and E. CAZAUBON (Bull. Assoc. Chim. Sucr., 1933, 50, 232—234).—The extensimeter (B., 1921, 316) is a valuable aid in the examination of flours (cf. B., 1930, 345). A modified form, adapted to operate with very small quantities of flour, has been successfully applied to the selection of individual plants in wheat culture. The results obtained with a given variety of wheat, however, are influenced by conditions of growth. A given sample of wheat, examined at intervals of a few days, shows an increase in the max. pressure and a decrease in the max. vol. of the "bubble," but ultimately fairly const. vals. are obtained so long as the sample remains sound. The baking val. of wheat is a hereditary factor.

J. H. L.

Discussion of the meaning of some terms used in cereal chemistry. Q. LANDIS and C. N. FREY (Cereal Chem., 1933, 10, 330—346).—Tentative definitions are given of the following terms: (a) *Fermentation relationships*: Lintner and Rumsey diastatic (saccharogenic) activities; limiting (saccharogenic) activity; fermentation rate; sugar level; potential sugar level; dough vol.; max. dough vol.; proof (sugar) level; residual (sugar) level; gassing power. (b) *Colloidal properties*: response; development; tolerance; resistance; strength; stability.

E. A. F.

Errors in gluten determinations. H. ANNEN (Mühlenlab., 1933, 3, 103—110).—A review is given of the errors which can be introduced into the moist and dry gluten determinations and the gluten swelling factor (Berliner and Rüter) and of methods of eliminating these errors.

E. A. F.

Testing the properties of gluten. K. KŘTINSKÝ (Mühlenlab., 1933, 3, 97—104).—The scale used for

indicating the properties (elasticity, extensibility, and strength) of gluten at Prague and the methods used for determining these properties are described in detail. Apparatus have been constructed to replace the hand method of estimating these properties: the elastoscope for elasticity, and the fortiscope for extensibility and strength; these apparatus show up differences which would be missed by the hand method. The results obtained from these scales agree with those from the farinograph and from the baking test. The plotted relationships between character of gluten and, respectively, baking quality and H_2O absorption, and between strength and, respectively, baking quality and absorption, show that the strength of the gluten exerts the greatest effect on baking quality. If the strength of the gluten according to this scale is known, the baking quality can be read off directly from the graph.

E. A. F.

Relationship between viscosity, elasticity, and plastic strength of a soft material as illustrated by some mechanical properties of flour dough. III. R. K. SCHOFIELD and G. W. S. BLAIR (Proc. Roy. Soc., 1933, A, 141, 72–85; cf. B., 1933, 367).—There are two more effects, in addition to hardening, in which flour dough behaves similarly to metals: viz., elastic after-effect and elastic hysteresis. By taking these properties into consideration, the apparently conflicting results previously obtained (*loc. cit.*) fall into line.

L. L. B.

Variation of protein quality in wheat grown in aqueous culture media. W. F. GERICHKE (Cereal Chem., 1933, 10, 347–359).—A method has been devised for the production of wheat in aq. culture media on a scale large enough to provide samples for milling and baking tests. The cultures were treated alike up to ear-emergence and were then treated, respectively, with excess $Ca(NO_3)_2$, $NaNO_3$, and KNO_3 . With Bunyip all 3 cultures were alike in protein content (I), unequal in ash, alike in baking quality by the normal procedure, but unequal by the BrO_3^- method. Exposure of cultures to $NaNO_3$ in the latter stages of growth was injurious to quality as expressed by loaf vol., crust colour (II), and grain and texture of crumb. With Pusa the cultures were unequal in (I). The (I) and baking quality were higher in the case of Pusa than Bunyip, the lowest val. being shown with $NaNO_3$ treatment. (II) was inferior in Bunyip. The (II) of the $NaNO_3$ -treated wheats and of those where nutrients were withheld during the later growth period was inferior to that of other treatments.

E. A. F.

New characterisation of [wheat] gluten proteins. R. M. SANDSTEDT and M. J. BLISH (Cereal Chem., 1933, 10, 359–366; cf. A., 1930, 1459; 1932, 71; B., 1930, 637).—Three fractions called the “glutenin” (20–25%), “mesonin” (approx. 25%), and “gliadin” (45–55%) groups have been progressively isolated from wheat gluten by dispersing moist crude gluten in 0.1–0.08N-AcOH, adding a small amount of a salt (e.g., NaCl) or neutralisation, and cooling progressively from 12° to –12°. Sørensen's theory of reversibly dissociable component systems is applied to gluten proteins. The irreversibility in the “glutenin” system is probably due to the fact that in the gel form this system is compara-

tively susceptible to denaturation when in contact with the reagents from which it is pptd.

E. A. F.

Determination of “silver husk” [unpolished grains] in rice. A. GOUDSWAARD (Pharm. Weekblad, 1933, 70, 770–774).—The various methods of determining the vitamin content of rice are enumerated. Of these, only the biological method is completely reliable and this is subject to an error of 20%. A new method of double-staining the grains, first in a medium (diluted 10 times) consisting of equal parts of 10% aq. $K_4Fe(CN)_6$, AcOH, and H_2O followed by aq. $FeCl_3$, and subsequently in a medium composed of 5% PhOH and 1% fuchsin in 10% EtOH similarly diluted, gives permanent results, the unpolished grains being coloured red and those where husk is removed blue.

S. C.

Chemistry of soft-curd milk. S. M. WEISBERG, A. H. JOHNSON, and E. V. MCCOLLUM (J. Dairy Sci., 1933, 16, 225–247).—Hardness of curd is closely associated with high casein, Ca, and P contents. Curd character is influenced by the concn. and nature of dispersion of the fat and Ca phosphates, but the whey components do not constitute an important factor. Relationships between the viscosity, conductivity, and buffer power of milk and its chemical composition are examined.

A. G. P.

Rapid test for sucrose in milk. R. C. LÓPEZ (Anal. Fis. Quím., 1933, 31, 201–205).—3 c.c. of milk and 3 c.c. of conc. HCl are shaken together and warmed at 100° for 1 min. A faint rose colour is produced with unadulterated milk. Milk containing > 0.1% of sucrose gives a reddish colour, whilst > 1% gives a dark red. The reaction is due to the formation of chloromethylfurfuraldehyde.

R. K. C.

Cryoscopy of South African milk. L. DENIS-NATHAN (Union of S. Africa, Dept. Agric., Sci. Bull., 1933, No. 119, 24 pp.).—Using the Hortvet cryoscope, the average f. p. of known genuine milk (individual cows and herds) was -0.541° , with a range from -0.528° to -0.561° . The effect of tricresol (I) as a preservative was const. if it was used in a const. proportion and increased the depression of the f.p. by 0.008° for each 1 c.c. of (I) per 100 c.c. of milk.

E. B. H.

Use of vegetable stabilisers in ice cream. W. J. CAULFIELD and W. H. MARTIN (J. Dairy Sci., 1933, 16, 265–270).—In a no. of proprietary stabilisers examined, gums were the principal active constituents. The amounts used were adjusted so that the ice-cream mix contained approx. 1% of gum. Such stabilisers were not superior to gelatin.

A. G. P.

Factors influencing the crystallisation of lactose in ice cream. R. WHITAKER (J. Dairy Sci., 1933, 16, 177–202).—Effects of variations in the technical details of manufacture are examined.

A. G. P.

Defecation of complex materials with basic lead acetate in presence of alkali hydroxides. C. PERTUSI and E. DI NOLA (Annali Chim. Appl., 1933, 23, 311–314).—This method (B., 1928, 939) is useful in the determination of saccharin in ice cream. The material (50 g.), mixed in a 200-c.c. flask with about 120 c.c. of H_2O , is treated with 2–3 drops of phenolphthalein in EtOH, 20 c.c. of basic Pb acetate, and,

dropwise and with shaking, with 25% NaOH solution to give a faint pink colour. After a few min., 5–6 c.c. of saturated Na_2SO_4 and Na_2HPO_4 solution are added and, after keeping for a time, the liquid is made up to vol. with H_2O and filtered through a dry filter. An aliquot part of the filtrate is acidified with H_3PO_4 and shaken vigorously with $\text{C}_6\text{H}_6\text{--Et}_2\text{O}$ (1:1) to extract the saccharin. Using three such extractions, 0.0186 g. of saccharin was recovered from an addition of 0.019 g. The treatment gives good results also with wine, beer, etc., and in the determination of sucrose in gummy and other complex products. T. H. P.

Preparing the serum of butter for p_{H} determination. K. G. WECKEL (J. Dairy Sci., 1933, 16, 249–251).—The sample (35 g.) is warmed to 55–60° and centrifuged in a Majonnier flask or test-tube. The contents are chilled and the serum is withdrawn from beneath the solidified fat. A. G. P.

Calcium and phosphorus of cheese made under controlled conditions. R. B. McCAMMON, W. J. CAULFIELD, and M. M. KRAMER (J. Dairy Sci., 1933, 16, 253–263).—The protein, Ca, and P contents of various types of cheese are recorded. Cheddar types retain about 80% and soft cheeses 20% of the Ca of the milk. The P content varies with the amount of protein in the cheese. Approx. 37–38% of the P of the milk is retained in soft and Cheddar cheeses. A. G. P.

Packing of ground coffee. O. CARRASCO (Food, 1933, 2, 312–314).—The gases evolved from roast coffee are chiefly CO_2 and CO, the composition depending on the degree of roasting. The evolution is very slow at normal pressure, more rapid at 15 mm., and most rapid on treatment with H_2O . A theory is advanced to account for these observations. E. B. H.

Bromatological chemistry of fresh and preserved animal and vegetable products. M. TAVEIRA and J. E. ALVES FILHO (Rev. Soc. Brasil. Quim., 1933, 4, 47–62).—Analytical methods for the examination of foods are detailed. E. L.

Properties of soya-bean protein. II. Solubility in calcium thiocyanate solution. III. Shearing strength as adhesive. T. INUMA and M. MASHINO (J. Soc. Chem. Ind., Japan, 1933, 36, 373 B, 373–375 B).—II. 69% of the protein in soya bean is dissolved by treatment for 3 hr. at 98° with 30% aq. $\text{Ca}(\text{CNS})_2$, and under these conditions the cellulose remains undissolved. The total N in solution is equal to that dissolved by successive treatments with H_2O , EtOH, 10% aq. NaCl, and 1% aq. NaOH, and almost the whole is pptd. by EtOH.

III. Glue prepared from the soya-bean protein remaining after extraction of the oil with C_6H_6 + MeOH has a shearing strength equal to that of casein glue. A. G.

Ester oils. H. FRANZEN (Fettchem. Umschau, 1933, 40, 144–146, 156).—The manufacture of pale, edible "ester oils" by the esterification of refinery fatty acids (particularly from the Wecker process) with glycerol is reviewed. Ester oils tend to have a higher "stearin" content and slightly lower I val. and sap. val. than has

the original oil. The crude ester oil is conveniently purified by adding it to a fresh batch of crude oil undergoing distillation (de-acidification). E. L.

Artemisia Sieversiana silage and its feeding value. F. I. DENISOV, V. I. KOPYRIN, P. A. KORMTSHKOV, and I. V. LARIN (Trans. Omsk Inst. Dairying & Omsk Zone Stat. Dairying, 1932, 2, 97–103, 117).—The quality of this silage and its effect on the yield and quality of cow's milk depend on the method of ensiling and the stage of maturity of the crop. The nutritive val. of 3 kg. of sunflower silage is equal to that of 1 kg. of average-quality pasture hay. NUTR. ABS. (b)

Results of silage making by the A.I.V. method. L. SPILDO (Tids. norske Landbruk, 1933, 40, 84–86).—Silage made by the A.I.V. method from meadow grass, first-cut and aftermath, leaves of root crops including potatoes, and marrowstem kale has been highly successful. The amount of concentrates fed has been reduced to one half or less without reduction of milk yield (17.5 kg. per day) or quality. Quantities fed have varied from 10 to 40 kg. per head per day and the silage is readily taken not only by cows but also by calves, ewes, and sows. Preliminary analyses indicate a high content of digestible protein and very little PrCO_2H and AcOH . NUTR. ABS. (b)

Feeding trials with fish meal for calves and milch cows. (A). Summary and discussion. F. HONCAMP. (B) I. Trials with calves. (1) H. BÜNGER and H. LAMPRECHT. (2) W. HELMS. II. Influence of herring meal on the properties, quantity, and composition of milk and on the live-weight of cows. (1) H. BÜNGER, H. LAMPRECHT, EICHSTÄDT, and MROZEK. (2) W. HELMS and P. MALKOMESIUS (Landw. Versuchs-Stat., 1933, 116, 125–140, 141–164, 164–178, 179–212, 212–226).—(B). I. (1) The feeding to calves of various grades of fish meal tended to give rather smaller live-wt. increases than did other concentrates and had no favourable influence on bone strength. No essential difference in the effects of herring meals of varied fat and salt contents was observed. Health conditions were not adversely affected. (2) For milk-fed calves a supplement of herring meal produced smaller growth increases than when linseed cake was used.

II. (1) Partial replacement of the customary concentrates by herring meal of low fat and salt contents reduced the milk yield without alteration of the % of milk fat. With heavier replacements the yield increased slightly (but still < normal rations) and the fat content declined. Milk constituents other than fat, and Cl contents were not appreciably affected. The live-wt. of the animals improved. Small changes in the consts. of the butter fat occurred and butter was slightly softer where fish meal was used. Similar trials with fish meal of high fat and low salt content resulted in an increased milk yield without change in the % milk fat or the live-wt. of the animals. (2) Herring meal of low fat and high salt content improved the health and live-wt. of the cows and the milk yield. The % milk fat increased slightly. Meals of low fat and salt content increased the milk yield and the % fat, but as a protein food had no superiority over the customary (plant-product) concentrates. A. G. P.

Cacao butter. Egg-yolk oil.—See XII. **Starch from grain.**—See XVII.

PATENTS.

Manufacture of a gluten-like product. "TRES" GYÖGYSZER-VÉGYÉSZETI IPARI ÉS KERESKEDELMI R.T. (B.P. 396,150, 14.3.32. Hung., 31.8.31).—The seed kernels, or separated germinal substance thereof, of the carob-bean tree or of related plants of the group of *Mimosaceae* and *Caesalpiniaceae*, with or without treatment with dil. acids or bleaching agents, are treated by the usual methods for the production of gluten. The gluten may be stabilised by sterilisation and/or mixed with other materials or diluting substances for use as foodstuffs. E. H. S.

Manufacture of casein solution. F. C. ATWOOD (U.S.P. 1,893,608, 10.1.33. Appl., 3.8.29).—Casein (55 lb.) is soaked in H_2O (30 gals.) at 65–70° containing NaF (5 lb.) and NH_4Cl (2 lb.) until swelling ceases, and cryst. borax (6 lb.) is added to produce a homogeneous viscous dispersion of pH 4.6–7, H_3BO_3 being added if necessary to produce the desired pH . A. R. P.

Treatment of [vegetable etc.] products. U. G. TODD, Assr. to PFAUDLER CO. (U.S.P. 1,890,475, 13.12.32. Appl., 8.6.28).—Fruit, vegetables, etc. are subjected to repeated variations of vac. both while being washed and while being impregnated with syrup or other fluid. B. M. V.

Determining moisture of flour etc.—See I.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Purity of laboratory medicants. II. Standards.

R. DIETZEL and K. SAXHOLM (Pharm. Ztg., 1933, 78, 769–772).—Standards are given for the common impurities in 44 inorg. salts commonly used in pharmacy. The limits of sensitivity of some of the testing reagents required are given. F. O. H.

Rapid analysis of [medicinal] extracts. L. MERLO (Boll. Chim.-farm., 1933, 72, 528–529).—An improved form of the Monterumici apparatus for determining "dry residue" (B., 1933, 44) is described. Glycerol can subsequently be extracted by $COMe_2$ -EtOH (9:1), in which it has a solubility of 13.34%. F. O. H.

Cumin oil. A. BERENGUER (Anal. Fis. Quím., 1933, 31, 189–194).—The principal constituent of the essential oil of *Cuminum cuminum*, L. (yield 3%), is cumaldehyde. Small amounts of various terpene hydrocarbons and traces of cumyl alcohol are also present. The usual physical consts. are tabulated. R. K. C.

Application of Franchimont's method to determination of the composition of essential oils.

O. FERNÁNDEZ and M. DE MINGO (Anal. Fis. Quím., 1933, 31, 260–266).—Acetylation is carried out by adding conc. H_2SO_4 to a mixture with Ac_2O . After washing with brine, the product is hydrolysed with 5N-KOH and the proportion of alcohols or phenols calc. in the usual way. R. K. C.

Tobacco.—See XVI.

PATENTS.

Manufacture of a bactericide. I. S. BARKSDALE (U.S.P. 1,893,997, 10.1.33. Appl., 19.11.29).—A 1%

solution of Crystal-violet (100 c.c.) is treated with 1 c.c. of a solution of 10 mg. of $BiNH_4$ citrate. A. R. P.

Treatment of insoluble or partly insoluble solid compounds for internal use. F. B. DEHN. From L. A. TUVIN (B.P. 396,594, 18.11.32).—*Psyllium* or similar seeds are coated with a layer of liquid-absorbing material, e.g., India gum, with or without sweetening agents. The seeds may be agitated and heated and the sugar and gum either mixed together or applied in alternate layers. E. H. S.

Manufacture of an adenosinephosphoric acid. I. G. FARBENIND, A.-G. (B.P. 396,135, 22.2.32. Ger., 23.2.31).—Adenosinetriphosphoric acid from yeast, or the crude extract containing the acid, is hydrolysed at 10–50° and the free acid isolated by pptn. E. H. S.

Preparation of hormones. SCHERING-KAHLBAUM A.-G. (B.P. 396,581, 17.10.32. Ger., 23.10.31).—A prep. of the thyrotropic hormone of the anterior lobe of the hypophysis (A) is prepared from aq. extracts or press-juices of A by treatment with protein-pptg. agents, e.g., picric acid, followed by removal of the agent from the ppt. with org. solvents. Purification may be effected by repptn. and removal of the pptg. agent. Further quantities of protein can be removed by adjustment of the final solution to the isoelectric point. E. H. S.

Determining moisture in tobacco.—See I.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

PATENTS.

Production of photographic pictures. KALLE & Co. A.-G. (B.P. 391,963, 29.3.32. Ger., 28.3.31).—The sensitive layer comprises, in addition to monodiazotised aromatic diamines, an arylamine or phenol or a diazo compound which generates such on exposure to light, the print being developed by means of an oxidant. Paper is sensitised, e.g., with Cd *p*-aminobenzenediazonium chloride and PhOH (blue-black with $K_2Cr_2O_7$), NH_2Ph (green-black), 1:7-aminonaphthol (blue-red), or diazotised 2-amino-5-diethylaminophenol (brown); or with Cd *p*-dimethylaminobenzenediazonium chloride and Cd 4-diethylamino-2-hydroxybenzenediazonium chloride (violet with cuprammonium solution). C. H.

Obtaining photographic contrasts by means of diazonium compounds. N.V. PHILIPS' GLOEILAMP-ENFABR. (B.P. 391,970, 22.4.32. Holl., 22.5.31).—The sensitive layer comprises a diazonium compound convertible by exposure to light into a phenol which is oxidised by unchanged diazonium compound into a coloured substance, the rate of oxidation being > coupling speed and < rate of production of the phenol during exposure. Diazonium compounds (I) yielding non-coupling phenols are preferred. Prolonged exposure under a negative gives a negative, short exposure a positive. The unchanged and unreacted (unreduced) (I) are washed out with H_2O , preferably after allowing time for oxidation in the dark after exposure; oxidation is accelerated by heat (80°) or by a weak alkaline bath, e.g., aq. NH_3 with or without a Cu salt. Examples of

suitable (I) are those from *o*- and *p*-aminophenols, *o*-aminophenol-4-sulphonic acid, and *p*-aminodiphenylamine. C. H.

Device for indicating the presence of a chemical substance by colour change. F. O. BARRALET and C. E. RICHARDS (B.P. 396,672, 29.5.33).—A device similar to a photographic exposure meter has the paper sensitised with PdCl_4 and/or $\text{Pb}(\text{OAc})_2$ and is exposed for standard time in an atm. suspected of containing CO or H_2S . B. M. V.

Cellulosic compositions. Abrasion-resisting film.—See V. Printing ink for films.—See XIII.

XXII.—EXPLOSIVES; MATCHES.

PATENTS.

Manufacture of smokeless powder. R. WEINGAND and H. I. SCHULZ (U.S.P. 1,890,960, 13.12.32. Appl., 25.3.31. Ger., 28.3.30).—Nitrocellulose ($\leq 12.8\%$ N) is gelatinised at 100 atm. in the presence of MeOH and Et_2O or other org. liquids incapable of producing gelatinisation at atm. pressure. B. M. V.

Making [explosive] double-base powders. W. E. WAGNER, Assr. to WESTERN CARTRIDGE CO. (U.S.P. 1,890,241, 6.12.32. Appl., 7.4.30).—Nitroglycerin is added to nitrocellulose immediately after nitration of the latter, but before separation of the acids. B. M. V.

Igniter charge for blasting caps. L. H. FISHER, Assr. to HERCULES POWDER CO. (U.S.P. 1,890,112, 6.12.32. Appl., 23.12.31).—The charge may comprise $\text{K}_3\text{Fe}(\text{CN})_6$ 30, KClO_3 30, and nitrocellulose 40%. B. M. V.

Pure nitrocellulose.—See V.

XXIII.—SANITATION; WATER PURIFICATION.

Alkali peroxide (Oxylith) respiratory apparatus. G. F. JAUBERT (Compt. rend., 1933, 197, 484–486).—The air-purifying and O_2 -yielding properties of oxyliths-S, -PS, and -PPS (respectively activated Na_2O_2 , KNaO_3 , and K_2NaO_5), K_2O_4 , and Li_2O_2 , showing the superiority of the oxyliths as regards lightness and convenience over O_2 gas, are summarised. C. A. S.

Water economy in gas masks with one- and two-way respiration. H. ENGELHARD and K. PÜTTER (Z. Elektrochem., 1933, 39, 687–690).—Tests carried out under varying conditions of humidity demonstrate the relative efficiency of the one-way respiration filter. (Cf. B., 1933, 206.) E. S. H.

Chemical analysis of disinfectants derived from coal tar and used in agriculture and animal husbandry. J. B. DA ROCHA and D. DE A. SOUZA (Rev. Soc. Brasil. Quim., 1933, 4, 31–46).—Analytical methods are discussed. The Koppeschaar method (details given) for the determination of phenols *via* the Br-derivatives gives satisfactory and concordant results. Methods for the determination of H_2O , $\text{C}_5\text{H}_5\text{N}$ bases, and soda (method of U.S. Dept. Agric., Bur. of Animal Ind., Bull. No. 107) and of rosin (original method) are described and illustrated by analyses of typical commercial products. E. L.

Removal of organic-bound iron from highly coloured water. T. R. MCCREA (J. Amer. Water Works' Assoc., 1933, 25, 931–946).—Colour and org.-bound Fe were removed from extremely highly coloured H_2O from the Great Dismal Swamp area of N. Carolina by supplementing the normal chlorinated copperas treatment with 0.25–0.5 p.p.m. of KMnO_4 ; the action was most effective at pH 8.8–9.8. C. J.

Procedure for making odour determinations [in water]. O. GULLANS (J. Amer. Water Works' Assoc., 1933, 25, 974–981).—Full details are given for the carrying out of hot and cold odour determinations in drinking supplies on the lines suggested by Spaulding (cf. B., 1932, 962). The odour-free dilution H_2O is obtained by treatment with activated C. C. J.

Bacteriological methods of testing and means of disinfecting water with chlorine, with particular reference to swimming-pool water. W. L. MALLMANN and W. CARY (Amer. J. Public Health, 1933, 23, 35–44).—Samples of swimming-pool H_2O collected during periods of use and tested immediately showed more pollution than duplicate samples handled in the usual way by storing and testing later. Marked pollution was observed during periods of use in the presence 0.2–0.5 p.p.m. of Cl_2 , but disappeared during periods of rest, the rate of disinfection depending on the type of treatment used. With $\text{NH}_3\text{--Cl}_2$ the germicidal action is delayed and this occurs also with Cl_2 in alkaline H_2O , but to a lesser extent. It is recommended to remove the residual Cl_2 with $\text{Na}_2\text{S}_2\text{O}_3$ when collecting pool samples. C. J.

Controlling corrosion of [water]-distribution systems. A. WOLMAN (J. Amer. Water Works' Assoc., 1933, 25, 947–955).—Corrosion of Fe distribution mains and the resultant coloured supply has been reduced in certain waters of underground origin by aeration and a reduction in the CO_2 content by means of 0.5–1.0 grain of CaO per gal.

Purification of beet-sugar wastes. M. LEVINE (Amer. J. Public Health, 1933, 23, 585–590).—Diffusion effluent and pulp- H_2O from a beet-sugar factory in Iowa, after settling for 24 hr. in an open pond, showed a loss of 50–62% of its volatile solids and 13–22% of its biochemical O_2 demand (B.O.D.), and still remained warm enough for biological purification. Ponding wash-waters removed 93–98% of suspended matters, with a slight improvement in B.O.D., but the temp. was too low for biological treatment. Passing a mixture of 1 pt. of diffusion or pulp effluent with 5 pts. of wash-waters through a Dorr clarifier in 1 hr. eliminated 90% of suspended solids, 50% of the org. N, and 28% of the B.O.D. By subsequent trickle filtration through a 9-ft. layer of quartzite or cinders (size 0.5–1.5 in.) at a rate of 2 million gals./acre/day, the elimination was increased to 95% of org. N and 90% of the B.O.D. when the filter had become ripe. Steffen waste liquors, when diluted with 20 pts. of wash- or pulp-waters, were found amenable to biological purification on trickle filters. J. H. L.

PATENTS.

Separating materials of different densities.—See I. H_2O -softening substances.—See VII.