BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

NOV. 9, 1928.

I.—GENERAL; PLANT; MACHINERY.

Hot centrifuge. C. Hütter (Chem. Fabr., 1928, 543—544).—A centrifuge for use in the separation of the constituents of a mineral mixture by gravity in a fused salt mixture of high sp. gr. comprises four small wire-wound vertical tube furnaces evenly disposed around the axis of the ordinary laboratory centrifuge. Electrical contact with the heating current is made by means of brushes running on two contact rings below the rotating stage carrying the furnaces. The temperature is regulated by means of an external variable resistance and the centrifuge is driven by means of a small direct-drive motor in the foot of the shaft. To carry out a test a mixture of 0·5—3 g. of the mineral mixture is mixed with the powdered salt and introduced into a small silica or hard glass tube. When the mass has fused the centrifuge is started and run for 5 min. at 2000 r.p.m. After cooling, the tube is cut in half and the salt mixture dissolved from each separately. A. R. Powell.

New sampling pipette for sampling viscous liquids and lard-like substances. L. Allen (Chem. Umschau, 1928, **35**, 228).—The sampler consists of a hinged double scoop which is plunged open into the material to be tested; the leaves are then closed by a sliding collar and thus a cylindrical sample can be withdrawn representing all layers. E. Lewkowitsch.

Waste heat recovery. W. Gregson (Proc. Inst. Mech. Eng., 1928, 169—236).

Utilisation of waste heat for steam raising. G. Martin (Trans. Ceram. Soc., 1928, **27**, 222—241).

See also A., Oct., 1086, **Adsorption of mixtures of gases** (Klosky and Woo). 1101, **"Area" of contact catalysts** (Constable). 1105, **Sampling granular material** (Baule and Benedetti-Pichler). **Radiometric microanalysis** (Ehrenberg). 1106, **Electrometric titrations** (Rabinovitsch and Kargin). **Microanalysis** (Bermejo y Vida). 1009, **Acid-alkalimeter** (Goode).

Flash-point apparatus. Meyerheim and Frank.—See II.

Patents.

Retort-furnace. C. V. McIntire, Assr. to Consolidated Coal Products Co. (U.S.P. 1,681,946, 28.8.28. Appl., 15.7.24).—Transverse flues are formed within a horizontal retort by means of inverted, trough-shaped, metal sections which constitute a lining for the bottom of the retort. Hot gases are passed through the flues thus formed between the lining and the refractory retort bottom, grooves in which engage the outer edges of each metal section. F. G. Clarke.

Kilns. Carborundum Co., Ltd. From Carborundum Co. (B.P. 297,241, 12.11.27).—In a kiln as described in B.P. 266,140 (B., 1927, 351) the products of combustion are exhausted through ports evenly distributed over the floor of the work chamber. B. M. Venables.

Heat-exchange apparatus. C. F. Braun (U.S.P. 1,683,236, 4.9.28. Appl., 31.8.26).—A multi-tube and shell-type heat interchanger is arranged so that both fluids flow longitudinally and the fluid in the tube makes three passes for each one of the outer fluid, two passes being countercurrent and one concurrent. B. M. Venables.

Pulverising machine. E. T. Roebke, Assr. to Amer. Pulverizer Co. (U.S.P. 1,683,304, 4.9.28. Appl., 12.3.27).—The rotatable hammer heads of a disintegrator comprise alternate discs and spaced bars arranged in arcs of equal outer diameter. B. M. Venables.

Pulverising machine. A. M. Read (U.S.P. 1,683,627, 11.9.28. Appl., 31.12.19. Renewed 28.2.24).—A cylindrical barrel is approximately horizontal, but has its lower side inclined away from the feed end. It is provided with balls or other grinding media, and with at least one perforated transverse screen dividing it into at least two compartments. The perforated screens are concave to the feed end. B. M. Venables.

Ball-mills [for pulverising coal and feeding it to boiler furnaces]. P. L. Crowe (B.P. [a] 296,682, [b] 296,697, 1.3.27).—The apparatus described in U.S.P. 1,627,487—8 (B., 1927, 511) is in (a) provided with a ring of pole pieces attached to the mill itself, which form part of the electric motor for driving. In (b) several mills are combined in series with different sized balls in each stage. B. M. Venables.

Uniform admixture of finely-powdered material. Soc. Anon. des Ciments Luxembourgeois (Swiss P. 120,750, 28.5.26).—The material is stirred while suspended in about 50% of its volume of air, *e.g.*, in a cylindrical vessel with a conical base provided with inlet tubes supplying air to replace that escaping from the mixture. L. A. Coles.

Subliming apparatus. H. G. Stone (U.S.P. 1,683,931, 11.9.28. Appl., 2.6.22).—A heated plate with low walls at the edge has a conveying means running over it, and chambers above for collecting vapours which discharge into condensers sideways over the edge walls. B. M. Venables.

Emulsifier. W. Thordarson (U.S.P. 1,683,500, 4.9.28. Appl., 13.4.27).—A wheel with flat radial paddles revolves within a casing having sharp-edged corrugations on its interior surface and provided with an inlet at the top and outlet at the bottom. B. M. Venables.

Rotary agitators. A. E. White. From Pfaudler Co. (B.P. 296,247—8, 9.1.28).—A propeller is constructed of stamped sheet metal or tubes having the same thickness everywhere, and hence very suitable for coating with vitreous enamels. B. M. Venables.

Feeding materials into high-pressure vessels. I. G. Farbenind. A.-G. (B.P. 274,122, 11.7.27. Ger., 10.7.26).—An air-lock device is provided with an outlet valve (to the main reaction vessel) having a large opening, whilst the other closure or inlet valve is formed as a piston which when depressed forces the material into the main chamber and at the same time displaces nearly all the high-pressure gas out of the air-lock chamber. The piston is not withdrawn until after the outlet valve is closed. B. M. Venables.

Filters or the like. C. S. Garland (B.P. 296,359, 30.5. and 7.6.27).—The preliminary filtering or straining material of the filter comprises helically woven wire or strip the apertures of which are a maximum when the wires are at right angles, but when the mesh is stretched in either direction the apertures become diamond-shaped and smaller. The strainer preferably takes the form of a tube supported between end discs, the distance apart of which can be varied. Within the strainer may be situated a finer filter, preferably a pile of discs forming an edge-filter, or loose filling may be inserted. B. M. Venables.

Apparatus for making solutions [from materials partly insoluble]. H. Frischer (B.P. 281,695, 1.12.27. Ger., 6.12.26).—The material is charged to the interior of a perforated drum attached to the stirring device in a dissolving vessel, the stirring blades project beyond the drum, and the latter retains the undissolved matter. B. M. Venables.

Determining the concentration of turbid suspensions. R. E. Hall, Assrs. to J. M. Hopwood (U.S.P. 1,681,339, 21.8.28. Appl., 13.12.24).—A measured quantity of the suspension is diluted until a luminous object attains a predetermined standard of visibility, when viewed through a predetermined thickness of the diluted suspension. From the quantity of the latter, the original concentration is determined. F. G. Clarke.

Apparatus for concentrating solutions. Feld & Vorstman G.m.b.H. (G.P. 449,216, 5.8.24).—The liquor compartment contains below the heating tubes one or more depositing surfaces of such shape that deposited material slides down them by gravity, *e.g.*, two superposed cones. These are connected with the heating chamber by a tube through which condensed water passes. L. A. Coles.

Preventing separation of the constituents of liquid dispersed systems. Anode Rubber Co., Ltd. From P. Klein, A. Szegvári, S. Gotleb, and G. F. Wilson (B.P. 296,454, 3.3.27).—In order to maintain uniformity of composition in liquid dispersions or emulsions, *e.g.*, natural or artificial dispersions of unvulcanised or vulcanised rubber, which are liable to coagulation by agitation or shock, the fluid is kept in constant upward movement by withdrawal near the surface and reintroduction at the bottom; the rotary impelling device is so constructed as to minimise the shocks between it and the dispersion and to produce the desired rate of flow with a minimum speed of revolution. D. F. Twiss.

Apparatus for effecting reactions between gases and liquids, especially for the production of sulphuric acid using nitric acid or oxides of nitrogen. J. Fischler (G.P. 449,286, 10.3.26).—The liquid is atomised upwards by jets in a gas tube situated in the lower part of the reaction chamber, through circular devices corresponding to the atomising cone, which also serves for the withdrawal of the gases from the apparatus. L. A. Coles.

Separating and liquefying gaseous mixtures, especially air, into the components. C. W. P. Heylandt (B.P. 271,520, 23.5.27. U.S., 24.5.26).—Compressed air (or other mixture of gases) at atmospheric pressure is divided, one portion being expanded in an engine and the other through a throttle valve; the first portion passes through part only of a heat exchanger attached to a double-column liquefier, and the second part passes through the whole of the heat exchanger. The heat exchanger is cooled by the dissolved nitrogen. B. M. Venables.

Removal of dust from hot gases containing dust and oil particles. Trocknungs-, Verschwelungs-, & Vergasungs-Ges.m.b.H. (G.P. 449,185, 3.6.25).—The gases are treated with a counter-current of steam superheated to a temperature above the dew point of the oil. L. A. Coles.

Fractional condensation of mixed vapours. L. Weisberg, Assr. to Barrett Co. (U.S.P. 1,676,232, 3.7.28. Appl., 29.11.21. Renewed 23.3.27).—In a fractionating column the total reflux is divided at a suitable point, one portion being utilised as reflux for fractional condensation of the rising vapours. C. Hollins.

Furnace [draft] regulation. Smoot Engineering Corp., Assees. of C. H. Smoot (B.P. 282,437, 16.12.27. U.S., 16.12.26).

Furnace arches. H. W. Spencer. From F. B. Bigelow (B.P. 297,271, 17.1.28).

[Floors for] muffle furnaces. Gibbons Bros., Ltd., and T. E. Bridgford (B.P. 296,936, 4.1.28).

[Portable] apparatus for producing heat or coldness by means of chemical reactions. K. György (B.P. 285,511, 18.2.28).

Refrigerating apparatus. T. Zemann (B.P. 289,088, 23.4.28. Austr., 22.4.27).

[Bearings for sugar-cane] crushing machines. D. B. Cooper (B.P. 297,283, 22.2.28).

Melting furnace (B.P. 282,627).—See X.

Precipitation from gases (B.P. 296,956).—See XI.

II.—FUEL; GAS; TAR; MINERAL OILS.

Coking coals and the mechanism of the coking process. P. Damm (Brennstoff-Chem., 1928, 9, 293—295, and Stahl u. Eisen, 1928, 48, 1330—1332).—Either the "oily-bitumen" content (cf. Fischer, B., 1925, 233) or the caking index as determined by Meurice's method gives a satisfactory measure of the caking power of a coal. A distinction is drawn between the "swelling" of a coal and the "swelling pressure," the former being the volume increase on coking when the coal is free to expand, and the latter the pressure developed when the coal is coked in a confined space. No definite relationship exists between caking power and swelling pressure, although a good coking coal must develop a certain pressure on coking as well as possess a suitable caking index. A knowledge of the amount of volatile matter evolved before, during, and after the plastic period throws considerable light on the mechanism of the coking process and on the behaviour of particular coals.

A. B. Manning.

Chemical changes occurring in the coking and oxidation of a bituminous coal. O. Künle (Brennstoff-Chem., 1928, 9, 295—298).—The influence of the temperature of coking on the yield and composition of the coke from a Saxon coal has been investigated by the use of the crucible method for the determination of volatile matter. The amount of volatile matter evolved rose from 24·9% at 400—450° to 47·8% at 1000—1020°. At temperatures below about 350° considerable oxidation occurred. After 10 hrs.' heating at 225° the oxygen content of the coal had risen from 9·9% to 23·8%. The oxygen content of a sample of fusain, separated from the coal and heated under the same conditions, rose from 5·5 to 17·4%.

A. B. Manning.

Relation between humic acid and lignin. W. Fuchs (Brennstoff-Chem., 1928, 9, 298—302).—The physical and chemical properties of the nitration products of a humic acid from brown coal and samples of lignin of different origin show them to be compounds of closely related constitution. From a study of their composition, behaviour on methylation, mol. wt. of the methylated products, etc. it is concluded that they are *iso*nitrosoketohydroxycarboxylic acids of a radical of high mol. wt. and probably of cyclic structure. The principal difference between the lignin and the humic acid derivatives lies in the higher nitrogen content of the former. This may be due either to the presence of double linkings in the lignin molecule, or to its possession of more hydroxyl and less carboxyl groups than the humic acid, so that its more pronounced phenolic character would bring about a certain amount of true aromatic nitration.

A. B. Manning.

Improvement of the calorific value of coke-oven gas. R. Schönfelder, W. Riese, and W. Klempt (Ber. Ges. Kohlentechn., 1927, 2, 250—258; Chem. Zentr., 1927, II, 2251).—The gas is passed successively over catalytic material at 700° comprising nickel precipitated on magnesite to destroy organic sulphur compounds and to break down heavy hydrocarbons, and, after removal of hydrogen sulphide, over pieces of clay containing reduced nickel at 420° to reduce carbon monoxide and carbon dioxide to methane and water by means of the hydrogen in the gas. The calorific value is raised, *e.g.*, from 4136 to 5368 thermal units.

L. A. Coles.

Explosive gas mixtures. P. H. Prausnitz (Z. angew. Chem., 1928, 41, 1066—1069).—Tests on mixtures of coal gas, hydrogen, or petrol vapour with air or oxygen have shown that a porous quartz plate sealed into the combustion tube efficiently prevents back-firing when the composition of the gas mixture is within the explosion limits, provided that the plate does not become red hot. The fineness of the pores necessary depends on the nature of the gas mixture; for coal gas–air mixtures glass plates with medium-sized pores suffice, but for oxygen–hydrogen mixtures silica plates with fine pores are required. Back-firing may, however, take place behind the plate if the gases are supplied to the mixing chamber under very different pressures.

A. R. Powell.

Desulphurisation of lignite oils. B. Saladini (Annali Chim. Appl., 1928, 18, 337—352).—The decrease in sulphur content and the loss of oil have been determined when a crude lignite oil containing 1·4% S was subjected to the action of various reagents. The following treatments were adopted, the figures in brackets giving the final percentage sulphur content: 5% of sulphuric acid, *d* 1·30 (1·1); *d* 1·84 (0·65); 5% of fuming sulphuric acid (0·25); sodium hypochlorite solution (0·75); sodium hypochlorite solution followed by filtration through alumina (0·55); action of 10% of acetyl chloride and 2% of phosphoric oxide for 10 hrs. (0·8); 10% of anhydrous zinc chloride (1·10); reduction by 10% of stannous chloride until the evolution of hydrogen sulphide ceased (0·62); reduction by 10% of iron dust and 10% of hydrochloric acid (1·30); boiling for 3 hrs. with anhydrous aluminium chloride, 2·5% $AlCl_3$, (0·52); 20% $AlCl_3$, (0·08); sodium hydroxide (1·10); boiling for 6 hrs. with 10% of sodium plumbite (0·95); boiling with (*a*) cupric oxide (1·3), (*b*) reduced copper (0·8), (*c*) litharge (0·83), (*d*) mercury (1·3), (*e*) sodium (0·92), and (*f*) sodium amalgam (0·68); with lead soap containing sodium carbonate (0·33). The vaporised oil was passed at 500° over the following reagents: granular copper oxide (1·10); a mixture of 75% of copper oxide, 10% of litharge, 15% of ferrous oxide (0·9); a mixture of equal parts of manganese dioxide, soda-lime, and quicklime (0·86); anhydrous cuprous chloride (0·8); pumice ignited after soaking in copper chloride and sodium plumbite solutions (0·64). When the loss of oil during these treatments is considered in conjunction with their relative efficiencies it is concluded that the most promising reagents are sulphuric acid, aluminium chloride, and lead soap.

F. G. Tryhorn.

Discharge-stability tests on insulating oils. W. Zimmermann (Petroleum, 1928, 24, 1213—1230).—Tests have been carried out on the oils by means of the S.S.W. apparatus, which differs from previously described apparatus in that a fixed potential difference with a variable electrode gap is used. By including a circuit-breaker in the low-tension circuit of the 110—220/30,000 volt transformer, immediate cessation of the discharge is effected following each individual test, thus protecting both the oil and the electrodes; otherwise, a prolonged discharge after the breakdown potential gradient is reached causes a lowering of the discharge stability ("breakdown voltage"). Individual figures for the discharge stability obtained from successive discharges using the same sample of oil show great variation.

The minimum value is usually given by one of the earlier of a series of discharges, often by the first, but may be given by even the tenth. When the first discharge gives the lowest value of the discharge potential this is not necessarily due to incomplete cleansing of the electrodes. The minimum value may vary by as much as 50% below the mean of a series of determinations: it is questionable whether such a mean value alone is adequate for characterising an oil. In a long series of discharges (100—150) there is a tendency for the discharge stability to rise until the final value for the mean figures reaches the maximum obtainable by thorough drying. The steepness of the curve for the average figure gives an indication of the ease of desiccation of the oil, or of its original moisture content. Exchange of moisture between the oil sample and the atmosphere has a great influence on the discharge stability. Careful sampling of the oil is necessary since different samples of oil from the same consignment show great variation in discharge stability. The usual commercial spindle oil and benzene have the same discharge stability as insulating oils; petroleum is twice as stable. Used oils may be brought up to their original insulating value by refining by means of floridin alone or with acid. W. S. NORRIS.

Testing of transformer oils. I. MUSATTI and R. VOLTERRA (Giorn. Chim. Ind. Appl., 1928, **10**, 397—408). —Previous work (B., 1926, 65) is continued, the oxidation of transformer oils being studied in order to ascertain a sufficiently rapid and exact means of classifying these oils with regard to their ageing during use. The method of oxidation in air at 112° in copper cylinders is modified in various ways. All methods based on oxidation of the oil in the open are long and inconvenient and are liable to error, due to loss of the products. Investigations have been made on a rapid method of oxidation out of contact with air and in a closed vessel either in presence of oxygen or with a supply of oxygen to maintain a constant pressure in the oxidation chamber, and in absence or presence of copper. The results obtained show that the most suitable temperature is 200° and that the test should last for 2—3 hrs. The pressure should be kept constant, especially when the oxidation is protracted. The nature of the oxidation is essentially the same in presence and in absence of copper, but the accelerating influence of the metal is intensified under constant pressure. Oxidation of the oil in the air in copper cylinders gives, as regards tendency to formation of sludge, results similar to those furnished by oxidation in oxygen, but the latter method allows of a better differentiation of the oils and leads to greater development of acidity. No relation is apparent between the results of these oxidation methods and those given by the "life test" as used in America. The latter gives a measure of the resistance of an oil to the initial formation of sludge, and the oxygen method a measure of the velocity with which sludge-formation and development of acidity proceed. T. H. POPE.

Flash-point determinations [for oils] in the normal flash-point apparatus. G. MEYERHEIM and F. FRANK (Petroleum, 1928, **24**, 1235—1237).—Closely agreeing values for the flash points of thirteen lubricating and insulating oils are obtained using the following flash-point apparatus: (*a*) Marcusson's apparatus with porcelain, Krupp's V2A steel, or brass crucible; (*b*) the Schlüter-Göckel apparatus with 2 mm. clearance between the thermometer bulb and the side or bottom of the crucible; (*c*) the Bochow-Sommer and Runge apparatus, clearance 2 mm. or 5 mm., this clearance being accurately reproducible by reason of the thermometer socket and crucible top being mechanically positioned relatively to the crucible. W. S. NORRIS.

See also A., Oct., 1086, **Charcoal and its adsorption** (OKAZAWA). 1088, **Crystalline graphite** (CORDEBAS). 1099, **Detonation-wave in gaseous mixtures** (PAYMAN). **Striæ in explosion waves** (CAMPBELL and FINCH). 1130, **Phenols from alkaline solution** (VAVON and ZAHARIA).

Phenols of coal tar. BRÜCKNER.—See III. **Determination of carbon monoxide and methane.** KELLER and KLEMPT.—See VII.

PATENTS.

Production of artificial fuel. H. E. WETHERBEE, R. F. GRANT, and H. M. HANNA, Assees. of H. E. WETHERBEE and W. L. JACOBUS (B.P. 274,046, 24.5.27. U.S., 10.7.26).—Briquettes are formed from anthracite or other carbonaceous fuel by mixing the finely-divided material with a composite binder, and heating for 2—3 hrs. at about 300°. The binder comprises a filming agent, *e.g.*, kerosene (10%), a coking ingredient, *e.g.*, petroleum pitch of m.p. 57° (45%), and a non-coking toughening agent, *e.g.*, an air-blown petroleum residuum of m.p. 116° (45%). A. B. MANNING.

Preparation of a fuel product. H. F. MAUREL (U.S.P. 1,682,680, 28.8.28. Appl., 28.4.26).—The fuel is distilled in such a manner that the oil vapours and steam evolved are mixed with the required amount of air, and are circulated through a heating means and then again through the fuel itself. A. B. MANNING.

Briquetting [of fuel]. P. C. MULLIGAN, Assr. to L. J. HULL and I. M. FOSTER (U.S.P. 1,683,094, 4.9.28. Appl., 4.10.26).—The fuel material is mixed with molasses, the water is expelled by drying, and, after cooling and briquetting, the molasses is carbonised by baking the briquettes. C. O. HARVEY.

Treatment and formation of artificial fuels. H. E. WETHERBEE, Assr. to R. F. GRANT and H. M. HANNA (U.S.P. 1,683,061, 4.9.28. Appl., 1.10.25).—Moistened anthracite etc., of small irregular size, is treated with a filming oil to displace the water, and is then dried to effect coalescence of the particles. F. G. CLARKE.

Dehydration of moist fuel. I. G. FARBENIND A.-G. (B.P. 274,858, 18.7.27. Ger., 21.7.26).—The moist fuel is heated at above 200° and under a pressure greater than the corresponding vapour pressure of water, so that the latter is separated in liquid form. Solid fuels are mixed with a suitable liquid fuel before treatment. The process is of especial advantage where the dried fuel is to be hydrogenated. A. B. MANNING.

Production of carbon. A. LEDERER (B.P. 274,883, 20.7.27. Austr., 21.7.26).—Two different modifications of carbon are produced by the decomposition of carbon disulphide at 1600—1700° and 1800—1890°, respectively. The former modification (d 1·8) is brittle, hard, and black; the latter (d 2·3) is soft, grey, and of metallic character. The former may be converted into the latter by heating at above 2800°. The second modification is particularly suitable for the filaments of electric lamps; it can be subjected to an electric stress of 150—250 amp./mm.^{2} A. B. Manning.

Apparatus for producing carbon. C. Matlock, Assr. to Monroe-Louisiana Carbon Co. (U.S.P. 1,681,945, 28.8.28. Appl., 11.6.23).—A hydrocarbon gas and air, insufficient for complete combustion, are agitated in a mixing machine before they are passed to burners in a furnace. F. G. Clarke.

Coking retort ovens of the vertical-chamber type. Koppers Co., Assees. of J. van Ackeren (B.P. 281,221, 27.5.27. U.S., 27.11.26).—The heating walls of a vertical-chamber coke oven have groups of vertical heating flues, so arranged that there are upper and lower heating zones each having its own burners with air and fuel-gas supply connexions thereto. Each flue consists of a burner-equipped section in series with a section for conveying hot gases, and the flue groups are disposed in the wall with their burner sections located in different zones from those of their hot gas flow-sections and with substantially all the area of the heating wall composed of zones containing burner sections. Each combustion zone in a heating wall has its own outlet for combustion products. A row of reversible regenerators extends alongside the row of chambers and heating walls. The combustion products from half of the heating walls are led into a common duct and conveyed around the chambers into the other heating walls and thence through the outflow regenerators. A. B. Manning.

Vertical-chamber coke-oven batteries. Koppers Co., Assees. of J. van Ackeren (B.P. 288,558, 27.5.27. U.S., 12.4.27).—The oven structures of a vertical-chamber coke-oven battery are supported on frames which extend between the structures and the battery foundations and are capable of expansion horizontally, relatively to each of those parts. An air-cooling system, with inlets from and outlets to the atmosphere, helps to reduce the temperature of the frames and the under side of the battery. Beam frames extending side by side below the chambers and heating walls have gas-tight joints between contiguous sides, so that no brickwork is exposed on the under side of the battery. The frames and coke extractor may be directly connected.
A. B. Manning.

Rotary retort for the drying and low-temperature carbonisation of brown coal etc. Demag A.-G. (G.P. 448,667, 26.6.20).—The volatile products evolved in both the drying and the carbonisation zones of the retort are removed by suction. The water vapour etc. evolved up to about 100° is withdrawn through a tube, movable along the axis of the retort, by means of a fan, which is synchronised with the fan removing the volatile products from the carbonisation zone. The position of the tube in the retort is so adjusted that only the volatile products from the drying zone and none of the valuable carbonisation gases are withdrawn through it.
A. B. Manning.

Carbonising plant and generator for the production of low-temperature tar. C. Erhard (G.P. 448,535, 3.1.26).—Coals etc. of high water content are carbonised in an apparatus of the type described in G.P. 436,515 (B., 1927, 549), in which the low-pressure steam, which collects in the pressure chamber, is compressed by means of a steam pump into a high-pressure vessel, at the same time being supplied with just sufficient heat to convert it into high-pressure steam of any desired pressure. A. B. Manning.

Apparatus for the distillation of carbonaceous materials. P. M. Salerni, and Metallbank u. Metallurgische Ges. A.-G. (B.P. 296,108, 25.2., 12.4., 29.9., and 6.10.27).—A vertical retort contains a number of superposed annular trays, each provided with stirring devices, which bear on the trays mainly by the action of gravity and are so mounted that they are free to move to allow for any distortion which may occur. These stirrers, which are loosely connected to, and are actuated by, a rotary structure surrounding the trays, are so arranged that they direct the material from the outer part of each tray towards the inner part, whence it travels back to the outer part and overflows through a gap into the next tray, until finally discharged from the retort. The trays are heated preferably by conduction from a central heating chamber, the parts of the tray surfaces not in contact with the material under treatment being suitably lagged. The retort has a number of outlets at different levels, each provided with a centrifugal separator for the removal of dust from the volatile carbonisation products. A. B. Manning.

Carbonisation and liquefaction of materials of vegetable, animal, or mineral origin. V. Cambon (F.P. 618,888, 21.11.25).—The undried materials are heated with a definite quantity of water in an autoclave, the liquid products are discharged, and the residue is subjected to further pyrogenetic decomposition in the presence of superheated steam. A. B. Manning.

Carburetting processes and apparatus. Soc. Anon. Le Carbone (B.P. 288,588, 25.5.27. Fr., 13.4.27). —A method of carburation for internal-combustion engines using a volatile motor spirit consists in decomposing the spirit, mixed with sufficient air for atomisation, by subjecting it to the action of a heated catalyst, and then passing the treated spirit, mixed with the further quantity of air necessary for combustion, to the engine. The catalyst, which consists of a porous active carbon, is heated by the exhaust gases. The spirit may, if desired, be vaporised by passage through heating tubes before treatment with the catalyst. A. B. Manning.

Continuous production of concentrated acetate liquor from acid vapours from the carbonisation of wood. Ver. f. chem. Ind. A.-G., Assees. of E. Löw (G.P. 448,348, 16.2.26).—A portion of the acid vapours is passed through a solution or suspension of a carbonate or hydroxide, whilst the remainder passes to a condensing plant. The pyroligneous acid condensed in the latter is passed into the absorbing solution.
A. B. Manning.

Water-gas generators for consuming bituminous fuel. Patent Retorts, Ltd., and T. M. Davidson

(B.P. 296,161, 2.7.27).—A retort, superposed on a water-gas generator, is surrounded by a jacket containing chequered brickwork and communicating through suitably placed apertures with the upper end of the generator. The latter and the chequered brickwork are divided into two sections by vertical partition walls. The hot gases leaving the jacket are used to preheat the blast air. During the blow period the preheated air is passed up through both sections of the generator; steam is then admitted below one of the grates, passes up through the corresponding section of the generator, transversely through the material above the generator partition wall, and thence into the opposite section of the jacket. The operation is then reversed. The gas-making period may be concluded by a short down-run, when steam is admitted at the top of the chequered brickwork jacket and passed down through the generator. A. B. Manning.

Generation of [water-]gas. C. W. Botsford, Assr. to W. W. Odell (U.S.P. 1,682,264, 28.8.28. Appl., 30.8.23).—A water-gas generator is provided with air inlet ports midway between the top and bottom of the fuel bed, which during the blow period is air-blasted alternately up and down. The air is then shut off and a straight up-steam run is made, the steam being introduced from beneath the fuel bed and the gas removed from above the fuel bed.

A. B. Manning.

Production of generator gas from bituminous coal with by-product recovery. E. Fleischer (G.P. 448,333, 21.5.24).—The apparatus comprises a gas producer and a retort so connected that the hot gases from the former, containing as little carbon dioxide and steam as possible, pass directly into the latter at a temperature of at least 900°. Uniform distribution of the hot gases in their passage through the material in the retort is ensured by roof-shaped gas distributors. The issuing gases, when freed from their condensation products, may be mixed with the excess generator gas.

A. B. Manning.

Apparatus for utilising the heat evolved in gas generators. Frankfurter Gasges., F. P. Tillmetz, and E. Schumacher (B.P. 285,007, 31.1.28. Ger., 8.2.27).—A generator of the type having water-tubes in the walls of the shaft is provided with ordinary straight drums arranged horizontally above and below, to which the tubes are attached. The water-tubes are given a right-angled bend at top and bottom in such a manner that their expansion gives rise to no strain. The upper and lower drums are connected by appropriate return tubes on the outside of the generator. Vertical drums may be employed in place of the horizontal drums, if desired. A. B. Manning.

Removal and recovery of heavy hydrocarbons from low-temperature gases. Gelsenkirchener Bergwerks-A.-G., and H. Hock (G.P. 447,471, 3.11.22).—The gases are treated, under atmospheric or higher pressures and at the ordinary or lower temperatures, with acetone, or solid or liquid mixtures containing acetone. An apparatus suitable for the purpose is described. A. B. Manning.

Manufacture of asphaltic, bituminous, or tarry emulsions. Soc. Anon. La Trinidad (B.P. 279,026, 13.6.27. Fr., 15.10.26).—Pulverulent or colloidal mineral substances are mixed with asphalt, bitumen, or tar, so as to form a putty, to which is then added a substantially anhydrous emulsifying agent consisting of a soda or potash soap to which 1—8% of commercial olein has been added. To obtain an emulsion the requisite amount of water is added to the molten mixture.

A. B. Manning.

Production of purified montan wax. A. Smelkus (G.P. 447,530 and Addn. G.P. 449,297, [A] 6.11.23, [B] 7.10.25).—(A) The bituminous brown coal, preferably with the addition of a suitable decolorising agent, is extracted with a solvent, *e.g.*, an aliphatic alcohol or ester, which does not appreciably dissolve any of the oxy-acids present in the coal. The material may be treated during extraction, or subsequently, with nascent hydrogen. (B) Activated charcoal may be used as the decolorising agent. A. B. Manning.

Oil-cracking still. W. T. and J. W. Hancock (U.S.P. 1,680,541, 14.8.28. Appl., 20.9.26).—A rotatable shaft is suitably mounted in an inclined still tube. A number of discs are set rigidly on the shaft, lying in parallel planes and making acute angles with the shaft. Between each pair of discs is set a pair of ball-carrying plates, the plates of each pair being at opposite sides of the shaft. The inner edges of the plates are spaced from the shaft, whereas their outer edges and the peripheries of the discs are slightly spaced from the tube walls. Free balls are located in the spaces between adjacent discs and at opposite sides of the pairs of plates.

W. S. Norris.

Conversion of high-boiling into low-boiling hydrocarbons. Carburol A.-G. (G.P. 447,755, 2.5.23).—The heavy oil is passed under pressure through a heated tube at a speed of over 1 m./sec. The apparatus is so arranged that the oil, after reaching the most favourable reaction temperature, lying between 400° and 450°, is maintained at that temperature under a pressure of 20 atm. and at the same speed of passage through the tube for 30—80 sec. It is then suddenly permitted to expand. A. B. Manning.

Manufacture of liquid hydrocarbons of low b.p. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 296,034, 22.2.27).—Carbonaceous materials, atomised in a current of superheated steam, are passed through pipes heated to at least red heat, and the resulting gases, containing a high proportion of olefines, are converted into liquid hydrocarbons of low b.p. by the further action of heat, with or without the aid of high pressures or catalysts, and in the absence of materials, *e.g.*, iron or nickel, which give rise to the separation of carbon.

A. B. Manning.

Production of liquid and gaseous hydrocarbons of low b.p. from mineral and other oils, tars, etc. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 295,974, 21.4.27. Cf. B.P. 294,557; B., 1928, 738).—The material is decomposed by means of a device, *e.g.*, a nickel–chromium rod, which is immersed in the liquid and heated, preferably electrically, to at least red heat, and at the same time is continuously or intermittently subjected to a blast of steam or hydrogen etc.

A. B. Manning.

Manufacture of low b.p. oils by cracking mineral oils, tars, etc. I. G. Farbenind. A.-G. (B.P. 272,483, 26.5.27. Ger., 11.6.26).—Oils are cracked by electrically heated bodies, which are submerged in the liquid and kept in motion therein. The process may be carried out in the presence of hydrogen or other gases, and under any convenient pressure. Any carbon which is formed becomes suspended in the liquid and is removed subsequently by filtration. The heating bodies and containing vessels are preferably constructed of materials which, in contact with the oil, do not become charged with electricity of opposite sign to that on the carbon particles. A. B. Manning.

Treatment of hydrocarbons. Hydrocarbures et Dérivés (F.P. 618,896, 24.11.25).—A mixture of hydrocarbons is refluxed at 150° with 7—12% of a solid catalyst for about 2 hrs. A. B. Manning.

Distillation of petroleum. E. W. Isom, Assr. to Sinclair Refining Co. (U.S.P. 1,683,135, 4.9.28. Appl., 6.5.24).—Substantially less than a normal charge of oil is introduced into the still and the lighter fractions are withdrawn by way of a refluxing tower down which flows a supply of the crude oil. When the still is full the charge is distilled direct without refluxing.
C. O. Harvey.

Liquid-phase purification of distillates. T. G. Delbridge and J. B. Hill, Assrs. to Atlantic Refining Co. (U.S.P. 1,682,603, 28.8.28. Appl., 28.6.26).—The condensates from the fractionation of cracked petroleum distillates are brought into contact with fuller's earth at a temperature above their b.p. but under a pressure high enough to maintain them in the liquid state. The products are distilled to separate the lower-boiling fractions from those containing the polymerised oils. The latter may be used as reflux liquid in the fractionation of the distillates. A. B. Manning.

Distillation of oil from oil shale. H. B. Kipper (U.S.P. 1,682,287, 28.8.28. Appl., 2.8.23).—The finely-ground shale is distilled by the passage of a current of hot gases through the mass, which at the same time is mixed and further subdivided by means of a suitable stirring arrangement. A. B. Manning.

Treatment [cracking] of [hydrocarbon] oils. H. C. Kirk (U.S.P. 1,676,230, 3.7.28. Appl., 8.12.27).—Carbonisation is avoided by maintaining circulation of the oil by means of streams of oil suitably directed, *e.g.*, alternately upward and downward, the oil mass being carried forward or reversed in direction by a succeeding stream before it has lost the movement imparted by the preceding stream. C. Hollins.

Hydrogenation of cracked hydrocarbon oils. H. Rostin (F.P. 603,101, 10.7.25).—The oils are heated with hydrogen prepared by the passage of hydrogen sulphide over silver, which is preferably precipitated in a finely-divided form on asbestos or pumice. The silver sulphide produced is readily reduced again by any gas mixture rich in hydrogen. Treatment of the oils with nascent hydrogen in this manner hydrogenates the unsaturated constituents, converting them into stable oils. A. B. Manning.

Prevention of the colouring [and gumming] of hydrocarbon oils. J. Tausz (G.P. 447,557, 17.7.23).—Hydrocarbon oil distillates stable to light and air are obtained by adding to the oils, freed as far as possible from ammonia and amino-compounds, a small quantity of a substance which in an alkaline medium reacts with the oxygen of the air, *e.g.*, hydroxy- or dihydroxy benzene, and/or a small quantity of an acid, *e.g.*, benzoic or stearic acid. A. B. Manning.

Refining of [hydrocarbon] oils. L. Burgess, Assr. to Standard Oil Development Co. (U.S.P. 1,681,895, 21.8.28. Appl., 13.7.23).—The oil is repeatedly washed with 5—10% of fuming sulphuric acid, and, after each washing and separation, is treated with caustic soda and an aliphatic monohydric alcohol to remove the sulphur compounds produced.
F. G. Clarke.

Treatment of lead sludge [from gasoline purification]. J. B. Hill, Assr. to Atlantic Refining Co. (U.S.P. 1,682,562, 28.8.28. Appl., 17.3.26).—The sludge, separated from the spent aqueous sodium plumbite and dried, is roasted under oxidising conditions to remove sulphur dioxide. It is then dissolved in caustic soda and mixed with the separated spent liquor, for re-use in the purification process. F. G. Clarke.

Production of high-viscosity lubricating oil and high-grade asphalt from petroleum. A. E. Pew, jun., Assr. to Sun Oil Co. (U.S.P. 1,675,462, 3.7.28. Appl., 22.12.26).—Residues of petroleum which has been distilled under non-cracking conditions at low pressure are made to flow in a shallow stream agitated by injection of gas-oil vapours and heated by currents of mercury vapour in tubes wholly immersed in the liquid, which is under highest vacuum obtainable. An extremely viscous lubricating oil and the gas oil are separately condensed, leaving an asphalt containing little insoluble matter. C. Hollins.

Lubricating oils. T. H. Sanders (B.P. 297,201, 19.8.27).—To overcome "stickiness" of cold lubricating oils when used in internal-combustion engines, over 1% by vol. of an organic ester of low viscosity (amyl acetate, butyl lactate) is added. F. G. Crosse.

Apparatus for carbonisation and distillation of wood. R. Malbay (U.S.P. 1,684,875, 18.9.28. Appl., 21.4.25. Fr., 5.5.24).—See B.P. 233,335; B., 1925, 700.

Dehydration and distillation of tars or oils. D. Rider, Assr. to Thermal Industrial & Chemical (T.I.C.) Res. Co., Ltd. (U.S.P. 1,685,034, 18.9.28. Appl., 28.2.24. U.K., 10.4.23).—See B.P. 221,528; B., 1924, 934.

Plant for washing coal or other mineral substances. E. Hodeige (B.P. 297,007, 9.6.27).

Apparatus for combustion of pulverulent or powdered fuel. J. J. C. Brand and B. Laing (B.P. 297,240, 11.11.27).

Maintaining the temperature of [fuel] oil within predetermined limits. J. J. Kermode (B.P. 296,689, 2.5.27).

Apparatus for use in extinguishing burning oil in tanks. Asiatic Petroleum Co., Ltd., and A. H. Parker (B.P. 296,740, 7.6.27).

Lead tetra-alkyl (B.P. 283,913).—See VII. **Tiles etc.** (B.P. 296,626).—See IX. **Filtering material** (U.S.P. 1,676,151).—See XXIII.

III.—ORGANIC INTERMEDIATES.

[Separation of the] phenols of coal tar. H. Brückner (Z. angew. Chem., 1928, **41**, 1043—1046, 1062—1066).—The separation of the higher phenols from the crude cresol fraction of coal tar (b.p. $<$ 180°) is best effected by fractional hydrolysis of their sulphonic acids. The mixture is first fractionally distilled, collecting separately the fractions at every 5° between 175° and 215°, fractions above 200° being repeatedly fractionated. Every fraction is then separately heated for several hours at 103° with an equal weight of concentrated sulphuric acid whereby the phenols are converted into their sulphonic acids with a yield of 75—80%. Water is added and the mixture gently distilled in steam at 103—104° to remove unchanged phenols; superheated steam is then passed in and the temperature kept at 116—119° until no further *m*-cresol is obtained, it is then raised to 122—126° whereby phenol is obtained, and finally at 133—136° a mixture of *o*- and *p*-cresols is obtained. In the fractions of the original mixture distilling above 200°, steam distillation of the sulphonic acids yields a small quantity of *o*-4-xylenol at 107—110° and of *m*-4-xylenol at 120—124°. From the highest-boiling fractions traces of *m*-5-xylenol can also be isolated. The mixture of *o*- and *p*-cresol obtained as described above is separated by fusing it with finely-powdered sodium hydroxide and monochloroacetic acid to obtain the corresponding cresoxyacetic acids; the sodium salt of the *p*-acid is only slightly soluble whereas that of the *o*-acid is readily soluble in water. The sulphonic acid method may also be used for the fractionation of technical xylenol and is applicable especially to the isolation of the pure *m*-5-compound which alone distils by passing steam through the sulphonic acid mixture at 100°. At 107—111° the *o*-4-isomeride is obtained, at 114—118° a mixture of *o*-3- and *p*-2-, and at 121—125° *m*-4-xylenol. The mixture of *o*-3- and *p*-xylenols is separated by taking advantage of the solubility of the sulphonic acid of the former and the insolubility of that of the latter in 50% sulphuric acid.

A. R. Powell.

See also A., Oct., 1100, **Hydrolysis of saccharin** (Täufel and others). 1101, **Catalysts of acetylation reactions** (Conant and Bramann). 1102, **Electrolytic oxidation of organic substances** (Marie and Lejeune). **Photo-oxidation of organic compounds** (Plotnikov). 1106, **Micro-determination of sulphur in organic compounds** (Kubota and Hanai). 1107, **Micro-determination of carbon, hydrogen, and nitrogen** (Bobrański and Sucharda). 1112, **Catalysts for formation of alcohols from carbon monoxide and hydrogen** (Frolich, Fenske, and Quiggle). 1113, **Tests for methyl alcohol** (Todd). 1117, **Identification of hexamethylenetetramine and formaldehyde** (Ionescu). 1125, **Hydrogenation of nitrobenzene** (Vavon and Crajcinovic). 1127, **Catalytic preparation of alkylanilines** (Roy). **2 : 5 : 6-Trichloro-*m*-4-xylidine and its derivatives** (Bureš and Borgmann). **5-Bromo-*m*-4-xylidine** (Bureš and Mandel-Borgmannová; Wheeler and Thomas). 1149, **Rapid determination of phenol in glycerol** (Denigès). 1155, **Toxic derivatives of methane and ethane** (Haloff). **Determination of benzene** (Gadaskin).

Conductivity of solvents. Keyes and others.—See XI.

Patents.

Dehydration of alcohol etc. W. K. Lewis, Assr. to Standard Oil Development Co. (U.S.P. 1,676,700, 10.7.28. Appl., 16.8.22).—Alcohol is distilled, and the fraction containing over 95—96% of alcohol is redistilled under pressure of 100 lb. or more per sq. in. to remove a constant-boiling mixture and leave anhydrous alcohol.

C. Hollins.

Recovery of concentrated acetic acid from dilute acetic acid. H. Suida (B.P. 296,172, 18.7.27. Addn. to B.P. 230,447; B., 1925, 827).—Dilute acetic acid is superheated to 150—155° in a vaporiser, and the vapour is passed up a column down which is percolating a solvent which is difficultly soluble in water and has a b.p. above that of acetic acid. Suitable solvents are esters of mono- or poly-basic cyclic carboxylic acids (*e.g.*, *n*-butyl or hexyl phthalate). W. G. Carey.

Preparation of derivatives of dibenzanthronyl. K. Zahn and P. Ochwat, Assrs. to Grasselli Dyestuff Corp. (U.S.P. 1,675,014, 26.6.28. Appl., 28.12.26. Ger., 30.12.26).—3-Iodo-2-methoxybenzanthrone, m.p. 248°, is heated in nitrobenzene with copper powder to give 2 : 2′-*dimethoxy*-3 : 3′-*dibenzanthronyl*, m.p. 387—390°, which can be converted by alkaline fusion into a vat dye. (Cf. B.P. 278,047; B., 1927, 903.) C. Hollins.

Production of a new acid and its salts strongly absorbing ultra-violet rays. T. Suzuki and S. Sakurai, Assrs. to Zaidan Hojin Rikagaku Kenkyujo (U.S.P. 1,684,562, 18.9.28. Appl., 11.8.24. Japan, 20.12.23).—See B.P. 242,721; B., 1926, 76.

Manufacture of chlorides of aromatic o-hydroxycarboxylic acids. E. B. Higgins, Assrs. to Brit. Synthetics, Ltd. (U.S.P. 1,684,273, 11.9.28. Appl., 31.3.27. U.K., 20.7.26).—See B.P. 278,463; B., 1927, 903.

Manufacture of perylene. C. H. Marschalk (U.S.P. 1,684,738, 18.9.28. Appl., 1.12.24. Fr., 20.12.23).—See B.P. 226,492; B., 1925, 703.

[Sulphide vat] dye intermediates. F. Ballauf, F. Muth, and A. Schmelzer, Assrs. to Grasselli Dyestuff Corp. (U.S.P. 1,675,478, 3.7.28. Appl., 16.1.25. Ger., 24.1.24).—See B.P. 243,557; B., 1926, 121.

Aqueous dispersions (B.P. 296,685).—See XIV.

IV.—DYESTUFFS.

See also A., Oct., 1137, **Shibuol** (Komatsu and Matsunami).

Patents.

Sulphur dye. L. M. Shafer, Assr. to Tower Manuf. Co., Inc. (U.S.P. 1,675,430, 3.7.28. Appl., 18.1.26).—A mixture of *m*-tolylenediamine, dehydrothio-*p*-toluidine, and *p*-phenylenediamine (or *p*-nitroaniline) is heated with sulphur at 215—240° to give brown to greenish-bronze sulphide dyes. C. Hollins.

Manufacture of a yellow azo dye [for acetate silk]. E. Fischer and C. E. Müller, Assrs. to Grasselli Dyestuff Corp. (U.S.P. 1,684,762, 18.9.28. Appl., 20.4.27. Ger., 3.5.26).—See B.P. 270,352; B., 1928, 8.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Uses of esterified cotton. G. E. L. Hind (J. Soc. Dyers and Col., 1928, **44**, 280—281).—Esterified cotton (cf. B.P. 233,704; B., 1925, 956) in lustred and non-lustred types known as "Crestol" and "Cotopa," respectively, is now commercially available. Esterification occurs throughout the entire cotton fibre and results in considerable swelling and a 20% increase in weight. Esterified cotton resists direct dyes but may be dyed with Artisil dyes (disperse dyes similar to those of the S.R.A. series), so that materials consisting of cotton and esterified cotton may be dyed in two colours by one-bath methods. Crestol has a higher tensile strength than cellulose acetate silk and gains (cellulose acetate silk loses) strength when wetted; it is unaffected by storage at high temperatures (60—70°), whereas cellulose acetate silk acquires a yellowish-brown colour and a harsh handle within a few weeks under similar conditions. Crestol is not affected by hot ironing and does not lose its lustre when boiled in neutral or weak acid solutions; it can be dry-cleaned by the usual solvents. Esterified cotton may be scoured, de-sized, bleached, and mercerised. A. J. Hall.

Esterification of cellulose and cellulose esters. I. Velocity of nitration of cotton fibre. II. Decrease in viscosity of cellulose nitrate with duration of nitration. K. Atsuki and M. Ishiwara (Proc. Imp. Acad. Tokyo, 1928, **4**, 382—385, 386—388).—I. The nitration of cellulose fibre is governed firstly by the rate of diffusion of the mixed acid and secondly by the rate of nitration of the successive hydroxyl groups of the cellulose molecule. The diffusion rate is given by the expression $(a—n) = ae^{-kt^{\frac{1}{2}}}$, where a = % total nitrogen in the most nitrated product, n = % total nitrogen in the product after t min., and k = constant (0·649). The rate of nitration is given by the expression $k = (1-\sqrt{1-m})^2/2t$, where m = the fraction nitrated in t min., and k = constant (0·0291). Diffusion to the centre of a fibre was complete in 25 min., whilst complete nitration was effected in 100 min.

II. The viscosities of cellulose nitrate solutions, in ethyl ether–alcohol mixtures or in acetone, decrease with increasing nitration time, the rate of change being given by the expression $(a-y) = ae^{-kt(c-nt)}$ where a = assumed viscosity at $t = 0$, $(a-y)$ = viscosity after nitration for t min., c and n are constants, and k is a velocity coefficient. The decrease in viscosity is attributed to the depolymerisation of the molecular aggregate of cellulose nitrate during the nitration. A. E. Mitchell.

Transverse sections of artificial silk. II. Changes in section during moistening with water. Y. Kami and S. Nakashima (J. Cellulose Inst., Tokyo, 1928, **4**, 206—209; cf. B., 1927, 438).—The cross-sectional area of filaments of well-known brands of artificial silk increased by 50—60% after soaking in water, whilst the periphery alters but little. The filament tends to regain its original form when first coagulated. Reverse changes occur during drying. A. G. Pollard.

Bleaching of sulphite pulp. R. Bergquist (Papier-Fabr., 1928, **26**, 593—604).—A method for the determination of p_H values of bleaching solutions is described. The effect of changes of reaction in hypochlorite bleaching baths on the nature of the bleached pulp is examined. The mechanism of bleaching is discussed on the basis that chlorination and oxidation occur simultaneously to extents which may be partially controlled through the reaction of the liquor. During bleaching there is a progressive change of reaction toward the alkaline side. Alkaline bleaching favours the production of the whitest pulp. The hypochlorite ion is the chief bleaching agent, free undissociated hypochlorous acid having little bleaching power and chlorine having not only a poor bleaching effect but a definitely injurious action on the cellulose. In alkaline bleaching liquors the hypochlorite ion is preponderant. Analysis of pulps bleached in baths of varying reaction shows that the α-cellulose content, viscosity, and copper number are affected by changes in reaction. Regions of maximum change in these values are similar, increased copper number and α-cellulose content tending to correspond with decreased viscosity and *vice versâ*. Two well-defined maximum ranges occur, one on the alkaline and one on the acid side of neutrality. A. G. Pollard.

See also A., Oct., 1079, **X-Ray observations with cellulose** (Herzog and Jancke). 1109, **Sorption of vapours by fibrous or film materials** (Newsome). 1119, **Carbohydrates from pine wood** (Hägglund and others). **Pectin and hemicellulose of flax** (Henderson). **Soluble pinewood lignin** (Friedrich). 1162, **Cell-wall substances of plants** (Candlin and Schryver). **Cell-wall of wood** (Ritter).

Patents.

Treatment of plant materials in the preparation of fibres. Treatment of fibrous plant tissues. Abbey Synd., Ltd., and D. R. Nanji (B.P. 296,333—4, 29.4.27).—(A) Separation of the individual component fibres of unretted flax, grasses, etc. is effected by heating with a 0·1—0·5% solution of ammonium sulphate at 1—2 atm. for 60—20 min. to render soluble the gums and pectins. After removal of the slimy matter from the fibres by pressure, the depectinised tissue is heated with a 2—4% solution of caustic soda at 6—10 atm. for 20—60 min. and finally bleached. (B) A lustrous fibre is produced from hemp or other similar fibrous material by heating with 1—4% caustic soda solution at 10 atm. for 20—60 min., the material being bleached before or after the treatment. F. R. Ennos.

Production of fibrous thread [from sugar cane]. J. J. de la Roza, Assr. to Bagasse Products Corp. (U.S.P. 1,681,223, 21.8.28. Appl., 22.3.27).—Sugar cane is allowed to ferment so as to generate acids, and the fibrous part of the cane is retted with running water. H. Royal-Dawson.

Washing of textile fabrics. Henkel & Co. G.m.b.H. (B.P. 276,338, 16.8.27. Ger., 17.8.26).—A self-acting detergent effect may be obtained in washing liquors at temperatures below 70° by adding thereto urea and a

urease preparation to promote enzymic decomposition of the urea into ammonia and carbon dioxide.
D. J. Norman.

Protection of wool, skin materials, textiles, etc. against injurious insects. W. Carpmael. From I. G. Farbenind. A.-G. (B.P. 295,742, 18.5.27).—The material is treated with, *e.g.*, 10 times its weight of 0·2% hot or cold aqueous solution of a compound of the type $X(HF)_n$, where X is an organic or alkali salt free from fluorine, or a metal fluoride. Suitable compounds include tripotassium difluorodisulphate, monopotassium monofluorophosphate, and the additive product sodium *p*-toluenesulphonate + 2HF. Organic or inorganic acids or salts may be added to the bath, if desired. (Cf. B.P. 173,536; B., 1922, 138a.) D. J. Norman.

Recovery of cellulose from plants such as beechwood, bamboo, etc. R. Runkel (B.P. 296,547, 24.8.27).—The comminuted raw material is steeped in water or solutions of acid or basic substances, *e.g.*, tin chloride or caustic soda, either at ordinary or elevated temperatures for a suitable time. After removal from the liquid and reduction to the state of fine fibres, the mass impregnated with alkali is chlorinated while suspended in water, centrifuged, and treated with a 0·5—1% solution of caustic soda, the oxidation and chlorination process being repeated until a pure white cellulose is obtained.
F. R. Ennos.

Manufacture of cellulose acetate. G. W. Morden (B.P. 294,415, 25.11.27).—Cellulose is treated with sulphuryl chloride, acetic acid, and acetic anhydride, and acetylation is subsequently completed at below 25° in a mixture of acetic acid, acetic anhydride, and sulphuric acid. Hydrolysis to an acetone-soluble cellulose acetate is carried out in the usual way.
D. J. Norman.

Manufacture of cellulose acetate. E. S. Farrow, jun., Assr. to Eastman Kodak Co. (U.S.P. 1,679,966, 7.8.28. Appl., 5.9.25).—Cellulose is treated with concentrated hydrochloric acid, free from oxidants, at 15° for 2—6 hrs. before acetylation. C. Hollins.

Production of cellulose ester and ether compositions. H. J. Hands, and Spicers, Ltd. (B.P. 294,008, 27.8.27).—Mixtures of diphenyl monocresyl phosphate and phenyl dicresyl phosphate are used as plasticisers for cellulose ester and ether compositions, the relative proportions of these two compounds being so chosen that the final mixture corresponds, as regards its content of phenyl, cresyl, and phosphoric anhydride, to a mixture containing 45—65% (preferably 55%) of triphenyl phosphate and 55—35% (preferably 45%) of tricresyl phosphate. In this way the reduction of inflammability imparted by triphenyl phosphate and the pliability imparted by tricresyl phosphate may be obtained, without the disadvantages arising from the tendency of the former to crystallise out and the latter to give a greasy character to the film. D. J. Norman.

Cellulose ester composition. R. L. Kramer, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,676,612, 10.7.28. Appl., 6.9.24).—As softeners for cellulose nitrate especially in the manufacture of artificial leather there are claimed β-aryloxyethyl phthalates or laurates. β-*Phenoxyethyl phthalate*, β-o-(m- or p-)-*toloxyethyl phthalate*, and β-o-(m- or p-)*toloxyethyl laurate*, m.p. —1°, are described. C. Hollins.

Reducing the viscosity of cellulose ethers and products thereof. C. U. Prachel and L. E. Branchen, Assrs. to Eastman Kodak Co. (U.S.P. 1,679,943, 7.8.28. Appl., 21.12.25).—A cellulose ether is treated with sludge acid until the viscosity is reduced by at least one third.
C. Hollins.

Production of foils, films, bands, etc. from viscose and similar cellulose solutions. Wolff & Co., E. Czapek, and R. Weingand (B.P. 277,309, 12.8.27. Ger., 13.9.26).—In the manufacture of films by extruding viscose solution on to, *e.g.*, a rotating drum half immersed in a coagulating bath, there occurs a small interval of time during which the surface of the drum covered by the coagulated film becomes quite dry. If, therefore, the film is removed during this interval the surface of the drum remains clean and free from adhering fragments of viscose. The factors influencing the time which elapses between the application of the film to the drum and the point at which the surface of the drum becomes dry are adjusted so that the required time interval occurs when, *e.g.*, the drum has made about three quarters of a revolution starting from the point of application of the viscose solution. D. J. Norman.

Production of cellulose membranes, bands, and films. O. Sindl (B.P. 284,725, 4.2.28. Ger., 5.2.27).—Immediately below the slit nozzle through which the viscose solution flows is placed a second slit nozzle through which the coagulant is delivered down an inclined surface into the coagulating bath. In this way the viscose film floats down to the bath on a thin film of coagulant, whereby the underside of the film becomes coagulated while the upper part is still sufficiently fluid to permit the gases evolved to escape freely.
D. J. Norman.

Manufacture of artificial materials from viscose. L. Lilienfeld (B.P. 264,161, 5.1.27. Austr., 5.1.26).—Viscose silk of high strength both in the wet and dry state is obtained if, after coagulation in an acid bath of the ordinary type, the filaments are led into a second bath containing one or more strong mineral acids, *e.g.*, sulphuric acid of 50—85% strength (preferably at least 65%), optionally containing suitable organic or inorganic substances such as glucose, sodium bisulphate, etc. The temperature of the strong acid bath may be between — 10° and 40°, and the length of travel of the filaments may be 3—60 cm. or up to 2 m. The strength of the filaments is improved if additional stretch is applied to them in one or other of the baths or during their travel to the collecting device. Unmatured or but slightly matured viscose in the preparation of which 75—150% of carbon disulphide on the weight of cellulose has been used is particularly suitable.
D. J. Norman.

Manufacture of artificial filaments, threads, etc. Courtaulds, Ltd., H. J. Hegan, and E. Hazeley (B.P. 294,279, 21.4.27).—The annular cake of artificial filaments produced by box-spinning processes is more easily washed (or otherwise treated) centrifugally if a layer of pervious cloth, a wire gauze, or similar device

is interposed between the cake and the bottom of the box, so that the treating liquor can pass between them.
D. J. Norman.

Treatment of fabrics or articles containing fibres or threads of organic derivatives of cellulose. Brit. Celanese, Ltd. (B.P. 274,074, 1.7.27. U.S., 8.7.26).—Ordinary carbonisation processes can be applied for the removal of vegetable fibres (including regenerated cellulose silks) from mixed fabrics containing them in association with fibres derived from cellulose esters or ethers without impairing the dyeing or dye-resisting properties of the cellulose derivative or seriously reducing its lustre. Delustreing may, moreover, be entirely prevented by adding sodium sulphate to the carbonising bath, in quantity depending on the duration of treatment. D. J. Norman.

Supports made of cellulose derivatives for use in the manufacture of sheets of material soluble in organic solvents. I. G. Farbenind. A.-G. (B.P. 279,047, 8.9.27. Ger., 16.10.26).—The support is made of a layer of a cellulose derivative the surface of which has been so treated, *e.g.*, hydrolysed, that it consists wholly or partly of regenerated cellulose, and is therefore unaffected by organic solvents. D. J. Norman.

Manufacture of cardboard. G. E. Heyl, and Hycolite Liquid Wallpaper Manuf. Co., Ltd. (B.P. 294,442, 26.1.28).—Fibrous pulp or waste paper is finely comminuted in a dry condition in a high-speed disintegrator, and the resulting powder is mixed with 30—50% of water and 4—8% of a binder such as dextrin. This paste is then beaten in a colloid mill and formed into sheets. D. J. Norman.

Manufacture of cellulose derivatives. L. Lilienfeld (U.S.P. 1,680,224, 7.8.28. Appl., 22.5.26. Austr., 30.5.25).—See B.P. 252,654 ; B., 1926, 1009.

Cellulose ether and process of making same. L. Lilienfeld (U.S.P. 1,683,831, 11.9.28. Appl., 16.6.23. Austr., 13.7.22).—See B.P. 200,834 ; B., 1925, 202.

Preparation of cellulose ethers and alkali cellulose. L. Lilienfeld (U.S.P. 1,683,681, 11.9.28. Appl., 16.6.23. Austr., 13.7.22).—See B.P. 200,827 ; B., 1925, 67.

Preparation of alkali cellulose and cellulose ethers. L. Lilienfeld (U.S.P. 1,683,682, 11.9.28. Appl., 16.6.23. Austr., 13.7.22. Renewed 5.4.27.).—See B.P. 200,816 ; B., 1925, 67.

Apparatus [measuring pumps] for use in the manufacture of artificial silk or other operations in which liquids are supplied under pressure. Brit. Celanese, Ltd., and E. Kinsella (B.P. 293,325, 23.12.26 and 22.10.27).

[Twisting and winding threads in] manufacture of artificial silk or like threads and apparatus therefor. Brit. Celanese, Ltd., and S. A. Welch (B.P. 293,371, 4.4.27).

Cellulose waste liquors (B.P. 269,909).—See VII. **Treatment of cellulose films** (B.P. 281,663).—See XI. **Mixed lacquers etc.** (B.P. 296,796).—See XIII.

VI.—BLEACHING ; DYEING ; PRINTING ; FINISHING.

Influence of anions of mordants on the shade of Alizarin Red lake. P. P. Victorov (Rev. gén. Mat. col., 1928, **32**, 253—260).—An Alizarin Red printing paste to which iron salts have been added gives the best results in presence of a reducing agent (sodium hyposulphite) and the worst if an oxidant (potassium chlorate) is present. This is due to the solubility of the ferrous lake and the non-formation of the insoluble ferric lake in presence of reducing agents. Addition of thiocyanate protects the lake from iron contamination, but is ineffective when iron salts are added. For brightness and depth of shade a slow hydrolysis of the mordant salt is desirable ; mordant salts of acids which are volatilised during steaming are too rapidly hydrolysed. Mordant formates, however, in spite of this give good results on account of the reducing power of formic acid. The influence of the anion of mordant salts is thus complicated by the reducing effect and the rate of hydrolysis.
C. Hollins.

Production of Thioindigo Scarlet on the fibre. M. Baumann (Sealed Note No. 1955, 24.11.09. Bull. Soc. Ind. Mulhouse, 1928, **94**, 372—373). Report by Battegay and J. Schmid (*Ibid.*, 374).—Cotton and other fabrics may be dyed with Thioindigo Scarlet by padding with an alkaline solution containing phenylthioglycine-*o*-carboxylic acid and isatin bisulphite and steaming, whereby condensation and oxidation of these intermediates occurs. Phenylthioglycine-*o*-carboxylic acid is preferred to thioindoxyl since it is soluble in borax, whereas the last-named substance requires sodium carbonate for its dissolution, and premature formation of Thioindigo Scarlet occurs in the padding liquor when sodium carbonate is present ; the bisulphite compound of isatin is used instead of isatin for the same reason. Fabric may be dyed satisfactorily in pale pink to deep scarlet shades by padding with a liquor containing 10 g. of phenylthioglycine-*o*-carboxylic acid, 30 g. of borax, 2·8 g. of sodium carbonate, 10 g. of isatin, and 16 g. of sodium bisulphite per litre, then drying (a pink colour is thereby developed), steaming for about 5 min., and washing in a hot 1% solution of sodium carbonate for completion of the condensation. White and coloured reserves may be obtained by means of resist pastes containing a stable form of sodium hyposulphite, *e.g.*, Rongalite. Battegay and Schmid draw attention to similar processes described in G.P. 184,956 of 1905 and 229,369 of 1909 (cf. F.P. 407,226 ; B., 1910, 482).
A. J. Hall.

Action of light on cotton dyed with vat dyes. F. Scholefield and C. K. Patel (J. Soc. Dyers and Col., 1928, **44**, 268—274).—Cotton and viscose silk materials dyed with one of a large number of yellow and orange vat dyes (Indanthrene Yellow G and Alizanthrene Yellow 6R excepted) and exposed to light and air immediately after dyeing and while the vat dye is in its leuco-condition, become tendered by oxidation ; the dye itself may also be simultaneously oxidised with consequent partial or complete decolorisation, or if a second dye is present (especially Ciba Blue 2B) this may be oxidised in preference to the cotton or first dye. These effects are also produced when the dyed fabric is oxidised in the dark before exposure to light (sunlight or light from a Fadeometer), but are not produced if again washed before exposure; tendering occurs if the washed fabric is further impregnated with a dilute solution of caustic soda containing sodium hyposulphite or hydrogen peroxide and then exposed to light and air. By means of the starch–iodide test it was shown that an active oxidising agent (probably hydrogen peroxide) was formed during the oxidation of cotton dyed with Cibanone Yellow R. Certain direct dyes, including Diamine Fast Yellow and Chlorazol Fast Orange R, behave similarly to vat dyes in promoting tendering. The tendering of cotton when so exposed is rapid and may be serious in large-scale dyeing. *E.g.*, cotton fabric lifted successively 5 times (10 min. exposure each time) from the dye liquor and exposed to light and air while being dyed with 20% Cibanone Orange R paste had copper numbers of 0·2 (original fabric), 0·3 (dyed fabric not exposed), 0·7, 1·3, 1·5, 1·7, and 1·75 (after five successive exposures). Viscose silk is particularly susceptible to tendering if exposed during dyeing with Cibanone Orange R. The destructive action of sunlight is not appreciably affected by transmission through plate glass ¼ in. thick or didymium glass opaque to yellow light. A. J. Hall.

Azoic [Naphthol AS] colours on wool. S. C. Turner (J. Soc. Dyers and Col., 1928, **44**, 276—280; cf. Rath, B., 1928, 638).—Naphthols of the Naphthol AS series are substantive to wool and may be applied without deleterious effect to this fibre from solutions the temperature and alkalinity of which do not exceed 50° and 1·25 g./litre of caustic soda, respectively. The presence of sodium chloride in the naphthol solution diminishes the harmful effect of the caustic soda on wool and increases the absorption of the naphthol by wool, but it tends to salt out the naphthol, particularly with Naphthols AS-SW, AS-BR, and AS-BS, though less with Naphthols AS-G, AS-RL, and AS-D; it is suitable to use 60—80% (on the wool) of sodium chloride. The presence of sodium chloride in the naphthol solution particularly assists the absorption by wool of Naphthols AS-BR, AS-TR, andAS-G. Leonil S can replace soluble oils used in preparing Naphthol AS solutions and allows a considerable reduction in the amount of caustic soda used; it diminishes the susceptibility of such solutions to salting-out. Wool exerts its maximum affinity for Naphthols AS-SW, AS-BO, AS-G, and AS-BS at 30°; for Naphthols AS-D, AS, AS-BG, and AS-RL at 40°; and for Naphthols AS-TR, AS-BR, and AS-OL at above 50°; the tone of the resulting dyeings changes with a rise of temperature in the case of the three last-named naphthols. The rate of absorption of naphthols by wool is very rapid during the first 20 min.; the most satisfactory durations for naphtholating for deep and pale shades are 30 and 45 min., respectively. Naphtholated wool can be partially stripped by soaping, but not by washing with water. Diazo compounds stain wool brown during development unless a 1% excess of acetic acid is added to the diazo solution; the stain on damaged fibres is proportional to the degree of damage. It is essential that naphtholated wool should be completely developed by the diazo compound, since naphthols on wool readily become brown by exposure to light. The fastness to rubbing and light of azoic dyes on wool is respectively greater than and equal to that on cotton. A. J. Hall.

Novel [colour] effects on half-silk materials. P. Dosne (Sealed Note No. 1386, 4.4.03. Bull. Soc. Ind. Mulhouse, 1928, **94**, 358). Report by L. Paulus (*Ibid.*, 358—359).—Coloured textiles such as imitation "homespuns" are obtained from yarns manufactured by spinning together cotton and waste silk and then dyeing with dyes (*e.g.*, sulphur dyes) having an affinity for only one type of fibre. A. J. Hall.

Dyeing of [cellulose] acetate silk. V. Kartaschov and G. Farine (Helv. Chim. Acta, 1928, **11**, 813—836; cf. B., 1926, 49, 188).—A detailed study has been made of the dyeing of cellulose acetate silk (Celanese) by 15 water-insoluble anthraquinone derivatives. Determinations of the solubilities of these compounds in absolute alcohol show that the most soluble derivatives contain either a nuclear methyl group or a methylamino-group. The diaminoanthraquinones are more soluble than either the mono- or tetra-amino-derivatives, whilst the introduction of a hydroxyl group causes a slight diminution in the solubility. The solubilities of the dyes in the Celanese were determined by treating the material with an aqueous suspension of the dye at 60°, washing out the superficial colouring matter, and dissolving the dyed silk in acetone. During this process superficial crystallisation of the dyestuff on the fibre takes place followed by dissolution. The solubilities are independent of the concentration of the suspension and the size of the particles, and are analogous to those in alcohol. Determinations of the partition ratios of the dyestuff, silk, and alcohol show that for varying amounts of silk the values are the same for each dyestuff. These results indicate that the molecular changes in the colouring matters (association or polymerisation) are the same in both solvents, and also that adsorption does not occur. H. Burton.

Coloured reserves under sulphur dyes [by printing]. L. Goubyrin (Sealed Note No. 1933, 28.9.09. Bull. Soc. Ind. Mulhouse, 1928, **94**, 367—370; cf. B., 1928, 479). Report by V. Schwartz (*Ibid.*, 370—371).—Basic and insoluble azo coloured reserves under sulphur colours may be obtained simultaneously by reason of the fact that, during steaming, the formaldehyde compound of β-naphthol reacts with resorcinol in the presence of zinc chloride thereby yielding free β-naphthol capable of coupling with a diazo compound and a condensation product of resorcinol and formaldehyde capable of fixing basic dyes satisfactorily. Schwartz reports favourably on the process, the basic dyes fixed on the naphthol–formaldehyde mordant being fast to washing. A. J. Hall.

Esterified fibre. Victorov. **Bleaching sulphite pulp.** Bergquist.—See V.

Patents.

Preparation of effect threads. Chem. Fabr. vorm. Sandoz (B.P. 280,493, 12.5.27. Ger., 13.11.26).—Effect threads resistant to substantive dyes may be obtained by acetylating cellulose in any form in a mixture the activity of which has been so moderated, by adjustment of the quantity of catalyst and the temperature, that the cellulose is converted direct into mono- and di-acetates whilst retaining the original form, strength, and elasticity of the original material. A suitable acetylating mixture per kg. of cotton contains 3 kg. of acetic anhydride, 5 kg. of glacial acetic acid, and 2·5 g. of sulphuric acid. The reaction is allowed to proceed at 15°, and after two days a dye test is made to ascertain if acetylation has proceeded sufficiently far to render the fibre completely resistant to substantive dyes. D. J. Norman.

Phosphate reducer for bottom chrome dyeing. N. Neville, Assr. to Federal Phosphorus Co. (U.S.P. 1,675,459, 3.7.28. Appl., 29.10.24).—Sodium hydrogen pyrophosphate, with or without sodium hydrogen sulphate, is added to the dichromate bath in place of lactic acid or other assistant. Brighter dyeings are claimed. C. Hollins.

Process and apparatus [with submerged burner] for dyeing or washing articles of clothing, fabrics, etc. C. F. Hammond and W. Shackleton (B.P. 296,525, 13.4.27).

Colouring of rubber etc. (B.P. 296,461).—See XIV.
Dyeing of leather (F.P. 618,667).—See XV.

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

Wet process for working-up of phosphorites. S. I. Wolfkovitch and V. P. Kamzolkin (J. Chem. Ind., Moscow, 1928, 5, 474—480).—Phosphorite meal is treated with a mixture of sulphuric acid and ammonium sulphate, and the residue, containing 45—70% of calcium sulphate, is treated with ammonia and carbon dioxide, to form ammonium sulphate and calcium carbonate. The latter again is treated with oxides of nitrogen to yield calcium nitrate. No waste products are formed, both the ammonium phosphate and the calcium nitrate obtained being useful final products, whilst no basic material is lost. R. Truszkowski.

Reduction of barium carbonate by aluminium. E. F. Linhorst and H. Schlundt (Amer. Electrochem. Soc., Sept., 1928. Advance copy. 4 pp.).—On heating a finely-divided mixture of barium carbonate and aluminium in the molar proportion of 1 : 2 to about 400° a vigorous reaction occurs and the temperature rises to about 1400°. The product is a hard grey mass consisting of barium aluminate with small amounts of barium and aluminium carbides. With a much smaller proportion of aluminium the reaction was incomplete, and with coarser-grained aluminium powder no reduction occurred even when the mixture was heated to relatively high temperatures. H. J. T. Ellingham.

Electrometric titration of hypochlorite and hypochlorite-carbonate mixtures. A. Rius and V. Arnal (Amer. Electrochem. Soc., Sept., 1928. Advance copy. 8 pp.).—Electrometric titration of chlorine water with 0·1*N*-sodium hydroxide gives a point of inflexion on the titration curve corresponding with the formation of sodium chloride and hypochlorous acid, and another point of inflexion when the latter is converted into sodium hypochlorite. The platinum electrode which is immersed in the solution acts as a chlorine electrode. In a similar titration of a solution of sodium hypochlorite and carbonate with a 0·1*N*-hydrogen peroxide, 0·1*N*-sulphuric acid solution points of influxion were obtained corresponding with (*a*) neutralisation of free sodium hydroxide and half of the carbonate and (*b*) neutralisation of all the carbonate, whilst there is a sharp fall in potential when the hypochlorite is completely converted into chloride. Better values for hydroxide and carbonate were obtained by titrating with a solution containing a larger proportion of hydrogen peroxide so that the hypochlorite is decomposed while the solution is still alkaline and the sharp fall in potential thus precedes the points of inflexion. H. J. T. Ellingham.

Determination of small quantities of carbon monoxide and methane in mixtures of nitrogen and hydrogen. K. Keller and W. Klempt (Ber. Ges. Kohlentechn., 1927, 2, 246—249; Chem. Zentr., 1927, II, 2253—2254).—The gas mixture is passed successively through a porcelain tube containing copper oxide at 500—520° whereby hydrogen and carbon monoxide are oxidised, through carbon dioxide absorption apparatus containing barium hydroxide solution (1 c.c. $\equiv$ 1 c.c. CO_2 at 20° and 760 mm.), through a copper oxide tube at 850° to oxidise the methane, through a second carbon dioxide absorption apparatus, and into a burette in which the nitrogen is collected and measured over water. L. A. Coles.

Recovery of bromine from iron bromide. P. Höfer (Kali, 1927, 21, 222—224; Chem. Zentr., 1927, II, 2093).—95% of the bromine in commercial iron bromide, Fe_3Br_8, can be recovered by heating in a current of air. The ferric bromide is decomposed at 180° into bromine and iron oxide, and similar decomposition of the ferrous bromide begins at 310°. About 3·1% of hydrogen bromide is also formed. L. A. Coles.

See also A., Oct., 1090, **Silver hydrosols** (Voigt). **Colloidal gold solutions** (von Weimarn). 1095, **Decomposition of alkaline-earth sulphates** (Zawadski and others). **Dehydration of hydrated salts** (Rakuzin). 1099, **Decomposition of nitrogen pentoxide** (Sprenger). **Kinetics of nitrous acid** (Abel and others). 1101, **Electrolytic preparation of cuprous oxide** (Abel and Redlich). 1103, **Effect of alkalinity on basic cupric sulphates** (Nelson). **Basic magnesium carbonate** (Nishimura). **Calcium nitride** (Dutoit and Schnorf). 1104, **Hydrated tricalcium aluminate** (Travers and Sehnoutka). **Denigès' phospho-cœruleomolybdenum compound** (Verda). **Uranyl sulphate** (Colani). 1105, **Analysis by sedimentation** (Arrhenius and Riehm). 1106, **Detection of sulphide and thiosulphate** (Feigl). 1107, **Microdetermination of sulphuric acid** (Yamazaki). **Determination of persulphate** (Schwicker). **Detection of phosphate in presence of arsenate and molybdate** (Feigl and Krumholz). **Indophenol reaction in inorganic chemistry** (Stiepovich and Sà). 1108, **Determination of salts in solution** (Boutaric and Perreau). **Micro-determination of calcium** (Rogozinski). **Detection of magnesium in** rocks (FEIGL). **Colour reactions for magnesium** (BARNES). **Colorimetric determination of iron** (VAN DER VLUGT). 1009, **Photo-electric spectrophotometric analysis** (VON HALBAN and ZIMPELMANN). **Potentiometric determination of iron, copper, and arsenic** (ZINTL and SCHLOFFER). **Determination of bismuth** (PINKUS and DERNIES).

Alloys etc. for nitric acid industry. WAESER.—See X. **Hydrogen generator.** GARDINER and HULETT.—See XI. **Saltpetre and sodium nitrite as pickling agents.** RIESS and others.—See XIX. **Chlorine water.** MIKÓ.—See XX.

PATENTS.

Manufacture of nitric acid. W. R. ORMANDY (B.P. 296,121, 25.5.27).—Oil or other fuel is burnt in a flame submerged in water in presence of a catalyst consisting of a compound of a metal capable of forming a number of oxides, *e.g.*, nickel, vanadium, chromium, etc. Methods of introducing the catalyst into the oil, the flame, or the combustion air are described.
W. G. CAREY.

Production of phosphoric acid. H. MEHNER (Swiss P. 120,510, 21.7.25).—The mixture of phosphorus and carbon monoxide obtained by heating phosphates with coke and silica is burnt immediately it leaves the reaction zone, and phosphorus pentoxide is recovered from the products of combustion.
L. A. COLES.

Manufacture of hydrogen cyanide from formamide. P. LA F. MAGILL and P. J. CARLISLE, Assrs. to ROESSLER & HASSLACHER CHEM. CO. (U.S.P. 1,675,366, 3.7.28. Appl., 14.1.27).—Formamide vapour is passed rapidly through brass tubes (diam. not more than 1 in.) immersed in a bath at 450—650°.
C. HOLLINS.

Manufacture of materials containing iron oxide and of paint therefrom. F. RIVERS (B.P. 296,598, 17.11.27).—A product containing iron oxide, silica, and magnesia is made from clay containing at least 25% of iron oxide, the clay being balled into lumps, burned for 12 hrs., crushed, and screened. The material is then incorporated with linseed oil and turpentine to form paint. W. G. CAREY.

Production of alumina. M. BUCHNER (B.P. 283,117, 3.1.28. Ger., 3.1.27).—Aluminiferous material, *e.g.*, clay, is heated for several hours at 80—100° with a deficiency of nitric acid to form basic aluminium nitrate, the solution is concentrated by partial evaporation, cooled to 0° to crystallise the basic nitrate, and the product heated *in vacuo* with water or steam. W. G. CAREY.

[Continuous] production of red lead. E. HAYWARD (B.P. 295,975, 22.2.27).—Granular or finely-divided lead, lead carbonate, or massicot is heated at 450—500° and under 20—30 atm. in a reaction chamber provided with intermediate chambers and automatic valves for introducing and discharging material without loss of air pressure, and with means for conveying the material through the chamber; air and/or oxygen is circulated under pressure through the chamber in counter-current to the material. The air–oxygen mixture after use is re-circulated with the addition of fresh air or oxygen. W. G. CAREY.

Production of sodium sulphide from sodium hydrosulphide. P. KIRCHEISEN (G.P. 449,282, 25.12.26).—Sodium hydrosulphide solution is treated with carbon dioxide until it contains 1 mol. of sodium carbonate per 2 mols. of sodium hydrosulphide, and is then treated with lime to yield calcium carbonate and sodium sulphide. L. A. COLES.

Production of porous sodium sulphide readily soluble in water. B. ROOS & CO. (G.P. 449,284, 1.8.26).—The reduction process is effected under such conditions that the product is as pure as possible, and, before the reduction is finished, the melt is transferred from the furnace to another vessel in which the reduction is completed. L. A. COLES.

Production of sodium sulphide. I. G. FARBENIND. A.-G., Assees. of A. SCHÄFER (G.P. 449,584, 19.1.26).—Sodium sulphate is reduced to the sulphide by heating with coke in an air-tight furnace provided with a flat, rotating hearth, the materials being charged in continously through a water-cooled device. L. A. COLES.

Production of technically pure alkali hydrosulphides. B. REINHARDT (G.P. 449,283, 22.5.24).—The solution obtained by treating barium hydrosulphide with an alkali chloride and subsequently removing precipitated barium chloride is treated with carbon dioxide or carbonates to precipitate residual barium salts.
L. A. COLES.

Manufacture of solid sodium hydrogen sulphite or sodium sulphite. CHEM. FABR. KALK GES.M.B.H., and H. OEHME (G.P. 446,525, 5.4.25. Addn. to G.P. 440,380; B., 1927, 777).—Sodium hydrogen sulphite solution is neutralised with sodium hydrogen carbonate, and the resulting carbon dioxide is absorbed in sodium carbonate solution. The neutral sulphite solution or suspension is again saturated with sulphur dioxide and the process repeated as often as is necessary to obtain a solid sulphite. A. R. POWELL.

Treating residual liquors accruing from the treatment of cellulose material [using sodium sulphite]. P. A. BARBOU and R. DELVAILLE [SOC. BARBOU & CIE.] (B.P. 269,909, 21.4.27. Fr., 21.4.26).—The waste liquor is agitated with milk of lime at 75° whereupon calcium sulphite is precipitated, leaving a supernatant solution containing caustic soda and a sodium organic salt. The calcium sulphite is separated by decantation and converted into calcium bisulphite by treatment with sulphur dioxide, whilst the decanted liquor is agitated with calcium bisulphite to give an insoluble calcium organo-complex and a mixture of sodium sulphite and bisulphite. After settling, the supernatant liquor is drawn off and treated with sufficient caustic soda to form normal sodium sulphite for use in the treatment of further quantities of cellulosic material. The calcium organo-complex is dry-distilled to recover acetic acid, acetone, etc. D. J. NORMAN.

Utilisation of [production of sodium thiosulphate and carbon disulphide from] trithiocarbonate solutions. SILESIA VER. CHEM. FABR., Assees. of H. KLEIN (G.P. 449,604, 13.10.26).—Solutions containing trithiocarbonates, obtained in the preparation of aromatic substituted thiocarbamides, are treated with sulphur dioxide or a solution of it in concentrated sodium thiosulphate solution. L. A. Coles.

Purification of sodium stannate solution. C. L. Read and B. M. O'Harra, Assrs. to Amer. Smelting & Refining Co. (U.S.P. 1,681,497, 21.8.28. Appl., 3.7.26).—Lead and copper are precipitated by adding sodium sulphide and are removed; antimony, selenium, and tellurium are then precipitated by heating with tin in an oxidisable condition. F. G. Clarke.

Production of ammonium nitrate. Elektrizitätswerk Lonza (F.P. 623,265, 18.10.26. Switz., 23.10.25 and 17.6.26).—Crystalline ammonium nitrate prepared as described in Swiss P. 118,962 (B., 1928, 568) is purified by washing with concentrated ammonium nitrate solution, or manganese is precipitated as its hydroxide before crystallisation. Small quantities of manganese remaining in the mother-liquor are precipitated by intimate treatment with air. L. A. Coles.

Production of ammonium phosphate. S. G. S. Dicker. From Chem. Products Co. (B.P. 297,009, 10.6.27).—Phosphatic rock etc. is treated with ammonium bisulphate solution and the solution, after removal of calcium sulphate, is treated with ammonia to form triammonium phosphate, which is crystallised out, removed, and heated to yield a mixture of mono- and di-ammonium phosphates with liberation of ammonia. The calcium sulphate obtained in the first stage is treated with ammonium carbonate to yield ammonium sulphate and this, together with the ammonium sulphate in the mother-liquor from the crystallisation of the triammonium phosphate, is converted into the bisulphate for re-use by heating or by electrolytic treatment. L. A. Coles.

Manufacture of barium carbonate. Rhenania-Kunheim Ver. Chem. Fabr. A.-G., Assees. of K. Thelen (G.P. 446,863, 24.5.24).—Barytes is reduced to barium sulphide by heating in an atmosphere of carbon monoxide, the product is leached with water, and the solution treated with the carbon dioxide formed in the reduction process. A. R. Powell.

Conversion of barium carbonate into barium oxide. P. Askenasy and R. Rose (G.P. 444,122, 6.3.25. Addn. to G.P. 443,237; B., 1928, 51).—Barium carbonate is heated with an excess of carbon and the excess is removed by passing steam over the hot mass. A. R. Powell.

Treatment of barium and strontium sulphates. Rhenania-Kunheim Ver. Chem. Fabr. A.-G., Assees. of F. Rothe and H. Brenek (G.P. 444,861, 14.11.25. Addn. to G.P. 443,320; B., 1928, 51).—Before passing the reducing gases over the glowing sulphate mass they are freed from difficultly combustible constituents by passing through a purification chamber. A. R. Powell.

Preparation of a finely-powdered carbide from calcium carbide. H. Wittek (G.P. 446,410, 15.5.26).—The stream of molten calcium carbide from an electric furnace is atomised by means of a blast of nitrogen in the upper part of a water-cooled shaft. For the preparation of cyanamide cooling is so regulated that the temperature of the mass is brought down only to that at which absorption of nitrogen is rapid, and the gas stream is charged with particles of a granulated material which does not retard the reaction. A. R. Powell.

Manufacture of calcium nitrate together with alumina and phosphorus. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 296,832, 16.6.27).—Raw phosphate is fused with coal and sufficient aluminous material to produce an easily friable slag, and after recovery of the phosphorus the slag is treated with nitric acid, the silica collected on a filter, and the alumina precipitated with calcium carbonate or milk of lime with the addition of an oil, *e.g.*, coal-tar oil or tetrahydronaphthalene, to lower the surface tension and ensure rapid filtration of the calcium nitrate solution. W. G. Carey.

Preparation of metal bromides. J. H. van der Meulen (B.P. 285,915, 23.2.28. Ger., 25.2.27).—The formation of bromates and hypobromites is prevented by treating a non-acid compound, *e.g.*, oxide, carbonate, of the desired metal with bromine in the presence of water and a reducing agent which, during the process, is converted into water and/or gases. Such agents may be organic or inorganic compounds containing nitrogen, *e.g.*, urea, cyanamide, ammonium cyanide, etc. When nitrides, formates, oxalates, etc. are used, the salts should be those of the appropriate metal. W. G. Carey.

Manufacture of bleach liquor as by-product in salt purification. V. Yngve (U.S.P. 1,683,431, 4.9.28. Appl., 12.1.27).—The hydroxide sludge obtained by treatment of the brine with caustic soda (cf. U.S.P. 1,520,920; B., 1925, 131) is separated, and chlorinated until the magnesium hydroxide is on the point of being attacked. The resulting calcium hypochlorite bleach liquor is separated from the remaining sludge. F. G. Clarke.

Production of magnesium phosphate. Ver. f. chem. & met. Prod. (G.P. 449,288, 4.8.25. Addn. to G.P. 447,393; B., 1928, 603).—Mixtures of magnesium chloride and calcium phosphate are heated in the presence of chlorine or gases containing it. L. A. Coles.

Production of aluminium chloride. T. R. Haglund (Swiss P. 120,514, 2.4.25. Swed., 17.4.24).—Aluminiferous material is fused with reducing agents and material containing sulphur to yield a product containing aluminium sulphide, and this is treated with chlorinating agents. L. A. Coles.

Treatment of minerals containing aluminium. W. G. Bjorkstedt (U.S.P. 1,681,921, 28.8.28. Appl., 26.1.27).—The minerals are heated with ammonium sulphate, and, after leaching, the aluminium in the solution is precipitated with ammonium sulphite. H. Royal-Dawson.

Production of pure lead chloride and potassium nitrate. Silesia Ver. Chem. Fabr., Assees. of P. Schlösser, K. Bartsch, and G. Alaschenski (G.P. 449,739, 18.11.25).—Crude material containing lead is treated with nitric acid, excess acid is neutralised and iron is precipitated by the addition of lead carbonate, lead chloride is precipitated by the addition of potassium chloride, and, after removal of final traces of lead by precipitation as the sulphate, potassium nitrate is crystallised from the solution, the mother-liquor being returned to the cycle of operations.

L. A. Coles.

Manufacture of lead arsenate. Gebr. Borchers A.-G., and F. Borchers (G.P. 446,409, 15.6.26).—A solution of a soluble arsenate is treated with a deficiency of lead chloride and the reaction completed by addition of lead nitrate. A. R. Powell.

Preparation of lead tetra-alkyl. H. W. Daudt (B.P. 283,913, 14.10.27. U.S., 20.1.27).—An alkyl halide is added to a suspension of magnesium and a lead salt in ether, or magnesium is added similarly to the other components, the temperature being maintained (preferably for about 12 hrs.) at 28—40°. After addition of water the tetra-alkyl is removed by steam distillation. B. Fullman.

Production of nickel and/or cobalt carbonyl. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 296,558, 5.9.27).—Carbon monoxide is caused to react under pressure with porous, loose nickel and/or cobalt metal obtained by leaching the ores or intermediate metallurgical products with aqueous ammonia or solutions of ammonium salts containing free ammonia, treating the resulting complex ammonium compounds to obtain hydroxides or basic salts, and reducing them with hydrogen at a low temperature. W. G. Carey.

Electrolytic production of hydrogen and oxygen. Elektrizitäts A.-G. vorm. Schuckert & Co. (G.P. 449,603, 23.1.26).—Contamination of the oxygen in the decomposition apparatus is permitted to a greater extent than usual, and the production of an explosive mixture is prevented by diluting the gas with a non-combustible gas, *e.g.*, nitrogen, air, or oxygen, supplied through an injector for removing the gas from the apparatus in a proportion regulated automatically according to the volume of oxygen formed.

L. A. Coles.

Preparation of hydrogen. F. Gülker (G.P. 446,488, 31.7.26).—A mixture of water-gas with a slight excess of steam over that required to convert the carbon monoxide into dioxide is passed over a heated mixture, in granular form, of a catalyst and a substance capable of combining with the carbon dioxide produced. The catalytic mass is regenerated by heating in a current of air. A. R. Powell.

Production of concentrated oxides of nitrogen. I. G. Farbenind. A.-G., Assees. of R. Griessbach and O. Schliephake (G.P. 449,606, 17.6.26).—Gas mixtures containing oxides of nitrogen are brought in contact with liquid air, and the solidified oxides of nitrogen are recovered from the cooling agent by filtration.

L. A. Coles.

Production of phosphorus and ferrosilicon. I. G. Farbenind. A.-G. (B.P. 290,971, 16.4.28. Ger., 21.5.27).—Ferrophosphorus is mixed with the requisite amount of silicon, ferrosilicon, or mixtures forming silicon for the production of commercial ferrosilicon, and the mixture is fused in an electric furnace, the phosphorus being recovered by condensation. W. G. Carey.

Extraction of iodine from seaweed etc. C. Sicot and P. Davion (F.P. 622,660, 4.2.26).—Seaweed is brought into colloidal suspension or solution in water, the organic constituents are separated in the usual way, and the iodine is recovered from the mother-liquor by treatment with chlorine. A. R. Powell.

Recovery of organic substances containing iodine from marine algæ. P. Gloess (G.P. 446,866, 4.9.23. Fr., 30.5.23. Cf. F.P. 578,564; B., 1927, 956).—The aqueous extract of dried marine algæ is treated with a solution of lead or copper acetates and the precipitate is separated and digested with sodium sulphide whereby a solution of the sodium salt of the organic iodine compound is obtained. The mother-liquor from the acetate treatment is utilised for the recovery of a potash fertiliser. A. R. Powell.

Recovery of bromine from iron bromide. Kali-Forschungs-Anstalt G.m.b.H., Assees. of F. Kaselitz and P. Höfer (G.P. 449,736, 24.12.26).—Dry iron bromide, Fe_3Br_8, is heated at about 300° in a current of air or in the presence of oxidising agents, *e.g.*, bromates.

L. A. Coles.

Sulphuric acid (G.P. 449,286). **Liquefying air** (B.P. 271,520).—See I. **Acetate liquor from wood** (G.P. 448,348). **Lead sludge** (U.S.P. 1,682,562).—See II. **Iodine compositions** (B.P. 267,557—8).—See XX.

VIII.—GLASS; CERAMICS.

Florida clay in bone china bodies. C. E. Jackson (Trans. Ceram. Soc., 1928, **27**, 151—152).—Florida clay was substituted in varying degrees for English china clay in a body made up of 50% of calcined bone, 20% of Cornish stone, and 30% of china clay. Samples were fired to cone 11 and with one exception were satisfactory. Best results were obtained with bodies containing 9—12% of English china clay and 18—21% of Florida clay. Characteristic properties of Florida clay are its plasticity and strength. It increases considerably the dry strength of a body, yet does not affect the colour of the fired body so much as ball clay. F. Salt.

Refractories for the pottery industry. II. Saggars. W. Emery (Trans. Ceram. Soc., 1928, **27**, 169—219; cf. B., 1927, 44).—Data obtained from a number of saggar users indicated that losses in saggars were mainly due to cracking across the bottom and up the sides. (Information relating to the bone china and porcelain industries is not included.) A critical review of the literature is presented in relation to raw materials, their properties and methods of preparation, and to the manufacture of saggars. The results of a micro-examination of fired mixtures of siliceous fireclay and glazed grog, and of siliceous fireclay and fireclay grog, are given in an appendix. F. Salt.

The system Al_2O_3-SiO_2 and its importance in connexion with ceramic materials. G. Malquori (Annali Chim. Appl., 1928, **18**, 352—361).—A review of physico-chemical research on this system.

F. G. Tryhorn.

Determination of iron in silicates. A. E. J. Vickers (Trans. Ceram. Soc., 1928, **27**, 156—160). —Methods are described for determining both ferrous and ferric oxides in silicates, the data having been compiled from several sources and adapted to the special requirements of clay analysis. Directions are included for the use of the Reinhardt method of titrating iron, and also of the colorimetric determination of iron by the thiocyanate method. F. Salt.

See also A., Oct., 1088, **Hygroscopic water of clays** (Okazawa). 1110, **Weathering of clays** (Okazawa).

Patents.

Forming ceramic ware. H. R. Straight (U.S.P. 1,682,200, 28.8.28. Appl., 14.6.26).—Granulated shale is piled in a vertical stack the bottom and sides of which are sealed, and while the central and bottom portions are stirred steam is introduced under pressure in quantities in excess of its condensation, reducing the shale to a plastic state. H. Royal-Dawson.

Heat-treatment of ceramic articles. T. G. McDougal (B.P. 295,955, 21.2.27).—Sparking-plug porcelains, tiles, electrical insulators, etc. are passed, preferably in single file, through a tunnel kiln by a conveyor outside the kiln with supporting members of a minimum size projecting into the furnace through a narrow slot in the wall, the width of the ends of the members being not greater than that of the slot. The walls of the kiln are shaped to focus the heat on to all parts of the surface of the articles. L. A. Coles.

Manufacture of artificial plagioclase compounds. F. Singer (B.P. 282,402, 14.12.27. Ger., 17.12.26).—The oxides of bivalent metals (magnesium, barium, etc. and bivalent iron) are mixed with alumina and silica compounds (except alkali double silicates) in proportions corresponding approximately to the composition of natural plagioclase, and the mixture is heated at a temperature at least 50° below its fusion point. F. Salt.

Refractory body and method of making same. Hartford-Empire Co., Assees. of P. G. Willetts (B.P. 266,751, 28.2.27. U.S., 6.3.26).—A mixture of 4 pts. of raw aluminium hydrate (diaspore or bauxite), 4 pts. of calcined aluminium hydrate, 2 pts. of calcined alumina, 3 pts. of Grossalmerode (or similar) clay, and 5 pts. of a raw clay containing about 35% Al_2O_3 is ground to pass 325-mesh, made into a slip with water and agitated at about 90°, screened, filter-pressed, pugged, and finally dried. One portion of the dried mixture is converted into grog by calcination at 1750° and crushed to pass 12-mesh; the other is reground to 325-mesh. A mixture of these two portions, containing at least 50% of the grog portion, is then made into a paste with about 20% of water, pugged, partially dried, and moulded under pressure. The pressed blocks are fired at 1730°. [Stat. ref.] F. Salt.

Abrasive compositions. Carborundum Co., Ltd. From H. R. Power (B.P. 296,195, 30.8.27).—A bonding paste for abrasive grains of silicon carbide comprises fuller's earth, bentonite, etc., water, and material for retarding the evaporation of water, *e.g.*, maize syrup and glycerin. L. A. Coles.

Production of glass. M. Thomas, Assr. to Patent-Treuhand Ges. f. Elektr. Glühlampen m.b.H. (U.S.P. 1,684,332, 11.9.28. Appl., 26.6.26. Ger., 1.8.25).—See B.P. 256,189; B., 1927, 109.

[Arrangement of] kilns [for burning bricks, tiles, etc.]. E. G. Spencer-Churchill (B.P. 296,844, 29.6.27).

Manufacture of splinterless glass sheet. P. J. Port and J. Newton (B.P. 296,825, 13.6.27).

Sifting machines for treating potters' slip, powdered substances, etc. J. W. Ratcliffe, and E. Cotton, Ltd. (B.P. 296,959, 5.4.28).

Abrasive articles (B.P. 267,516).—See XIII.

IX.—BUILDING MATERIALS.

See also A., Oct., 1095, **Decomposition of alkaline-earth sulphates** (Zawadski and others). **System calcium oxide–silica–water** (Baylis).

Patents.

Moulded articles such as tiles, slabs, etc. Brit. Thomson-Houston Co., Ltd., Assees. of L. E. Barringer (B.P. 282,810, 29.12.27. U.S., 29.12.26).—Moulded articles suitable as building materials or in the construction of refrigerators comprise asbestos bonded with an inorganic binder, *e.g.*, hydrated calcium silicate, coated with a layer of a synthetic resin made from a polyhydric alcohol and a polybasic acid, *e.g.*, from glycerin and phthalic acid, and preferably mixed with fillers and plasticisers. L. A. Coles.

Materials for making tiles, slabs, road surfaces, etc. F. Morton (B.P. 296,626, 28.1.28).—Coal-tar or blast-furnace pitch having a twisting point of 40—65° is melted and mixed with granite or other stone chippings and is moulded while hot, under pressure, with a heated coloured filler of powder or sand. W. G. Carey.

Colouring mineral matter [slate]. H. C. Fisher, Assr. to Richardson Co. (U.S.P. 1,680,941, 14.8.28. Appl., 25.11.22).—Crushed slate is impregnated with copper sulphate solution, dried, and heated at 800° to decompose the sulphate. The mass is then impregnated with ferrous sulphate and again calcined, whereby copper ferrite is formed on the surface of the slate particles, the colour of which is modified according to the quantities of the two sulphates used. A. R. Powell.

Method of preserving wood and wood preservative. G. Gunn (U.S.P. 1,684,222, 11.9.28. Appl., 2.6.26. U.K., 26.3.26).—See B.P. 273,007; B., 1927, 655.

Tarry emulsions (B.P. 279,026).—See II.

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

Theory of blast-furnace smelting [of iron ores]. F. Wüst (Stahl u. Eisen, 1928, 48, 1273—1287; cf. B., 1928, 406).—The theory is based on analyses of iron pellets recovered from slag at various points in the furnace, on the composition of the slag, and on confirmatory tests carried out in the laboratory. The iron pellets suspended in the slag invariably contain higher percentages of impurities than does the pig iron tapped from the furnace, showing that the ore is reduced to iron above the tuyères and in passing through the oxidising zone round the tuyères is subjected to a refining process in which part of the impurities is removed by oxidation similar to that taking place in a converter. Some granules of metal removed from a cold furnace just above the tuyères contained up to 60% Mn, 8% Si, and 5% P; these large amounts could not have been taken up by the iron during its passage through the short distance between the melting zone and the tuyères, and hence must have been taken up by cementation in the solid state. Laboratory tests showed that at 1100° in an atmosphere of hydrogen iron absorbed 8% Mn from manganese oxide in 7 hrs., at 1200° in an atmosphere of carbon monoxide it absorbed 3·8% Mn and 0·27% P, and, in contact with carbon at 1170° it absorbed 8% P, 5% Mn, and 2·5% Si in 4—5 hrs. from their respective oxides.

A. R. Powell.

Dependence of the operation of the Thomas converter on the temperature curve. R. Frerich (Stahl u. Eisen, 1928, **48**, 1233—1240).—From measurements made with the Holborn–Kurlbaum ardometer temperature–time curves have been constructed for numerous charges of cast iron blown in the Thomas converter under varying conditions of wind pressure. When a steady even pressure is maintained throughout the blow the points at which the silicon, carbon, and phosphorus begin to burn are plainly visible on the temperature curve. The curve rises more steeply at the beginning and end of the operation than in the middle owing to the greater heat of combustion of silicon and phosphorus compared with that of carbon. By varying the pressure of the blast the temperature at any stage of the blow can be regulated as desired, but the best results are obtained by maintaining throughout the blow as even and as high a pressure as is possible without causing iron to be projected out of the converter. In this way the ferrous oxide content of the slag may be kept low with a consequent improvement in the quality of the steel and the removal of any fear of red-shortness in the finished metal owing to the greater ease with which complete deoxidation may be effected. A high, even pressure of blast also reduces the time required in blowing, lowers the amount of corrosion of the lining per charge, decreases the nitrogen content of the steel, and increases the yield from a charge owing to the smaller loss by burning the iron.

A. R. Powell.

Comparative tests on the mechanical properties of cast steel at elevated temperatures. A. Pomp (Stahl u. Eisen, 1928, **48**, 1321—1330).—The mechanical properties of eight steels from the Siemens–Martin furnace, three from the Bessemer converter, and one from the electric furnace have been determined at temperatures beteeen 20° and 500°. The elastic limit and yield point decreased almost linearly with rise of temperature, and at 500° were 42—67% below the values at 20°, steels with a high manganese content giving the highest values at 500°. Of the open-hearth steels tested, that with 1·65% Ni had a relatively low yield point (9·8 kg./mm.^{2}) at 500°, but that with 2·68% Ni had a high yield point (30·5 kg./mm.^{2}) at 20°. Of the Bessemer steels those with a relatively high phosphorus and sulphur content behaved just as satisfactorily as those with only small quantities of these impurities. With rise of temperature the tensile strength of all the steels decreased slightly up to 100°, then increased again to a maximum between 200° and 300°, after which a rapid fall in strength took place, the values at 500° being 45—68% below those at 20°. The decrease in strength was least marked with steels having a high manganese or carbon content; nickel had little effect in maintaining the strength at high temperature, but phosphorus and sulphur up to 0·15% increased the hot strength of Bessemer steels. The elongation and reduction in area of all the steels decreased to a minimum at 200—300°, and then increased rapidly. The impact strength increased more or less steeply according to the composition to a maximum at 100—200°, then fell slowly to 300—400°, and then rapidly. The values of the impact strength are shown to be dependent on the size of the test-piece and on its position in the casting.

A. R. Powell.

Conditions of formation of cementite. G. Charpy and P. Pingault (Compt. rend., 1928, **187**, 554—556).—The formation of cementite by the carburisation of hydrogen-free electrolytic iron filings, heated in contact with hydrocarbons or alkali cyanides, has been followed from changes in density and magnetic properties. After complete transformation, the filings, which contained 6·75% C, were capable of scratching glass and dissolved completely in nitric acid leaving no trace of graphite. The cementite remained stable when heated *in vacuo* for 10 hrs. at 1000°, and apart from slight variations due probably to unchanged iron, the heating curves showed no marked critical point.

J. Grant.

Use of aluminium, steels, VA alloys, and silicon alloys in the nitric acid industry. B. Waeser (Chem. Fabr., 1928, 529—530, 544—546).—A review of the properties, uses and resistance to corrosion of aluminium, chromium–nickel steels, and silicon–iron alloys (Thermisilid, Tantiron, and Duriron), with special reference to their behaviour in nitric acid of varying concentrations.

A. R. Powell.

Smelting copper in the reverboratory furnace. G. L. Oldright and F. W. Schroeder (Amer. Inst. Min. Met. Eng. Tech. Pub., 1928, No. 49, 20 pp.).—The charge is finely divided and is preheated, and powdered coal or oil is used as fuel. Preheating the air, and extending the length and raising the temperature of the smelting zone are suggested. The condition of the brick lining is described; water-cooling the silica bricks is not feasible.

Chemical Abstracts.

External corrosion of copper and brass service pipe [for water]. K. H. Logan and S. P. Ewing (J. Amer. Water Works' Assoc., 1928, **20**, 390—403).—Specimens of brass buried in different types of soil for upwards of two years indicated on examination that although the losses were too small and variable to permit definite conclusions, brasses of high copper content withstood soil corrosion well and were definitely superior to ferrous materials. There was little indication that galvanic action due to contact with lead or steel was a cause of accelerated corrosion. A serious cause of service-pipe failure in the neighbourhood of powerhouses or sub-stations is due to stray electric currents passing from the pipe to the surrounding soil. The character of the pipe material is not a vital factor, though brasses with 30—40% Zn showed evidence of selective corrosion analogous to pitting in steel. The life of a service pipe under such conditions depends largely on the thickness of the pipe wall.

C. Jepson.

Nickel mirrors by the nickel carbonyl method. C. G. Fink and W. G. King, jun. (Amer. Electrochem. Soc., Sept., 1928. Advance copy. 4 pp.).—By admitting nickel carbonyl vapour suddenly into an evacuated vacuum flask uniformly heated in an air oven to 180—200°, the walls may be coated with a bright, adherent, uniform deposit of nickel, which has a reflectivity for heat waves nearly as high as that of silver. The presence of traces of air, oxygen, chlorine, etc. is to be avoided as it leads to dark deposits. Preliminary flushing with hydrogen is effective in ensuring bright deposits, but is unnecessary if the vessel is evacuated to 5—10 microns pressure. Coatings of nickel on porcelain and metals may be similarly produced and serve as a foundation for the electrodeposition of other metals.

H. J. T. Ellingham.

Corrosion in the tin can. I. Electrochemical relations of iron and tin. R. H. Lueck and H. T. Blair (Amer. Electrochem. Soc., Sept., 1928. Advance copy. 23 pp.).—In approximately $0\cdot2N$-solutions of various acids, having p_H values ranging from 0·81 to 2·98, iron dissolves with evolution of hydrogen but tin is unattacked. With an iron–tin couple hydrogen was evolved but the rate of evolution was always less than that from uncoupled specimens of iron. Experiments in a citric–malic acid solution of p_H 2·98 showed that this protective action of tin on iron was exhibited when the solution was aerated as well as when it was kept saturated with hydrogen or nitrogen. Corrosion was most rapid in the aerated solutions, but in all cases it is the tin which dissolves more rapidly from the couple. Cadmium coupled with iron protected it to a similar extent but the cadmium dissolved more rapidly than tin under the same conditions. Measurements of the *E.M.F.* of cells of the type Fe|canned foods|Sn show that, although tin is definitely cathodic to iron on open circuit, on short-circuiting, the *E.M.F.* falls rapidly and changes sign, the tin becoming the anode. Removal of either electrode and exposing it to the air gave it a more noble potential. With similar cells using iron and cadmium electrodes the latter was always the anode and the *E.M.F.* changed very little on short-circuit; using tin and cadmium, cadmium was again always anodic but the *E.M.F.* fell notably on closed circuit and recovered gradually when the circuit was opened. In a diaphragm cell containing a citric–malic acid mixture buffered to p_H 3·5, the effect of saturating the electrolyte around the individual electrodes with oxygen or hydrogen was examined. With the iron in a solution saturated with oxygen or hydrogen, the tin electrode always became the anode whether the solution into which it dipped was kept saturated with oxygen or with hydrogen or not treated with gases at all. But with no gas passed through the solution around the iron, the tin was always cathodic if the solution into which it dipped was kept saturated with oxygen or with hydrogen. Addition of hydrogen peroxide to the solution around the tin also kept it cathodic to the iron. These results are considered to be related to the high hydrogen overvoltage of tin compared with that of iron; the tin becomes polarised and then hydrogen is more readily liberated at the iron. The abnormal tendency of red fruits to cause perforation of tin cans cannot be explained on current views. It is possible that mild oxidising agents are present and serve to cause the microscopic areas of exposed iron to become anodic to the surrounding tin.

H. J. T. Ellingham.

Porosity of electro-deposited chromium. E. M. Baker and A. M. Rente (Amer. Electrochem. Soc., Sept., 1928. Advance copy. 9 pp.).—Chromium was deposited on polished nickel cathodes from baths containing chromic acid and sulphuric acid in the molar concentration ratio of 100 : 1, and the porosity of the plating was determined by cathodic treatment of the plates in an acid copper sulphate bath. Copper only deposits at points where the underlying nickel is exposed. For all bath compositions investigated at temperatures from 35° to 60° minimum porosity was attained at a certain thickness of deposit ($< 4 \times 10^{-3}$ mm.). At 45° this minimum porosity becomes progressively lower as the total bath concentration is increased. With a bath which is $2\cdot5M$ to chromic acid, the least porous deposits are obtained at about 55°, the optimum thickness then being about 9×10^{-4} mm. For deposits 3×10^{-4} mm. thick, the porosity does not vary much with temperatures between 40° and 60°. But as the temperature or total concentration is increased it is necessary to increase the thickness of the deposit in order to get the minimum porosity obtainable at that temperature or concentration. The nature of the porosity has been studied and an explanation of it is suggested.

H. J. T. Ellingham.

See also A., Oct., 1077, **X-Ray analysis of Heusler's alloy** (Persson). 1078, **X-Ray analysis of silver–aluminium alloys** (Westgren and Bradley). **Changes in the alloy CuAu** (Gorsky). 1079, **Slip-bands in stretched aluminium crystals** (Yamaguchi). 1080, **Mechanical properties of brass crystals** (Masima and Sachs). 1081, **Magnetic properties of cobalt** (Samuel). **Magnetisation of nickel crystals** (Kaya). 1082, **Iron crystals** (Dussler). **Superconductivity** (Kretzschmann). **"Resistance limits" for gold–copper system** (Le Blanc and others). 1083, **Electrical resistance of molten metals** (Matsuyama). **Conductivity of metals** (Lapinsky). **Volume change of manganese during solidification** (Matsuyama). 1085, **Lead–antimony alloys** (Bronievski and Slivovski). **Palladium antimonides** (Thomassen). 1094, **System antimony–arsenic** (Mansuri). **System copper–silicon** (Matsuyama). 1095, **System aluminium–calcium** (Matsuyama). 1098, **Passivity of chromium and its alloys** (Strauss and Hinnüber). 1104, **Reactions in the evolution flask** (Kitashima). 1108, **Test for silver** (Feigl).

Mischmetal as rectifier. Kremers and Thomas. **Co-deposition of copper and graphite.** Fink and Prince. **Nickel plating solutions.** Dorrance and

Gardiner. **Electrodeposited nickel.** MacNaughtan and Hothersall. **Chromium plating.** Baker and Pettibone.—See XI.

Patents.

[Blast-furnace] tuyère. G. W. Vreeland (U.S.P. 1,682,816, 4.9.28. Appl., 8.7.27).—The tuyère has a cylindrical water-cooled body slightly tapering towards the nose portion which is solid and is composed of a shell within which is a cast-iron ring. A. R. Powell.

Regenerative open-hearth furnace. S. J. Cort, Assr. to Bethlehem Steel Co. (U.S.P. 1,683,656, 11.9.28. Appl., 21.12.23).—The furnace is diabolo-shaped in plan and a system of buckstaves, tie rods, and channel members for supporting the roof is described.
B. M. Venables.

Melting furnaces for liquid fuel. G. Regnac-Paille (B.P. 282,627, 15.8.27. Belg., 23.12.26).—The combustion chamber is provided with a tortuous passage which gradually narrows towards the fusion chamber and is so constructed as to present a deflecting elbow against which the mixture of air and fuel impinges and past which the flame, but not the liquid fuel, can pass into the fusion chamber. M. E. Nottage.

Manufacture of cast iron. A. F. Meehan, Assr. to Mechanite Metal Corp. (U.S.P. 1,683,086—7, 4.9.28. Appl., [a] 16.6.27, [b] 27.8.27).—(a) Molten grey cast iron is treated with a silicide of an alkaline-earth metal and a graphitising agent such as nickel. (b) Molten iron which, if cast, would contain more than 2% of combined carbon is treated with such a proportion of calcium as will produce the degree of graphitisation required (cf. B.P. 210,118; B., 1924, 262).
A. R. Powell.

Improvement of fused material, especially cast iron. Maschinenfabr. Oerlikon (Swiss P. 120,564, 14.7.26).—The fused material is stirred by means of agitators constructed of highly refractory material covered with a high-melting metal. L. A. Coles.

Production of iron sponge. S. E. Sieurin (B.P. 296,235, 6.12.27).—Iron sponge, produced by imbedding iron ore in a solid reducing agent (carbon) mixed with lime or magnesia, and reducing in the absence of air at a temperature below the m.p., may be made free from sulphur by using the reducing agent in such an excess over the amount necessary for the reduction of the ore that carbon still remains in the ash at the end of the process. The cooling of the product is accelerated inversely as the amount of excess of reducing agent, so that the calcium or magnesium sulphide formed in the charge is prevented from decomposing.
M. E. Nottage.

Improving the tensile qualities of drawn steel wire. Verein. Stahlwerke A.-G. (B.P. 272,240, 7.6.27. Ger., 4.6.26).—After cold-drawing, the wire is tempered at a temperature between 350° and the Ac1 point either by drawing it through a lead or salt bath or by heating the whole coil in an oven. The temperature of tempering is increased to a small degree as the carbon content increases, whilst the duration is extended approximately in proportion to the square of the radius of the wire so that the capacity for expansion increases. This heat-treatment precedes any galvanising, tinning, or metal-coating process.
M. E. Nottage.

Treating [annealing] strip metal [iron or steel]. W. E. Watkins (B.P. 279,787, 5.7.27. U.S., 28.10.26).—Iron or steel strip is passed continuously through a horizontal annealing furnace through which hot reducing gases are passed. To prevent oxidation the metal may previously be coated with an oil having an asphaltic base or with a mixture of a reducible metal oxide and the oil so as to produce a metallic coating on the strip. The treated strip passes from the furnace, through a cooling chamber filled with non-oxidising gases, thence into a pickling bath, washing bath, and drying apparatus in succession. A. R. Powell.

Removal of iron from minerals [bauxite etc.]. I. G. Farbenind. A.-G. (Swiss P. 120,854, 25.9.25. Ger., 1.10.24).—The minerals are treated with carbon monoxide at 250° under pressure to yield volatile iron carbonyls. L. A. Coles.

Precipitation (cementation) of copper. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 296,814, 9.6.27).—In the precipitation of metallic copper from solutions by means of iron, a gaseous agitating agent is employed which contains oxygen and such a quantity of sulphur dioxide as will prevent re-oxidation of the metallic copper produced. M. E. Nottage.

Deoxidation of metals or alloys. Siemens & Halske A.-G. (B.P. 288,543, 22.2.28. Ger., 11.4.27).—Copper and nickel or their alloys are deoxidised by the addition of up to 0·5% of beryllium in the form of a 5—10% alloy with the copper or nickel or both.
A. R. Powell.

[Non-oxidisable] alloys. E. Manos (B.P. 282,096, 10.12.27. Switz., 11.12.26).—Hard white alloys containing 72—74% Cu, 18—20% Ni, 6—7% Zn, 0·1—1% Al, 0·025—0·2% Fe, 0·01—0·2% Si, and 0·05—0·3% Mg are claimed. A particular alloy consists of 72·9% Cu, 19·6% Ni, 0·3% Al, 6·86% Zn, 0·1% Fe, 0·14% Si, and 0·1% Mg. F. G. Crosse.

Alloy. S. E. Winslow, Assr. to Consol. Ashcroft Hancock Co. (U.S.P. 1,683,749, 11.9.28. Appl., 4.3.24).—In a nickel–copper–tin alloy, the respective metals are present in the atomic proportions of 10 : 4 : 1 or less.
F. G. Crosse.

Refinement of nickel alloys. W. S. Smith, H. J. Garnett, and J. A. Holden (B.P. 296,112, 25.4.27).—The sulphur content of alloys containing not less than 50% Ni may be minimised or eliminated by melting the metal or scrap in the presence of slag in a reducing atmosphere, preferably in an induction furnace. The slag may consist mainly of lime and silica together with a small amount of either fluorspar or calcium chloride. After the supply of reducing gas is cut off, the slag is removed from the surface and a small amount of the oxide of one of the constituents of the alloy is introduced to remove the absorbed reducing gases.
M. E. Nottage.

Fusible lead alloys. E. C. R. Marks. From Amer. Machine & Foundry Co. (B.P. 296,584, 20.10.27).—An alloy for use as a solder consists of pure lead together with 0·05—0·10% of lead phosphide and, if desired, 1% of a brightening metal such as aluminium, antimony, tin, or zinc. M. E. Nottage.

Separating impurities from impure lead or lead alloys. H. Harris (B.P. 296,557, 3.9.27).—Arsenic, tin, and antimony are removed successively from impure lead by allowing the molten lead to fall in fine streams into a molten mass of sodium hydroxide, with or without sodium chloride, to which regulated amounts of litharge or lead oxide dross are added. For the removal of arsenic and tin from antimonial lead, antimony oxide may be used in place of some or all of the lead oxide. A. R. Powell.

Production of aluminium castings. H. Maurer, jun. (Swiss P. 120,859, 1.6.26).—Compact castings free from blow-holes are obtained by stirring the aluminium just at its m.p. with 2 pts. of powdered white glass per 100 pts. of metal, and removing the impurities separating at the top and bottom of the melt. L. A. Coles.

Bearing-metal alloys. T. Goldschmidt A.-G. (B.P. 295,265, 25.2.27. Ger., 25.2.26. Cf. B.P. 266,696; B., 1928, 789).—Aluminium may be rendered suitable for bearing purposes by the addition of one or more of the metals calcium, barium, strontium, or beryllium and incorporating with the alloys thus produced one or more of the elements titanium, vanadium, molybdenum, tungsten, chromium, iron, manganese, or boron which do not form with aluminium either solid solutions or eutectic mixtures but which crystallise out as such, forming hard crystals in the alloy. One or more of the metals magnesium, zinc, copper, cobalt, nickel, or cerium, also silicon or silicides of lithium and magnesium, may also be introduced as additional components. M. E. Nottage.

Resistance alloys. Brit. Thomson-Houston Co., Ltd., Assees. of T. S. Fuller (B.P. 285,908, 20.2.28. U.S., 25.2.27).—An aluminium alloy containing 4—10 Mn and 2—8% Zn and preferably consisting of 90% Al, 6% Mn, and 4% Zn has a resistance of about 11·5 microhms per c.c. M. E. Nottage.

Making metallic tungsten. K. Anjow, Assr. to Mitsubishi Kogyo Kabushiki Kaisha (U.S.P. 1,682,058, 28.8.28. Appl., 3.7.26. Japan, 18.5.26).—Technically pure tungsten is obtained by heating the crude metal with alkali solution in a closed vessel under pressure. H. Royal-Dawson.

Form of tungsten and manufacture of same. C. G. Fink (U.S.P. 1,675,486, 3.7.28. Appl., 16.1.24).—Tungsten slugs are mixed with a reducing agent and heated in hydrogen at high temperatures to remove the intercrystalline impurities by reduction. A tungsten which is largely crystalline results. C. Hollins.

Treatment of ores etc. containing platinum. S. C. Smith (B.P. 296,744, 7.6.27).—Sulphide ores or concentrates containing the platinum metals in association with copper, nickel, and iron sulphides are smelted to obtain a copper–nickel–iron matte. This is crushed to 60-mesh and digested at 70—80° with sulphuric acid (400 g./litre), whereby the iron and nickel sulphides are dissolved, leaving a residue of copper sulphide and precious metals. This residue is roasted and leached with dilute sulphuric acid to obtain a rich concentrate from which the platinum metals may be recovered by known means. A. R. Powell.

Increasing the conductivity of metals. S. Ruben (U.S.P. 1,683,209, 4.9.28. Appl., 15.2.26. Renewed 12.5.27).—Metal wires are heated by resistance while passing through an electromagnetic field. A. R. Powell.

Coating of metals by the cementation process. Metallbank u. Metallurgische Ges. A.-G. (B.P. 272,920, 15.6.27. Ger., 15.6.26).—Iron, copper, and other metals or alloys are provided with a coating of aluminium by heating them in an inert atmosphere at 700—1200° embedded in a mixture of aluminium dross containing 15—30%, preferably 20%, of free aluminium capable of diffusing into the surface of the metal under treatment. A. R. Powell.

Material for use in case-hardening metals. A. E. Taylor, H. W. Barton, and F. A. Jones (B.P. 297,163, 25.6.27).—The material comprises disintegrated Dum Palm nut, Coquilla nut, apple nut, or Coroza nut, or mixtures of these, which may be dried or heat-treated, and barium carbonate, with or without the addition of charcoal and sodium carbonate. L. A. Coles.

Production of iron castings with a low carbon content. K. Emmel and H. Walbert (U.S.P. 1,683,714, 11.9.28. Appl., 11.8.25. Ger., 9.12.24).—See B.P. 244,405; B., 1927, 79.

Manufacture of steel. R. A. Hadfield (U.S.P. 1,683,886, 11.9.28. Appl., 20.11.22. U.K., 19.6.22).—See B.P. 204,110; B., 1923, 1182 a.

Casting articles of corrosion-proof steel. F. Hauptmeyer, Assr. to F. Krupp A.-G. (U.S.P. 1,684,700, 18.9.28. Appl., 26.1.27. Ger., 18.2.26).—See B.P. 266,305; B., 1927, 753.

Flux for welding or soldering of aluminium and other metals. W. Reuss (B.P. 296,923, 10.11.27).—See U.S.P. 1,675,664; B., 1928, 610.

Flotation process. A. H. Fischer, Assr. to Guggenheim Bros. (U.S.P. 1,684,536, 18.9.28. Appl., 24.1.27).—See B.P. 284,198; B., 1928, 373.

Jigs for washing ores etc. T. V. O'Hare (B.P. 296,889, 26.8.27).

Centrifugal casting of hollow metal bodies. A. Possenti and C. Scorza (B.P. 296,902, 28.9.27. Addn. to B.P. 277,996).

Annealing of metal bands. O. Busse, and Mansfeld A.-G. f. Bergbau u. Hüttenbetrieb (B.P. 296,146, 11.6.27).

Production of copper cakes. G. B. Ellis. From Anaconda Copper Mining Co. (B.P. 296,746, 7.6.27).

Manufacturing compound metal sheets. F. Krupp A.-G. (B.P. 280,518, 21.10.27. Ger., 11.11.26).

Apparatus for atomising and spraying metals and other fusible materials [in the form of wire or powder]. Metallisator Berlin A.-G., and E. Greiser (B.P. 296,546, 24.8.27).

Ferrosilicon (B.P. 290,971).—See VII.

XI.—ELECTROTECHNICS.

High-frequency induction furnace for chemical preparations above 1000°. C. N. SCHUETTE and C. G. MAIER (Amer. Electrochem. Soc., Sept., 1928. Advance copy. 14 pp.).—A special furnace was constructed in which the inductor coil had 2·25 turns/cm., the turns being insulated from each other with asbestos paper coated with Bakelite varnish. In this furnace a graphite cylinder was heated to 1300° in 5 min., whereas with a similar furnace with 0·79 turn/cm. it required 14 min. when operated at the same power. In order to raise the cylinder to 1900°, 10 kw. sufficed with the former furnace, and 14 kw. with the latter. For heating *in vacuo*, crucibles were supported in specially designed silica tubes. To avoid imbedding the crucibles in magnesia or other insulator a radiation screen was devised and was effective in preventing overheating of the silica tube. A satisfactory method of preparing silica crucibles by heating a mixture of raw and preburned silica in graphite moulds in the high-frequency furnace has been developed, and the technique of the operation is described. Sintered magnesia crucibles have also been made by a similar method. In the preparation of ferrous oxide by heating iron and magnetite *in vacuo* in iron crucibles local melting of the crucibles occurred. This was avoided by using a series of superimposed iron trays with holes drilled in the centre so that the oxide flowed from one tray to the others. At higher temperatures rotation of the whole vacuum tube permitted operation in an iron crucible imbedded in magnesia, even when the iron was molten. The melting of copper–iron alloys in hydrogen and the preparation of pure ferrous sulphide are also referred to.
H. J. T. ELLINGHAM.

Thermoelectric measurement of temperatures above 1500°. H. L. WATSON and H. ABRAMS (Amer. Electrochem. Soc., Sept., 1928. Advance copy. 13 pp.).—The construction and characteristics of a tungsten–graphite thermocouple are described. It has an accuracy of about ± 10° up to 1600°, and with suitable protection can be used up to much higher temperatures. Short runs at temperatures over 2300° have been made, but the life of the couple is short under such conditions. It can be used under conditions where platinum–rhodium couples would fail through contamination. Special refractory sheath materials are being developed to suit the numerous possible applications of the thermocouple, such as in the manufacture of steel, glass, carbide, etc. An advantage of its use for such purposes is that it lends itself readily to automatic recording and controlling devices which otherwise could not be employed at such high temperatures.
H. J. T. ELLINGHAM.

Effect of adsorbed gases on the contact resistance of carbon. R. H. WRIGHT and M. J. MARSHALL (Amer. Electrochem. Soc., Sept., 1928. Advance copy. 12 pp.).—In a specially designed apparatus two carbon filaments arranged at right angles to one another could be brought into contact and pressed together with any desired pressure. The decrease of the electrical resistance of the contact with increase of contact pressure was measured both in the presence of air and in a vacuum after heating the filaments to a high temperature *in vacuo* to remove adsorbed gas. At low contact pressures the contact resistance is lower when the adsorbed gas film has been removed, but at high pressures, when the contact area is doubtless much larger owing to the elasticity of the material, the resistance is practically the same as in air.
H. J. T. ELLINGHAM.

Conductivity of organic solvents. D. B. KEYES, S. SWANN, JUN., and H. W. HOERR (Amer. Electrochem. Soc., Sept., 1928. Advance copy. 8 pp.).—By means of a simple direct-current method the approximate specific conductivities of a number of commercial samples of organic liquids and mixtures have been measured at 25°. Data obtained by previous workers for common organic liquids are tabulated.
H. J. T. ELLINGHAM.

Voltaic hydrogen generator. W. C. GARDINER and G. A. HULETT (Amer. Electrochem. Soc., Sept., 1928. Advance copy. 10 pp.).—The voltaic cell consisting of an amalgamated zinc anode and a platinum-black or nickel cathode in a solution of sodium hydroxide containing a little barium hydroxide has been adapted for use as a generator to furnish a slow stream of pure hydrogen over a long period. The rate of hydrogen evolution may be controlled by introducing a variable resistance in the circuit; but no impurities are introduced into the hydrogen when the generator is run on a short-circuit. No oxygen is produced by the action of the cell, and the generator is designed so as to deliver pure hydrogen at once. Freedom from oxygen was indicated by the use of luminescent bacteria (cf. A., 1923, i, 1267).
H. J. T. ELLINGHAM.

Use of mischmetal as an electrolytic rectifier. H. C. KREMERS and D. C. THOMAS (Amer. Electrochem. Soc., Sept., 1928. Advance copy. 6 pp.).—A cell consisting of a lead electrode and an electrode of mischmetal, specially prepared so as to be free from iron, in solutions of sodium phosphates or sodium tungstate was examined with respect to its rectifying properties. An electrolyte containing 25% of trisodium phosphate and 10% of sodium hydroxide gave most satisfactory results. The film forms rapidly and is permanent, and the degree of half-wave rectification approaches that of a tantalum cell. Break-down voltages as high as 90 volts were obtained.
H. J. T. ELLINGHAM.

Co-deposition of copper and graphite. C. G. FINK and J. D. PRINCE (Amer. Electrochem. Soc., Sept., 1928. Advance copy. 6 pp.).—Experiments have been made to determine whether a self-lubricating bearing metal could be made by simultaneous electrodeposition of copper and graphite from acid copper sulphate solutions containing "aquadag." With a solution containing 200 g. of copper sulphate crystals, 100 g. of sulphuric acid, and 6·55 g. of graphite per litre at 20° and 2·08 amp./dm.^{2} a fine-grained adherent deposit containing 11% of graphite was obtained on the cathode. Increasing the graphite concentration in the solution above 13 g./litre does not increase the amount of it in the deposit. The deposits were brittle even when the bath temperature was raised to 55°, but the brittleness can be largely removed by annealing at a red heat. At 55° the deposits were coarser grained than at 20° but adhered well. Since graphite settles out rapidly from acid solutions, gelatin was tried as a protective agent, but at 55° it gives rise to non-adherent deposits. Vigorous stirring is an effective substitute for addition of gelatin at 55°. H. J. T. Ellingham.

Polarisation and resistivity in nickel-plating solutions. R. L. Dorrance and W. C. Gardiner (Amer. Electrochem. Soc., Sept., 1928. Advance copy. 10 pp.).—To N-nickel sulphate, $0\cdot25M$-boric acid solutions were added varying concentrations of chlorides of ammonium, sodium, potassium, magnesium, or nickel, and the influence of these chlorides on the anodic and cathodic polarisations and on the resistivity of the solution at 17° was determined by means of the Haring cell (B., 1926, 497). The p_H value of all the solutions was adjusted to $5\cdot6 \pm 0\cdot2$. Addition of any of the above chlorides at a concentration of $0\cdot25M$ reduced the anodic polarisation at 1 amp./dm.^{2} from 1·78 to 0·3—0·5 volt, but increased the cathodic polarisation from 0·56 to 0·7—0·9 volt, whilst the resistivity fell from 10 ohm-cm. to 5—6, except with nickel chloride, when the value was 7·7. It is concluded that the cation associated with the chloride ion has no specific effect on the anodic polarisation. Further experiments showed that the bromide ion reduces anodic polarisation as effectively as the chloride ion, but the fluoride ion has no effect of this kind. Hydrogen peroxide does not affect the polarisations, but sodium citrate increases the anodic polarisation. Cadmium chloride gives a low cathodic polarisation and hence may be expected to lower the throwing power of the bath. H. J. T. Ellingham.

Causes and prevention of pitting in electrodeposited nickel. D. J. Macnaughtan and A. W. Hothersall (Trans. Faraday Soc., 1928, 24, 497—509).—Observations made of a magnified image of an illuminated cathode surface during deposition indicate that pits, circular or tailed, are caused by bubbles of gas, usually hydrogen, clinging to the surface during deposition, or by a succession of bubbles from a point on the surface. That tailed pits were probably due to local stagnation of electrolyte, and consequent depletion in metallic ions immediately above a bubble was shown by comparison with pits artificially produced by screening the surface with small glass beads. Pitting was less frequent when the anodes and solutions were replaced by highly purified materials, and was localised to defects in the cathode surface where bubbles formed. Bubbles and pitting were both absent in the case of a ground and polished copper surface or of a copper surface the defects of which had been covered by a preliminary deposit of copper. Hence, to remove these defects, a steel surface was given first a thin nickel deposit, then one of copper from acid copper sulphate, and a final nickel deposit. Preferential discharge of hydrogen at surface defects suggests decreased hydrogen overvoltage relative to elsewhere on the surface. The effect of deposited copper, therefore, is to cover surface defects, thus eliminating areas of lower overvoltage and providing basis metal for nickel deposition upon which overvoltage of hydrogen discharge is higher than upon steel. Use of commercial materials with copper-treated basis metal did not invariably prevent pitting, which was attributed to a defective condition of the solution. N. M. Bligh.

Steel anodes for chromium plating. E. M. Baker and E. E. Pettibone (Amer. Electrochem. Soc., Sept., 1928. Advance copy. 4 pp.).—With a bath containing 2·5 mols. of chromic acid and 0·025 mol. of sulphuric acid per litre at 44—46° the rate of corrosion of steel anodes increases rapidly with increase of carbon content of the steel; a very low rate of corrosion is found with electrolytic iron anodes. For a given anode material the rate of corrosion is practically proportional to the anodic current density over the range 3·6—21·6 amp./dm.^{2}, and at given current density it decreases with time of electrolysis, the decrease being most marked in the case of anodes with the highest carbon content. The steady value of the ratio of tervalent to sesquivalent chromium which is established in the solution during electrolysis is not appreciably affected by varying the carbon content of the anodes from 0 to 1%. H. J. T. Ellingham.

See also A., Oct., 1101, **Preparation of cuprous oxide** (Abel and Redlich). 1102, **Oxidation of organic substances** (Marie and Lejeune). 1149, **Furnace for organic combustions** (Phillips and Hellbach).

Hot centrifuge. Hütter.—See I. **Insulating oils.** Zimmermann.—See II. **Titration of hypochlorite etc.** Rius and Arnal.—See VII. **Corrosion of tin cans.** Lueck and Blair.—See X.

Patents.

Electric furnace. H. George (B.P. 279,818, 10.10.27. Fr., 27.10.26).—A refractory crucible is surrounded by an outer crucible, and the intervening space contains tin which is heated by an electric current. J. S. G. Thomas.

Induction pressure or vacuum furnace. E. F. Northrup, Assr. to Ajax Electrothermic Corp. (U.S.P. 1,683,986, 11.9.28. Appl., 1.8.25).—In a furnace having top and bottom walls and an inductor side wall, all vacuum-sealing against passage of air, the inductor side wall comprises the sealing part of the side of the enclosure. J. S. G. Thomas.

Electrolytic rectifier. H. C. Kremers (U.S.P. 1,682,846, 4.9.28. Appl., 16.7.26).—The cell comprises a filming electrode containing a rare-earth metal, *e.g.*, cerium, and at least one non-corrodible metal electrode. F. G. Clarke.

Electric [storage] batteries. Silica Gel Corp., Assees. of W. J. Plews (B.P. 272,916, 14.6.27. U.S., 15.6.26).—Plate electrodes are supported in spaced relation by a non-yielding packing of hard, adsorbent, granular or coarsely-ground silica gel, with or without electrolyte. J. S. G. Thomas.

Sulphur-proofing metallic conductors for cables etc. F. Kirschner and J. Hess (B.P. 297,161, 23.6.27). —Zinc is electrolytically deposited on a coating of an easily fusible metal or alloy, *e.g.*, tin, nickel, or tin alloy, which is itself deposited upon the conductor and fused; a thin layer of tin is then deposited on the zinc. J. S. G. Thomas.

Coatings conductor of electricity for electroplating non-metallic articles. K. Baranovski (B.P. 297,260, 21.12.27).—Water is added from time to time in small quantities to a syrupy paste produced by boiling finely-powdered carbon, soot, or synthetic graphite with a dilute alcohol or ether; after heating until the alcohol or ether has been completely evaporated, the aqueous paste is mixed with soluble glass. J. S. G. Thomas.

Apparatus for electrical precipitation of suspended particles from gases. Lodge-Cottrell, Ltd. From Lurgi Apparatebau Ges.m.b.H. (B.P. 296,956, 26.3.28).—Resistances are inserted in the feeders of different groups of electrodes connected to a common source of high-tension unidirectional current, and/or between the discharge electrodes and the opposite collecting electrodes. J. S. G. Thomas.

Increasing the electric disruption strength or resistance of films consisting of cellulose esters or ethers. M. Ow-Eschingen (B.P. 281,663, 29.11.27. Austr., 1.12.26).—The dielectric character of the films is increased by soaking them with an oil of high disruptive strength (*e.g.*, paraffin oil, transformer oil, etc.). The process is carried out *in vacuo* and subsequently under a pressure above atmospheric. F. G. Crosse.

[Electrode mounting for] electric furnaces. Soc. Electro-Métallurgique de Montricher (B.P. 282,747, 17.12.27. Fr., 28.12.26).

Separators for electrodes of electrolytic cells. J. L. Woodbridge (B.P. 297,246, 23.11.27).

Electric incandescence lamps with concentrated filaments. S. G. S. Dicker. From N. V. Philips' Gloeilampenfabr. (B.P. 297,170, 4.7.27).

Electrical heating apparatus for electroplating baths. H. Zander (B.P. 297,225, 1.10.27).

Carbon (B.P. 274,883).—See II. **Hydrogen and oxygen** (G.P. 449,603).—See VII. **Resistance alloys** (B.P. 285,908). **Conductivity of metals** (U.S.P. 1,683,209).—See X. **Sugar juice** (F.P. 618,779).—See XVII. **Antirachitic preparations** (B.P. 286,665).—See XX.

XII.—FATS; OILS; WAXES.

Electrically-heated apparatus for fat and oil Soxhlet extractions. F. Gogolev (Masloboino Zhir. Delo, 1928, No. 3, 18—19).—The usual apparatus is water-jacketed. Chemical Abstracts.

Determination of the saturated fraction of fats by means of the thiocyanogen value. H. P. Kaufmann (Z. angew. Chem., 1928, **41**, 1046—1048).—As the thiocyanogen values of oleic and linoleic acids are approximately the same, *i.e.*, 89·93 and 90·57, respectively, the percentage of saturated acids in a fatty acid mixture may be calculated by multiplying the thiocyanogen value by 1·108 and subtracting the result from 100. Similarly, in a mixture of glycerides the percentage of saturated compounds is obtained as above but by using the factor 1·158. The results agree closely with those obtained by the lead salt method and by Bertram's oxidation method. A. R. Powell.

Detection of rancid edible fats which have been reworked. J. Grossfeld (Z. Unters. Lebensm., 1928, **55**, 376—385).—The octoic acid value of fats (see below) is progressively increased by heating the fat at 150° or above in contact with air, by treatment with steam, or by development of rancidity, but it is not increased by heating the fat in a current of carbon dioxide or by the process of hardening. Further, the prolonged action of ultra-violet light on normal lard destroys the fraction causing luminescence, raises the octoic acid value, and forms the substance responsible for the Kreis reaction of rancid fats. It is suggested that the increase in the octoic acid value is due to pelargonic and azelaic acids formed by oxidation and fission of oleic acid, and that the substance causing luminescence is a derivative of oleic acid, probably of hydroxyoleic acid. W. J. Boyd.

Octoic acid value for determination of coconut oil. J. Grossfeld (Z. Unters. Lebensm., 1928, **55**, 354—375).—A new octoic acid value for the determination of coconut oil in fat mixtures is defined as the quantity of fatty acid in 0·5 g. of fat which under the given conditions is not precipitated by magnesium sulphate but is precipitated by buffered copper sulphate solution expressed in c.c. of 0·01*N*-solution. A sample of the fat (0·50—0·58 g.) is saponified by warming with 0·2 c.c. of 50% potash and 1 c.c. of glycerin (*d* 1·23). The fatty acids having insoluble magnesium soaps are precipitated by magnesium sulphate solution and collected on a filter next day. From a portion of the filtrate the octoic acid is precipitated by means of a solution containing 50 g. of crystallised sodium acetate, 3·12 g. of crystallised copper sulphate, and 50 c.c. of 20% acetic acid per litre. The precipitate is removed by filtration in a tared Gooch crucible and washed first with a saturated solution of copper octoate and then with 1—2 c.c. of water. Crucible and precipitate are dried at 100° and weighed when cool. The weight of the precipitate in mg. multiplied by the appropriate factor gives the octoic acid value. When less than 2 mg. of copper octoate are weighed the result should be checked by dissolving the precipitate in 20% acetic acid, adding potassium iodide, and titrating the liberated iodine by means of 0·0025*N*-sodium thiosulphate. After deducting the correction obtained from a blank test the octoic acid value is obtained by multiplying the number of c.c. of thiosulphate solution used by the appropriate factor. This method gives results practically identical with those obtained by precipitation of the octoic acid as the silver salt (cf. Bertram, Bos, and Verhagen's method; B., 1926, 499), and avoids the disturbing effect of reducing substances in the soap solution. The octoic acid value found for various fats and for mixtures of coconut oil with butter fat and with cacao fat are given. W. J. Boyd.

Approximate determination of butter fat and coconut oil in fat mixtures. T. Sundberg (Z. Unters. Lebensm., 1928, **55**, 397—404).—A diagram has been prepared by plotting the Polenske and Reichert–Meissl values of lard–coconut oil–butter fat mixtures between rectangular co-ordinate axes, and lines have been drawn representing mixtures of equal content of coconut oil and butter fat, respectively. The area so marked out is triangular with two sides straight and the third curved and indicates mixtures containing no butter fat. From the diagram, providing the Reichert–Meissl and Polenske values of the mixture are known, the contents of coconut oil and butter fat can be read, and also the Reichert–Meissl value due to the butter fat present. This corrected Reichert–Meissl value may be used to obtain, from tables provided, the butter fat content of the mixture when the Reichert–Meissl value of the butter fat is 27 or 29 instead of the value 27·8 on which the diagram is based. W. J. Boyd.

Tung oil. II. D. Holde, W. Bleyberg, and M. A. Aziz (Farben-Ztg., 1928, **33**, 3141—3144; cf. B., 1928, 612).—The iodine value (Hanus) obtained for elæostearic acid is influenced by the time of reaction (*loc. cit.*), the presence of light, and the mode of preparation of the iodine–bromine reagent. Attempts were made to determine the extent of halogen substitution or secondary dehalogenation by determining the halogen acids in the reaction mixture after titration with thiosulphate. Only one fourth to one fifth of the iodine apparently absorbed could be accounted for by the halogen retained by elæostearic acid; the remainder was recoverable from the aqueous solution and appeared to be due, at least in part, to a secondary elimination of halogen acid. It could not be ascertained at what stage in the Hanus test this separation occurred, but it is suggested that there is a tendency for the 6-membered chain constituting the triple conjugated linkings to close, by the addition of halogen to the terminal carbon atoms and subsequent elimination of halogen hydride, leaving hydroaromatic or aromatic derivatives. E. Lewkowitsch.

Tung oil. III. Constitution of elæostearic acid. A. Eibner and E. Rossmann (Chem. Umschau, 1928, **35**, 197—199; cf. B., 1924, 477; 1926, 448).—By treating the ozonides of α- and β-elæostearic acids with cold water, in the presence of sulphurous acid to avoid oxidation, the authors succeeded in identifying glyoxal (60% yield; isolated as the nitrophenylosazone) as a product of the reaction. This fact constitutes experimental support for the Böeseken–Ravenswaay formula for elæostearic acid (cf. B., 1925, 813). The remaining fragments of the elæostearic acid chain—azelaic and valeric acids and their aldehydes—were identified, but no trace of succinic aldehydes was found. When the ozonide was hydrolysed in the hot, carbon dioxide was freely evolved, but only traces of glyoxal were apparent. It is considered that the small quantities ($< 9\%$) of succinic acid found by von Schapringer and by Vercruysse among the products of oxidation of elæostearic ozonide by permanganate were due to secondary reactions; tests show that, under such conditions, azelaic acid yields small quantities of succinic acid. E. Lewkowitsch.

Constitution of tetradecenoic acid from tsuzu oil. M. Tsujimoto (Chem. Umschau, 1928, **35**, 225—227).—The crystalline tetradecenoic acid isolated from tsuzu oil (B., 1926, 637) is identified as Δ^3-tetradecenoic acid by investigation of the ozonide, and is termed "tsuzuic acid." E. Lewkowitsch.

Tetradecenoic acid from sperm oil. M. Tsujimoto (Chem. Umschau, 1928, **35**, 227).—The name "physeteric acid" is given to the Δ^4-tetradecenoic acid isolated from sperm oil (B., 1925, 856; 1926, 637), the term "physetoleic" acid being already assigned to Δ^8-hexadecenoic acid found in whale oils. Physeteric acid is isomeric with tsuzuic acid (cf. preceding abstract). E. Lewkowitsch.

Evaluation of oil seeds. P. Lipták (Ber. ungar. pharm. Ges., 1926, **2**, 155—158; Chem. Zentr., 1928, i, 1562).—The acid value is determined directly on the alcoholic extract of the ground oil seeds. A. A. Eldridge.

Extraction of castor oil from the seed with gasoline. A. Slashchev (Masloboino-Zhir. Delo, 1928, No. 3, 9—11).—Benzene darkens the oil; the loss when gasoline is used is 1·5—2%. The use of cold gasoline is unsatisfactory. The characters of standard, extracted, and pressed oils are compared. Chemical Abstracts.

Purification of vegetable oils. A. Zinoviev (Masloboino-Zhir. Delo, 1928, No. 3, 11—15).—To remove slime, crude vegetable oils were heated at 80—100° for 20—30 min., and a current of dry air was blown through them. Similar results were obtained with carbon dioxide, hydrogen, and nitrogen. Chemical Abstracts.

Sp. gr. of linseed oil. F. Fritz (Farben-Ztg., 1928, **34**, 24—28).—An exhaustive review of the published values for the sp. gr. (and temperature coefficient) of linseed oil. E. Lewkowitsch.

See also A., Oct., 1086, **Solubility of alkali soaps in hydrocarbons** (Weichherz). 1092, **Oil emulsions** (Köhler). 1103, **Oxidation of fats** (Palit and Dhar). 1115, ***iso*Oleic acids** (Bauer and Mitsotakis). **Esters from Philippine lumbang oil** (Vicente and West).

Sampling pipette. Allen.—See I. **Bromometric examination of fats etc.** Andriska.—See XX.

Patents.

Manufacture of cream or like fatty powders. J. E. Nyrop (B.P. 297,256, 14.12.27).—Fatty material, *e.g.*, cream, emulsions of fats in skim milk, etc., is homogenised and dried by spraying with a "Niro" atomiser (cf. B.P. 259,922) into an atmosphere free or practically free from oxygen and at a temperature sufficiently low to prevent destruction of the vitamins. L. A. Coles.

Manufacture of Turkey-red oils etc. Erba A.-G. (B.P. 294,621, 15.12.27. Ger., 28.7.27).—Colourless oils are prepared by sulphonating castor oil etc. in the presence of quantities of oxidising bleaching agents, *e.g.*, peroxides, per-acids, and per-salts, in excess of those required for catalytically influencing the sulphonation of the oil (cf. B.P. 292,574; B., 1928, 792). The sulphonation may be preceded and/or followed by treatment with ordinary bleaching agents, fuller's earth, etc. L. A. Coles.

Manufacture of highly sulphonated oils, fats, fatty acids, and waxes. Erba A.-G. (B.P. 296,935, 30.12.27. Ger., 22.11.27. Addn. to B.P. 294,621, preceding).—Highly sulphonated colourless products are obtained from animal and vegetable oils and fats, fatty acids, or waxes (other than castor oil) by sulphonation with sulphurous acid, or with sulphuric acid or organic sulphonic acids in the presence of oxidising bleaching agents in excess of the amount required to catalyse the sulphonation. After-bleaching may be

performed, if required, and physically acting bleaching agents (*e.g.*, fuller's earth) can be employed.
E. Lewkowitsch.

Apparatus for the separation of vegetable oils, e.g., crude olive oil, from juice. Aktiebolaget Separator (F.P. 620,601, 25.8.26. Spain, 27.8.25).—The oil and juice, after preliminary separation by gravity in a tank, are run through separate inlet tubes into a centrifugal apparatus, the inlet tube for the oil being movable so that it always feeds the oil near the surface, and that for the juice discharging near the bottom of the apparatus. L. A. Coles.

Oil composition and retardation of development of rancidity therein. W. D. Baldsiefen and T. H. Rogers, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,675,631, 3.7.28. Appl., 9.3.22).—To retard the development of rancidity in castor oil and other oils used as softeners for cellulose nitrate, diphenylamine (0·25—4·0% on the oil) is added. C. Hollins.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Lacquer diluents. A. Noll (Farben-Ztg., 1928, 33, 3260—3265).—The analysis of various mixtures of aliphatic and aromatic hydrocarbons and alcoholic solvents is described. Qualitatively, ethyl alcohol is detected by formation of its benzoate, benzene by formation of nitro-compounds and colour reactions, and petroleum hydrocarbons by insolubility on nitration or sulphonation. Examination of a series of experimental mixtures demonstrates that "total benzol" content can be obtained with sufficient accuracy for the present purpose either by nitration or sulphonation. In the complete scheme of analysis propounded, alcoholic constituents are determined by absorption by calcium chloride solution, the alcohol in the aqueous layer being obtained, if desired, by distillation methods, and hence the water by difference. The hydrocarbon residue is then nitrated or sulphonated, giving the aromatic content directly and the aliphatic by difference. Typical test reports are quoted, the results of which are to be considered as complementary to such tests as rate of evaporation, distillation range, etc. S. S. Woolf.

See also A., Oct., 1090, **Particle size in precipitated zinc sulphide** (Levi and Fontana). 1100, **Principles of polymerisation** (Scheiber). 1105, **Prussian-blue** (Davidson and Welo).

Tanning agents. Blanc.—See XV.

Patents.

Production of high-grade plasters and mixed lacquers containing the same. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 296,796, 9.4.27).—The products comprise cellulose esters or ethers mixed with at least three times their weight of powdered talc or graphite, or of mixtures of these with lithopone, white lead, ground slate, asbestos, etc., with the addition, if desired, of solvents for the cellulose compounds, plasticising agents, lacquers, resins, etc.
L. A. Coles.

Manufacture of phenolic resins. Brit. Dyestuffs Corp., Ltd., N. Strafford, and E. E. Walker (B.P. 296,514, 7.7. and 10.11.27).—Phenol-aldehyde resoles are incorporated with an inert filler (wood meal, cotton waste, asbestos, china clay), and free phenols and soluble condensation products are extracted with a solvent (water, benzene). When water is used it is advantageous to adjust the p_H to about 6 before extraction. The purified "resole" may subsequently be removed from the filler for use in varnishes, or may be filtered off together with the filler and used as moulding powder. The process is also suitable for production of laminæ, the "filler" being paper sheets. C. Hollins.

Manufacture of flexible abrasive articles such as sandpaper etc. Minnesota Mining & Manuf. Co., Assees. of R. P. Carlton (B.P. 267,516, 8.3.27. U.S., 13.3.26).—Phenol-formaldehyde condensation products in a plastic condition, with or without the addition of solvents or agents for modifying the flexibility, *e.g.*, glycerol, are used as binding agent, and are subsequently hardened by heat. L. A. Coles.

Manufacture of artificial masses. Soc. Chem. Ind. in Basle (B.P. 284,589, 30.1.28. Switz., 29.1.27).—The product obtained by condensing an aromatic amine, preferably aniline, with formaldehyde in the presence of an acid is treated with an alkali to neutralise the acid, after which it is washed, dried, ground to a powder, and compressed, alone or mixed with fillers, coloured material, etc., at the ordinary or at a raised temperature. L. A. Coles.

Production of material [artificial resin] resembling glass. P. Carpentier (F.P. 620,169, 6.8.26).—A solution of casein in 10% sodium carbonate solution is poured into molten phenol, sodium salicylate is dissolved in the mixture, and formaldehyde is then added. After filtration, the mixture is heated under reflux, 80% of the water is removed by distillation *in vacuo*, and the residue is heated at 100° in moulds until polymerisation is complete. L. A. Coles.

Manufacture of condensation products of urea or its derivatives and formaldehydes. I. G. Farbenind. A.-G. (B.P. 296,361, 28.2.27. Addn. to B.P. 266,752, B., 1928, 762).—Hydroxymethylcarbamide and other products of mild condensation of formaldehyde with carbamide are treated with alcoholic condensing agents, the treatment being stopped before the formation of high-molecular products. From hydroxymethylcarbamide and methyl hydrogen sulphate in methyl alcohol there is obtained after neutralisation a crystalline *product*, m.p. 91—92·5°. The product may be further condensed, without elimination of water, to give glassy compounds. C. Hollins.

Manufacture of solvent oil. S. Iymori and K. Suzuki, Assrs. to Zaidan Hojin Rikagaku Kenkyujo (U.S.P. 1,675,977, 3.7.28. Appl., 4.8.23. Japan, 1.11.22).—Resin acids, *e.g.*, colophony or its dry-distillation products, are mixed with fuller's earth, kieselguhr, etc., and distilled at 500°. The main product is an oil, b.p. about 230°, *d* 0·88, which is a solvent for rubber, pitch, sulphur, etc. C. Hollins.

Production of binding medium [for colours, varnishes, and cements]. J. Tengler (B.P. 271,073, 9.5.27).—See U.S.P. 1,660,851; B., 1928, 376.

Purification of phenol-formaldehyde resins. F. Seebach, Assr. to Bakelite Ges.m.b.H. (U.S.P. 1,683,702, 11.9.28. Appl., 6.2.26. Ger., 17.2.25).—See G.P. 431,514; B., 1926, 889.

Powdered vitreous polymerised styrene and homologues. I. Ostromislensky, Assr. to Naugatuck Chem. Co. (U.S.P. 1,676,281, 10.7.28. Appl., 7.5.24).—See B.P. 233,649; B., 1926, 451.

Method and apparatus for spraying paints, lacquers, etc. for production of a coating upon surfaces. A. Grube (B.P. 280,500, 22.7.27. Ger., 15.11.26).

Iron oxide paint (B.P. 296,598). **Red lead** (B.P. 295,975).—See VII. **Moulded articles** (B.P. 282,810).—See IX.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Patents.

Production of rubber goods from vulcanised rubber such as reclaimed rubber, waste rubber, etc. Anode Rubber Co., Ltd. From P. Klein (B.P. 296,107, 23.2.27).—Aqueous dispersions prepared from the vulcanised rubber are caused by electrophoretic, chemical, or mechanical treatment to form deposits upon permanent or temporary backings or moulds. Compounding ingredients may be mixed previously into the dispersions. D. F. Twiss.

Production of aqueous dispersions of organic substances [*e.g.*, rubber etc.]. Anode Rubber Co., Ltd. From P. Klein and A. Szegvári (B.P. 296,685, 4.3.27).—The organic material, *e.g.*, rubber, reclaimed rubber, or factice, is plasticised and two reagents, *e.g.*, oleic acid and aqueous alkali such as 6% ammonia solution, capable of reacting to form one or more dispersing agents, are introduced while the kneading process is being continued; the aqueous alkali is added gradually and in small amounts. The mass finally becomes fluid, the water then constituting the continuous phase. Compounding ingredients may be incorporated at any stage. D. F. Twiss.

Producing dipped goods from organic dispersions. Anode Rubber Co., Ltd. (B.P. 285,844, 30.5.27. Ger., 23.2.27).—In the production of shaped goods by repeated dipping operations from aqueous dispersions of organic substances, especially natural or artificial dispersions of rubber, the dipping mould is heated between individual dippings and, if desired, also during the process of immersion. D. F. Twiss.

Production of designs [in colour] on rubber or like materials penetrable by volatile solvents but otherwise non-absorbent. P. Allman and H. N. Morris (B.P. 296,461, 3.5.27).—For producing designs on rubber, celluloid, etc. an ink is used comprising a solution of a suitable colour, colour base, or fatty acid salt of the colour in a hydrogenated derivative of phenol, naphthalene, or naphthol, with or without other solvents miscible therewith. D. F. Twiss.

Plastic material. W. B. Wescott, Assr. to Rubber Latex Res. Corp. (U.S.P. 1,680,234, 7.8.28. Appl., 13.1.27).—Asbestos extracted with hydrochloric acid is incorporated with rubber latex. C. Hollins.

Preventing separation in liquid dispensions (B.P. 296,454).—See I.

XV.—LEATHER; GLUE.

Depilation of skins by means of alkaline solutions. R. H. Marriott (J. Soc. Leather Trades' Chem., 1928, **12**, 342—360; cf. B., 1928, 580, 794).—The hydroxyl ions in fresh lime suspensions hydrolyse the disulphide linkings in the cystine of skin keratins to form calcium sulphide which reduces the remaining keratin more quickly. Clear lime water does not conserve the calcium sulphide formed, and consequently does not loosen the hair on skins. Suspended matter, *e.g.*, lime suspensions, and collagen degradation products, *e.g.*, old lime liquor, retain the sulphides. Since hair which has been treated with hydroxides is less susceptible to the reducing action of sulphides, it follows that fresh lime liquors will not always loosen the hair. The hydroxyl-ion concentration of an old lime liquor is too low to produce this inhibiting effect on the reduction process; the sulphides present from previous use reduce the cystine. There is less dissolved air in an old lime liquor, hence reduction is facilitated. The hair is loosened more quickly by "sharpening" lime liquors with sodium sulphide because of the small sulphide content of old lime liquors. Cystine is probably hydrolysed before it is reduced, and in presence of oxygen the sulphydryl group formed may be oxidised; this will be prevented if reducing agents are present. Most of the ammonia present in lime liquors is derived from the cystine groupings in the hair proteins, and a little is provided by the amides in both hide and skin proteins. The keratins in living or freshly flayed skin contain sulphydryl groups whereas those of dead or preserved skin do not, hence only the former can be unhaired easily in solutions of alkaline hydroxides. D. Woodroffe.

Biochemistry of soaking [of animal skins]. II. Effect of time, temperature, and hide proportion on soak waters. E. R. Theis and E. L. McMillen (J. Amer. Leather Chem. Assoc., 1928, **23**, 372—397; cf. McLaughlin and Rockwell, B., 1925, 682).—Pieces of hide were soaked in four times their weight of water for 1—5 days and the soak liquors analysed. The amount of ammonia present and also the organic, protein, and amino-nitrogen increased as the time of soaking increased, but the amino-nitrogen increased more rapidly than the ammonia, thus showing that the formation of ammonia is not the first criterion of protein degradation. The melanin nitrogen diminished rapidly as the time of soaking increased, probably owing to the bacterial or enzymic destruction of tryptophan. Amide nitrogen is formed through the deamination of the monoamino-acids and through the decomposition of the diamino-acids, and it is shown that these acids decrease during the soaking. The arginine in the hide probably decomposes into urea and ornithine. The former may be oxidised to ammonia and carbon dioxide, the latter to amino-valeric acid or putrescine. The formation of diamines, *e.g.*, putrescine, is a typical reaction of putrefaction and they are easily formed by adding arginine or lysine to a putrefying medium. The reducing power of the soak increases rapidly after 24 hrs. As the proportion of hide to soak water is increased, the amount of ammonia and organic and protein nitrogen decreases. The optimum hide–water ratio is from 1 : 4—1 : 6, at which proportion less protein degradation occurs. As the temperature rises, a much greater hydrolysis takes place and more protein is dissolved. D. WOODROFFE.

Tanning by means of condensation products of aldehydes and phenols and their derivatives. C. BLANC (Sealed Note, No. 1928, 9.9.09. Bull. Soc. Ind. Mulhouse, 1928, **94**, 359—364). Report by L. MEUNIER (*Ibid.*, 364—367).—Although skins may be tanned by means of phenols and their substitution and oxidation products (quinones), superior results are obtained by use of the condensation products of such substances with formaldehyde. *E.g.*, the product obtained by heating resorcinol with formaldehyde in the presence of a mineral acid is resinous, water-insoluble, and of no value as a tanning agent, whereas a satisfactory tanning agent is obtained by heating for 5—10 min. at 50—60° a mixture of 10 g. of resorcinol, 500 g. of water, 150 g. of sodium bisulphite (d 1·261), and 85 g. of formaldehyde (d 1·083). Skins are tanned by immersion for several hours in the last-named product diluted 3—4 times. Tanning may be effected simultaneously with formation of the tanning agents. Thus, skins may be impregnated and immersed in a suitable mixture of water, resorcinol, sodium bisulphite and formaldehyde, and after a few hours more sodium bisulphite and formaldehyde may be added to complete the condensation and tanning. MEUNIER reports favourably on the process, indicating several related processes, particularly that of Wolesensky (B., 1926, 375). A. J. HALL.

[Acidity of] aqueous extracts from [vegetable-tanned] leathers. E. BÜTTGENBACH (Collegium, 1928, 444—449).—The fat solvent used in degreasing leather does not affect the $p_{\rm H}$ of the aqueous extract of the leather. Aqueous extracts (Procter extractor) of leather are moderately buffered solutions of a mixture of weak acids of slightly differing dissociation constants. The $p_{\rm H}$ values of these extracts can be determined to an accuracy of 0·1 by the quinhydrone electrode or by colorimetric methods. The metallic electrode in the former method should be completely surrounded with quinhydrone. The form of the buffering curves supports the use of phenolphthalein as indicator in titrating the acidity of dilute solutions of vegetable tannins and indicates the presence or absence of strong acids in aqueous extracts of vegetable-tanned leathers. Additions of chlorides to these solutions increases their hydrogen-ion concentration. D. WOODROFFE.

Difference of resistance to enzymes of treated and untreated collagen. V. S. SADIKOV (Trans. State Inst. Appl. Chem., Moscow, 1927, No. 6, 82—88).—The resistance of collagen to trypsin is reduced by hydrolysis with water, by rise of temperature, by hydrolase, or by pulverisation. If hides and fascia are pulverised and treated with dilute sodium hydroxide solution their resistance to enzymes is reduced.

CHEMICAL ABSTRACTS.

Preparation of pure collagen and its utilisation for the determination of tannins in tanning materials. V. S. SADIKOV (Trans. State Inst. Appl. Chem., Moscow, 1927, No. 6, 64—81).—For analytical purposes collagen is preferable to hide powder, which contains also keratin, elastin, proteins, and mucoids. Washed fascia of an ox, after removal of remains of other tissues, is pulverised; the powder is agitated for 6 hrs. (or digested for 24 hrs.) at the ordinary temperature with 0·35% sodium hydroxide solution, the process being repeated twice with fresh solutions. The mass is washed by decantation with water, coagulated with acetic acid or carbon dioxide, pressed, suspended in water, again pressed, and agitated with frequent changes of water. The collagen is finally pressed into thin leaves which are dried, first in cool air (or with acetone or alcohol) then at 40°, and pulverised.

CHEMICAL ABSTRACTS.

Provision of hide powder [for tannin analyses]. TATARSKAJA (Collegium, 1928, 463—464).—Ordinary limed pelt from a tannery is delimed, bated with "Oropon," treated with sodium hydroxide solution for 3 days, washed, brought to $p_{\rm H}$ 5 with acid, washed, pressed, dried with alcohol, and ground in a specially cooled mill. The product compares favourably with English hide powder in composition and in tannin analyses. D. WOODROFFE.

Effect of acid concentration in plumping on the mechanical and chemical properties of leather. G. G. POVARNIN and SHIMANOVICH (Vestnik, 1926, No. 7, 7—10).—Treatment of calfskin with sulphuric acid before vegetable tanning decreased the tensile strength and resistance to stretch; treatment with lactic acid during tanning had no effect on tensile strength. The "true tanning coefficient" and "true filling coefficient" increased with increased swelling; swelling accompanied by hydrolysis decreases tensile strength and increases roughness. CHEMICAL ABSTRACTS.

Swelling, degree of tannage, and mechanical properties of leather. C. O. POVARNIN and M. LIUBICH (Vestnik, 1925, No. 10—11, 115—118).—Swelling of skin with acids (0·04N) decreases the strength; with increasing swelling the "filling coefficient" increases, whilst the "tanning coefficient" becomes maximal and then declines. There is no direct connexion between chemical composition and strength of leather. CHEMICAL ABSTRACTS.

Action of sulphuric acid on leather. A. KUKARKIN (Vestnik, 1925, No. 1, 150—155).—By precipitation of soluble tannin as phlobaphens, the addition of small quantities of sulphuric acid to sole leather increases the apparent percentage of tannage.

CHEMICAL ABSTRACTS.

Resistance of leathers to hydrolysis. G. ARBUSOV (Vestnik, 1926, No. 4, 29—31).—An inconclusive study of the resistance of leathers to hydrolysis before and after extraction with aqueous methyl alcohol.

CHEMICAL ABSTRACTS.

Water-penetration of sole leather. H. VAN DER WAERDEN (Collegium, 1928, 453—458).—The author has used the apparatus previously described by Gerssen (B., 1928, 794) to determine the water penetration of vegetable-tanned sole and dressing leathers, before and after removing a thin split from grain and flesh sides. There is practically no difference in the water penetrability of these leathers of good quality except that caused by the finishes applied to grain and flesh sides. Quality, filling with extract, or treatment with mineral salt is without effect on this property. Wet leather is more penetrable than dry leather. The water-penetration test is not of much use in judging sole leathers. D. Woodroffe.

Rôle of non-tannin. P. I. Pavlovich (Vestnik, 1926, No. 5—6, 16—19).—Addition of non-tans to tan liquor is undesirable; addition of acid is preferable. Chemical Abstracts.

Determination of total acid in tan liquor. M. Michailenko-Malenko (Vestnik, 1925, No. 9, 52—54).—The liquor is treated with a solution of sodium chloride (50 g.), gelatin (8 g.), and gum arabic (4 g.) in hot water (250 c.c.) neutralised with sodium hydroxide; the mixture is filtered and an aliquot part of the filtrate is treated with 0·01N-sodium hydroxide solution, using hæmatin. Chemical Abstracts.

Colorimetric determination of p_H values in the tannery. L. Köhler (Collegium, 1928, 449—453).—A modified Tüpfel method is used. A 1 : 1 indicator solution and the solution to be tested are mixed on a spotting tile with cavities 0·2 mm. deep. The colour produced is compared with those on a colour chart of the colours obtained at different p_H values. The effect of the natural colour, turbidity, or viscosity is thereby reduced 1000 times as compared with the ordinary colorimetric method. The indicators used are bromophenol-blue, bromocresol-green, methyl-red, bromocresol-purple, bromothymol-blue, phenol-red, cresol-red, and thymol-blue. D. Woodroffe.

Comparison of methods of hydrolysis in determining nitrogen in leather. R. W. Frey, L. J. Jenkins, and H. M. Joslin (J. Amer. Leather Chem. Assoc., 1928, **23**, 397—402).—Four conditions of hydrolysis were compared and the following method is recommended. The leather (1·5 g.) is digested in a Kjeldahl flask with 0·5 g. of copper sulphate crystals, 10 g. of pulverised anhydrous sodium sulphate, and 25 c.c. of concentrated sulphuric acid. After heating below the b.p. until frothing ceases, the solution is boiled briskly so that the condensed vapours of sulphur trioxide hover in the upper half of the bulb of the flask. After 2—2·5 hrs.' boiling, the flask is cooled, the contents are diluted, and the ammonia is distilled off and titrated as usual. Prolonged digestion (4—5 hrs.) may cause loss of nitrogen and is unnecessary. D. Woodroffe.

Lecithin reaction for detecting egg yolk in leather. N. Jambor (Collegium, 1928, 459—460).—Ordinary finishes are removed from the leather with 1% ammonia solution; nitrocellulose finishes with amyl acetate. The treated leather (10 g.) is then extracted with ether, and to the extract, after removal of the ether by evaporation, are added hot water and 3 c.c. of 10% sodium hydroxide. After boiling the liquor for some minutes, cooling, acidifying with acetic acid, and boiling again it is filtered. Addition of ammonium molybdate in excess to the filtrate acidified with nitric acid produces a yellow precipitate on warming if lecithin is present. 0·2% of egg yolk used in fat-liquoring was detected. D. Woodroffe.

Effect of dilute solutions of gallotannic acid on gelatin. A. Küntzel (Collegium, 1928, 460—463).—The effect on four different grades of gelatin has been determined. The concentrations of the solutions of gallotannic acid at which the gelatin becomes turbid and gives maximum swelling, respectively, are shown to be connected and also to depend on the quality of the gelatin. The differences are attributed to the different isoelectric points of gelatin and gelatose. D. Woodroffe.

See also A., Oct., 1092, **Colloidal state of gelatin solutions** (Frankel). **Absorption of water by gelatin** (Jordan-Lloyd and Pleass).

Patents.

Production of soft, tough leather dyed in coloured patterns. N. Wakhrouchev (F.P. 618,667, 7.7.26).—Skins are successively softened in water, treated with a solution containing calcium hydroxide and arsenious oxide or sodium sulphide, rubbed to remove the grain, subjected to white- and chrome-tanning processes, and dyed in the usual manner. Portions of the skins are then forced through openings in perforated plates, and the exposed portions only are dyed by treating them successively with solutions containing tannin and a basic dye. L. A. Coles.

Manufacture of albumin-containing plastic [horn-like] masses having elastic properties. O. Manfred (B.P. 281,223, 7.6.27. Czechoslov., 26.11.26).—Mixtures for manufacturing the products comprise albuminous material, an aldehyde-ammonia or a condensation product of an aldehyde with an amine or a thioamine, rubber latex, and accelerators and vulcanisers, or, alternatively, powdered caoutchouc or butadiene hydrocarbons, catalysts, and, if desired, protective colloids and fillers. L. A. Coles.

Manufacture of glue in small pieces, *e.g.*, granules, drops. Stockholms Benmjölsfabriks Aktiebolag (B.P. 284,704, 30.1.28. Swed., 4.2.27).

XVI.—AGRICULTURE.

Influence of soil reaction on flax and oats. M. Domontovich and G. Abolina (Nauch. Agron. Zhur., 1927, **4**, 346—354).—The yield is maximal at p_H 4·1 and 8·1 for oats and p_H 6 for flax. With oats, neutral and alkaline soils produced the largest percentage of nitrogen. Chemical Abstracts.

Effect of the constituents of alkali fertilisers and soil amendments on the permeability of certain fine-textured soils under irrigation. C. W. Botkin (New Mexico Agric. Exp. Sta. Bull., 1927, No. 160, 61 pp.).—Sodium (and potassium) compounds retarded the penetration of water in a clay and a clay-loam soil, the effect decreasing in the order: carbonate, acetate, chloride, nitrate, silicate, sulphate. The following substances (0·5%) increased the rate in decreasing order: aluminium sulphate, ferrous sulphate, aluminium chloride, (primary) calcium hydrogen phosphate, ferric sulphate, potassium hydrogen sulphate, tannin, stable manure, ammonium sulphate. Depressants rendered the soil more alkaline, and highly deflocculated, and *vice versâ*. Fertilisers which tend to decrease soil alkalinity improve permeability and tilth. Chemical Abstracts.

Availability [in soils] of nitrogen in sodium nitrate, ammonium sulphate, and dried blood with varying ratios of phosphoric acid and potash. J. G. Lipman and A. W. Blair (New Jersey Agric. Exp. Sta. Ann. Rep., 1926, 521—528).—A record of the fourth year of work. A constant amount of nitrogen from three different sources, singly or combined, is used with single, double, or triple portions of phosphoric acid and single and double portions of potassium. The highest average recoveries were obtained with sodium nitrate. For the combined crops (the fertiliser being applied to the first, and the second being grown to utilise any remaining nitrogen), *e.g.*, rape and sorghum, the double portion of potassium gave lower yields and recoveries than the single. Chemical Abstracts.

Influence of acidity and degree of saturation of soils on the uptake of phosphates and potash. F. W. Wacker (Landw. Jahrb., 1928, 67, 589—628; Bied. Zentr., 1928, 57, 343—345).—In the examination of soil nutrients it is important to differentiate between methods measuring nutrient content (*e.g.*, Neubauer seedling method) and those, such as field trials, measuring the nutrient requirement. In the former type of process, experimental conditions largely influence results. Neubauer's method does not yield true nutrient values on very acid or very alkaline soils. It is, however, effective on clay soils within the ranges $p_{\rm H}$ 5·5—6·2 and 7·7—8·3 (Dirks' method; cf. B., 1927, 55), on sandy soils between $p_{\rm H}$ 6·0—7·5 and 7·3—8·4, and on moorland soils between $p_{\rm H}$ 6·6—5·5 and 7·6—8·1, in all cases the double $p_{\rm H}$ figure being initial and final values in this process. The intake of nutrients by plants begins to decrease in the region of $p_{\rm H}$ 8·1. Hydrolytic acidity is saturated in clays at $p_{\rm H}$ 7·5—7·6, in sands at $p_{\rm H}$ 7·2—8·3, and in moor soils at $p_{\rm H}$ 7·0—8·1. For optimum growth conditions, the reaction of the soil must be adjusted by liming to meet these conditions. Liming to the extent required by the Daikuhara process is insufficient to produce optimum growth of seedlings. A. G. Pollard.

Increasing the manurial value of Mahua cake. N. D. Vyas (Agric. Res. Inst., Pusa, Bull. No. 176, 1928, 12 pp.).—The effective manurial activity of Mahua cake is but slowly exerted. To increase the rate of nitrification, it is recommended to compost 100 pts. of finely-ground cake with 25 pts. of soil, 5 pts. of charcoal, and 65—70 pts. of water. Fermentation is allowed to proceed for 3 months and the mass is maintained in a slightly moist condition. A. G. Pollard.

$p_{\rm H}$ values of plants and corresponding soils. A. V. Blagoveshchenski, N. I. Sosedov, and A. G. Toshchchevikova (Bull. Univ. Asie Cent., Taschkent, 1926, 9—16).—The $p_{\rm H}$ values of the soils of the West Ferghana salt desert at 10—20 cm. depth were 7·8 ± 0·003; the $p_{\rm H}$ values of press-juice from leaves of various plants ranged from 3·0 to 8·2. Chemical Abstracts.

Lime and sodium fluosilicate [in insecticides]. S. Marcovitch (J. Econ. Entomol., 1928, 21, 436—437).—When wet plants are dusted with lime and sodium fluosilicate, calcium fluosilicate, which may cause injury to foliage, is formed. An inert carrier for the fluosilicate is preferred. Chemical Abstracts.

See also A., Oct., 1110, **Red soils of Cochin China** (Agafonov). 1161, **Maize grown in sand cultures** (Sprague). 1162, **Rôle of phosphorus in plants** (Barrenscheen and Albers). **Determination of phosphoric acid requirement of soils** (Nemec). **Mineral nutrient content of plant solutions** (Gilbert, McLean, and Adams).

Patents.

Fungicide or insecticide. I. G. Farbenind. A.-G. (G.P. 446,530, 11.2.23).—A solution of copper sulphate and 70% of molasses is treated with sodium hydroxide to alkaline reaction, then with calcium naphtholsulphonate, and evaporated to dryness, preferably *in vacuo*, at a low temperature. The product may be mixed with kiesulguhr, clay, or chalk for use as a dusting powder or dissolved in water to give a 0·5% solution for spraying. A. R. Powell.

Fungicide for plants and seeds. I. G. Farbenind. A.-G., Assees. of Badische Anilin u. Soda Fabr. (F.P. 610,281, 30.1.26. Ger., 9.2.25).—Compounds or salts of iron, copper, or mercury with formic acid or formamide form effective fungicides and bactericides for seeds and also promote germination and growth. This applies especially to iron and copper formates and the compound $(\rm HCO{\cdot}NH{\cdot}HgCl)_2,3HCl$. A. R. Powell.

Dry fungicide for seeds. A.-G. f. Anilin-Fabr. (F.P. 599,308, 10.6.25).—The seeds are mixed with a dry powder which evolves a poisonous gas, *e.g.*, kieselguhr impregnated with metaformaldehyde or with oils or other liquids which evolve chlorine. Organic or inorganic salts of copper or mercury may also be incorporated in the mass. A. R. Powell.

Insecticide. I. G. Farbenind. A.-G. (F.P. 617,784, 18.6.26. Ger., 19.1.26).—Esters of formic acid, especially ethyl and methyl formates, are claimed as insecticides; they are more effective than is carbon disulphide and are non-poisonous. A. R. Powell.

XVII.—SUGARS; STARCHES; GUMS.

Nitrogenous constituents of molasses and their bearing on its value. H. Claassen (Z. Ver. deuts. Zucker-Ind., 1928, 371—384).—Average data for German molasses from different factories indicate slightly higher nitrogen contents (referred to total non-sugars) for raw-sugar factory molasses than for molasses from white-sugar factories or refineries; but these differences, amounting to about 5—10% of the total nitrogen, are scarcely significant in view of much wider ones (up to 25—30% of the total nitrogen) between individual raw factory molasses. Rational evaluation of beet molasses for yeast manufacture or foddering purposes should take account of the contents of total, assimilable, and amide nitrogen. Assimilable nitrogen may be determined by two successive yeast fermentations, with addition of sugar after the first, as described previously (B., 1926, 686). The amount thus determined is much greater than that actually assimilated in methods of aeration yeast manufacture where large quantities of ammonium salts are added, because the yeast assimilates the ammonia in preference to other nitrogenous compounds, although the latter are a better form of nutriment. The total amount of nitrogenous matters in beet molasses is about 8·5 times the total nitrogen content, and represents about half the total non-sugars or 80% of the organic non-sugars as usually calculated. To obtain maximum yields of bakers' yeast, the molasses worts should contain 2—2·5 pts. of assimilable nitrogen per 100 pts. of sugar, although only about half of the former passes into the yeast crop; a more complete utilisation of the assimilable nitrogen is only possible at the expense of the quality of the yeast. Beet molasses usually contains, per 100 pts. of sugar, about 3·4 pts. of total nitrogen and 1·4—1·8 pts. of assimilable nitrogen. The necessary excess of the latter may be provided by addition of an extract of malt germs, which contain about 1·8% of total soluble nitrogen and 1·4% of assimilable nitrogen similar in character to that of molasses. Cane molasses contains about $\frac{2}{3}$—$\frac{3}{4}$ as much organic non-sugar and $\frac{1}{5}$—$\frac{1}{6}$ as much total nitrogen as beet molasses, and only a small proportion of the nitrogen is assimilable; its value for yeast manufacture lies therefore almost entirely in the sugar content, and it is much poorer in buffer substances than beet molasses. J. H. Lane.

Clarification of sugar solutions for polarimetry. V. Sázavský (Z. Zuckerind. Czechoslov., 1928, **52**, 669—672).—If 26 g. of beet molasses are defecated with basic lead acetate solution and made up to 100 c.c. the volume of the precipitate causes an error of about +0·26 on a polarimetric reading of 50. Such errors are avoided by the use of Horne's dry basic lead acetate defecant, added after the molasses solution has been made up to volume. A slight error in the opposite sense arises, however, from an increase in volume of the liquid due to the space occupied by the excess of defecant in the dissolved state. Excess of defecant must be used to obtain the necessary degree of decolorisation, and an excess of 1 g. is found to cause an error of —0·09 on a Ventzke reading of 50°. J. H. Lane.

Extraction of sucrose from carobs. G. Oddo (Chim. et Ind., 1928, **20**, 207—215).—The average composition of carob (locust) beans, without their seeds, is moisture 9—19·5%, nitrogenous matters 2—7%, fat 0·25—0·6%, sucrose 10—34%, reducing sugar 8—28%, starch and other extractives 24—38%, cellulose 4—12%, ash 2—4%, P_2O_5 0·16—0·24%. The author considers that extraction of the sucrose by the ethyl or methyl alcohol process described previously (cf. B., 1928, 29) is economically feasible on a large scale. J. H. Lane.

Danger of inversion in sugar factory products. O. Spengler and F. Tödt (Z. Ver. deut. Zucker-Ind., 1928, 393—405).—According to the hypothesis of ionic activities, the rate of inversion of sucrose in any solution depends only on the temperature and the activity of the hydrogen ions present; and since this activity determines the measured p_H value (as distinct from that calculated from acid concentration), it should be possible to calculate the rate of inversion at any temperature in any sugar factory product the p_H value of which has been determined. As a basis of reference for such calculations, two graphs showing the rates of inversion for p_H values from 2 to 8 and temperatures from 30° to 130° have been constructed by the authors from the inversion data of Jackson and Gillis (B., 1920, 634). Using these graphs to calculate the rates of inversion at 80° in a number of beet sugars, massecuites, and molasses for which Saillard has determined the actual rates and p_H values, the authors found that the calculated rates either agreed fairly closely with the actual ones or were higher than these. In most cases the ratio of calculated to actual rate was less than 2 : 1, but in some it was about 10 : 1, and in one case 35 : 1. Rates calculated from the p_H values as indicated might therefore prove useful as representing upper limits for the danger of inversion. J. H. Lane.

New modification of the Clerget method for determining sucrose. J. Schlemmer (Z. Zuckerind. Czechoslov., 1928, **53**, 13—23).—Clarification is effected by means of bromine liberated in the sugar solution itself by the interaction of potassium bromide and chloramine-*T*. The conditions of actual inversion are those of the Clerget–Herzfeld method, but both direct and inversion polarimetric readings are taken in presence of acetic acid. Applied to beet molasses, for which the method was worked out, the procedure is as follows:—52 g. of beet molasses are diluted to 200 c.c. with water alone, 50 c.c. are treated with a mixture of 10 c.c. of dilute hydrochloric acid (*d* 1·092) and 20 c.c. of a solution containing 400 g. of sodium acetate and 50 g. of potassium bromide per litre; 10 c.c. of a 15% aqueous solution of chloramine-*T* (Activin) are added with gentle agitation and the liquid is made up to 100 c.c. and filtered for the direct polarisation. For inversion another 50 c.c. of the original solution are treated with 10 c.c. of the dilute hydrochloric acid and inverted according to the Herzfeld procedure, whereupon 20 c.c. of the acetate–bromide solution are run in at once, and, after cooling, 10 c.c. of the chloramine-*T* solution are added, preferably in three portions. The solution is made up to 100 c.c., filtered after about 20 min., and polarised at 20°. For very dark products 0·25—1 g. of Carboraffin or Norit may be added before filtering. The sucrose is calculated by the usual Herzfeld formula except that the divisor 141·75 is substituted for 142·66. J. H. Lane.

Determination of sucrose by means of alkaline iodine solution. G. Borries (Z. Unters. Lebensm., 1928, **55**, 405—415).—The method of Auerbach and Bodländer (B., 1924, 107) for the volumetric determination of dextrose has been applied to the determination of sucrose, by finding the difference in the iodine equivalent of the solution before and after inversion. Corrections due to the reaction of the iodine with the lævulose and with the hydrochloric acid used for inversion have been determined. An excess of 9—10 c.c. of 0·1*N*-iodine must be present. The method is suitable for the determination of sucrose in the presence of invert sugar or in artificial honey. W. J. Boyd.

Evolution of carbon dioxide in the boiling of thin [beet] juices. I. E. Thielepape and P. Meier (Z.

Ver. deut. Zucker-Ind., 1928, 385—392).—The carbon dioxide evolved in the boiling of thin juices is not derived entirely from bicarbonates; other decomposition processes occur to some extent. Juices boiled under pressure at 116° evolve during the first hour a definite amount of carbon dioxide, which does not appreciably increase during the second hour, and the amount of sugar decomposed is negligible. At 124°, however, considerable decomposition of sugar occurs and carbon dioxide is evolved as long as boiling is continued. At both temperatures the juices, originally alkaline, become slightly acid in time. J. H. LANE.

Abnormal colour of raw [beet] sugar. K. ŠANDERA and A. RUZICKA (Z. Zuckerind. Czechoslov., 1928, **52**, 661—664).—Juices and raw sugars abnormal in colour were obtained in a number of Bohemian factories working beets from a limited area in which hailstorms had done considerable damage to the foliage of the growing plants. The juices after carbonatation were greenish and liable to loss of alkalinity. The separation of the syrup from the raw sugar in the centrifuges was unusually complete, so that the sugars were high in polarisation (*e.g.*, 96·0—97·65) and low in ash content (*e.g.*, 0·6—1·1%). The sugars were greyish and not adapted to long storage owing to loss of alkalinity. There is no record of any special difficulties in refining them. J. H. LANE.

Accurate determination of dry substance in beet-house syrup. R. J. BROWN, J. E. SHARP, and A. R. NEES (Ind. Eng. Chem., 1928, **20**, 945—948).—The method described is designed for extreme precision and not for routine use. It is probably unsuitable for cane products containing invert sugar. The material, mixed with sand and some graphite, in an aluminium dish, is dried at 90° for 72 hrs. or longer in a vacuum oven the residual air of which is displaced by carbon dioxide, and then cooled for 3 days over phosphorus pentoxide before re-weighing. J. H. LANE.

See also A., Oct., 1110, **Hydrolysis of sucrose by acids** (COLIN and CHAUDIN). 1103, **Oxidation of carbohydrates** (PALIT and DHAR). 1114, **Colour reactions of mannitol** (EKKERT). 1117, **Alkali fission of pentoses** (FISCHLER and BOETTNER). **Carbohydrate oxidation** (EVANS and others). 1119, **Carbohydrates from pine wood** (HÄGGLUND and others). 1149, **Determination of reducing sugars** (SEMIGANOVSKY). 1157, **Hydrolysis of starch by salts** (E. and R. GLIMM). **Hydrolysis of sucrose by enzymes** (WEIDENHAGEN). 1158, **Fermentation of dextrose and lævulose by yeast** (HOPKINS). **Fermentation of racemised hexoses** (FERNBACH, SCHOEN, and MORI). 1162, **Starch in pine-needles** (BARGUES). 1163, **Gum from *Anagyris fœtida*** (CONDORELLI and CHINDEMI).

Cuban honey. FIEHE.—See XIX.

PATENTS.

Preserving sugar-beets for production of sugar therefrom. B. J. OWEN and J. C. STEAD (B.P. 295,619, 13.4.27).—Whole beets are dried slowly in the dark by warm air at 27—32° until their moisture content is reduced to 5—10%. They are afterwards dry-cleaned to remove soil, and eventually shredded or disintegrated for sugar extraction. The drying may be carried out by piling the fresh beets in a tall chamber in the centre of which, extending upwards from the floor, is an air-supply chamber with adjustable shuttered outlets for warm air. The roots may first be piled to a depth of 18 in., successive layers being added later as the lower ones become partially dried, until a height of 15 ft. is reached. The drying process occupies 50—60 days. An alternative method is to pile the fresh beets in a trench with sloping sides and with a grating along the bottom forming the roof of a warm-air duct. J. H. LANE.

Manufacture of sugar. B. H. VARNAU and T. B. WAYNE (B.P. 294,800, 29.9.27).—The syrups derived from the purging of ordinary granulated sugar massecuites in cane-sugar refineries are made to yield, without reboiling, a further crop of extra-fine, soft, granulated sugar. These syrups, delivered from the centrifuges at 60—72°, and at a density of about 78—80° Brix, may, if necessary, be heated sufficiently to redissolve any false grain, and then cooled rapidly to 35—55° to induce the formation of a regular grain, the product being kept in slow motion in crystallisers for ½—6 hrs. or longer. The degree of cooling necessary depends on the purity of the syrup, and in cases of low purity a seeding magma may be added to the syrup. The sugar which crystallises out is purged and washed in centrifuges. When dry, it polarises 99·5—100, and is free-running and non-hygroscopic; most of the crystals will pass 35—40-mesh. The syrup separated from it may be re-boiled as usual. Apparatus for carrying-out the process is described. J. H. LANE.

Extraction of sugar from beet. R. G. W. FARNELL (B.P. 294,520, 23.2.27. Cf. B.P. 293,066; B., 1928, 685).—Beet cossettes are dried at 100° or below and under atmospheric pressure, and the pressure is then suddenly reduced to facilitate the breaking down of the structure of the beet. J. H. LANE.

Purification of liquids containing sugar. G. E. VAN NES (B.P. 295,831, 18.8.27).—The cold raw sugar juice is treated with lime to render it weakly alkaline to phenolphthalein, and saturated with carbon dioxide until its reaction is acid to this indicator. After heating to 55°, a further quantity of lime is added so that the solution shows a final alkalinity corresponding to about 700 mg. of CaO per litre, and the liquid is allowed to settle for ½ hr. The clear juice is decanted, and the turbid juice remaining is further carbonated, allowed to settle, and the decanted clear juice and the filtered turbid juice are added to a further batch of raw juice in the stage of the purification process before the first settling operation. F. R. ENNOS.

Bleaching and purification of sugar juice. PETROLEUM PRODUCTS REFINING CO. (F.P. 618,779, 15.1.26. Italy, 15.1.25).—The juice, *d* 1·263—1·383, is treated with nitrogen peroxide under the influence of an electric current, then with a stream of hydrogen, and, after filtration, with a high-tension electric current.

L. A. COLES.

Removal of albuminous substances from saccharine [sugar] juices, molasses, etc. J. POHLMANN and J. R. F. RASSERS (B.P. 287,119, 15.3.28. Holl., 15.3.27).—Raw cane or beet juices, syrups, or diluted molasses, in a neutral or slightly acid condition, are treated with tannin, tannin derivatives, methyl alcohol, or picric, phosphotungstic, or phosphomolybdic acids to precipitate nitrogenous matters which impede the crystallisation of sugar. J. H. LANE.

Production of [filtered] syrups. F. B. LOMAX (U.S.P. 1,681,490, 21.8.28. Appl., 3.5.26).—A solvent is fed into the two enclosures, above and below a horizontal filter, and the solute is introduced into the upper enclosure in which is an agitating device. The liquid is withdrawn from the bottom enclosure and circulated through the filter until clear. F. G. CLARKE.

Manufacture of dextrose. E. C. R. MARKS. From CORN PRODUCTS REFINING CO. (B.P. 295,830, 15.8.27).—The acid hydrolysis of starch is carried out in the presence of an absorbent, *e.g.*, animal or vegetable carbon free from fats and heavy metals, fuller's earth, silica gel, etc., and in a glass-enamelled vessel which exerts no catalytic tendency to polymerise the dextrose. F. R. ENNOS.

Manufacture of starch. CORN PRODUCTS CO., LTD., Assees. of R. O. MCCOY (B.P. 288,546, 30.3.28. U.S., 11.4.27).—After disintegration of maize or other starch-bearing materials with water, the whole is subjected to the usual germ separation, and coarse and fine slop separations, followed by the tabling and washing of the starch. A portion of the effluent from the starch tables is re-used for the slop separations, and the remainder, after removal of the gluten, is used for steeping the material, whilst the major part of the effluent from the starch washing is returned to the germ separation. F. R. ENNOS.

Fibres from sugar cane (U.S.P. 1,681,223).—See V.

XVIII.—FERMENTATION INDUSTRIES.

Determination of alcohol by distillation. K. AMBERGER (Z. Unters. Lebensm., 1928, **55**, 447—453).—In order to avoid loss of alcohol in distillation, the still wine to be analysed should be diluted so that the distillate contains less than 30 vol.-% of alcohol. Precautions to be observed in fitting up the apparatus and in carrying out the distillation are described. W. J. BOYD.

See also A., Oct., 1157, **Hydrolysis of sucrose by enzymes** (WEIDENHAGEN). **Emulsin of 23 years ago** (BRIDEL and DESMAREST). 1158, **Fermentation of dextrose and lævulose by yeast** (HOPKINS). **Fermentation of racemised hexoses** (FERNBACH, SCHOEN, and MORI). **Co-zymase** (VON EULER and MYRBÄCK). 1159, **Co-zymase** (VON EULER and MYRBÄCK; NILSSON). **Mutase** (VON EULER and GRABE). **Nucleic acid in yeast** (ISHIYAMA). **Enzymes of *B. coli communis*** (GREY). 1160, **Female sex hormone in yeast** (GLIMM and WADEHN). 1164, **Citric acid production by fungi** (BERNHAUER). **Fermenting power of *Aspergillus fumaricus*** (WEHMER).

Nitrogenous constituents of molasses. CLAASSEN.—See XVII.

PATENTS.

Acetification apparatus or vinegar generators. H. FRINGS (B.P. 296,950, 21.2.28).—A spent-air duct, which runs the whole length of the battery of generators, is fitted with siphon devices adapted for the periodic delivery of the appropriate charge of wash to the generators. C. RANKEN.

Washing of fabrics (B.P. 276,338).—See V.

XIX.—FOODS.

Determination of moisture in buttermilk powder. T. VON FELLENBERG and P. HONEGGER (Z. Unters. Lebensm., 1928, **55**, 470—473).—Owing to the volatility of the lactic acid, determination of the moisture in buttermilk powder by drying in the oven or by distillation with xylene gives too high results. An error arises also by the formation of lactone and water by the action of heat on lactic acid. The correct result can be obtained as follows. The total water is distilled off with xylene after the method of Mai and Rheinberger (Z. Unters. Lebensm., 1912, **24**, 125) whereby some lactic acid and lactone are also found in the aqueous layer. The lactic acid and lactone in the latter are determined by titration before and after saponification with excess of alkali solution. The water formed by decomposition of lactic acid is calculated from the decrease in acidity of the whole sample used. Then the water (W) originally present in the sample is given by the formula, $W = (V - V') - 0{\cdot}2\,[A - (B + C)]$, where V is the volume of the aqueous layer of the distillate, V' the sum of the lactic acid and lactone in the distillate expressed in c.c., A the lactic acid (in g.) present before distillation, B the lactic acid (in g.) in the undistilled residue, and C the lactic acid (in g.) in the distillate. W. J. BOYD.

Detection of margarine in butter. H. P. STADLE (Z. Unters. Lebensm., 1928, **55**, 404—405).—For the preliminary examination of several samples the Litterscheid pocket polarisation microscope is useful. Adulteration can thereby be detected by observing the presence of starch grains and also, with practice, the occurrence of fat crystals. In testing butter under the quartz lamp a preliminary test may be carried out on the material as received. Pure butter fluoresces yellow, rarely very faintly, whilst margarine shows a blue luminescence. It is best, however, to use a solution of the sample in ether and to examine the insoluble residue microscopically. Pure butter solution fluoresces not at all or only faintly yellow, whilst margarine solution fluoresces so strongly blue that 15% added to butter can be detected. W. J. BOYD.

Determination of starch in infants' food. T. VON FELLENBERG (Z. Unters. Lebensm., 1928, **55**, 473—475).—The sample is finely ground and 0·25 g. is weighed into a 35 c.c. test-tube. By centrifuging and decanting, the material is extracted first with ether, and then twice with dilute iodine solution. The precipitated starch is dissolved by boiling with 10 c.c. of saturated calcium chloride solution, and the solution is diluted, centrifuged, and the liquid decanted and filtered through cotton wool. The residue is twice washed with 5 c.c. of calcium chloride solution, and the solution diluted, centrifuged, decanted, and filtered as before. The residue is tested with a drop of iodine in case further washing may be necessary. The filtrate and washings are made up to 100 c.c., and the starch in 20 c.c. of this is precipitated by excess of iodine (2 c.c. of 0·5N-iodine solution are usually sufficient); the mixture is centrifuged and the liquid decanted. The residue is washed twice with 5—10 c.c. of 60% alcohol, the alcohol being removed by centrifuging and decanting. The residue is then shaken with 2 c.c. of water and most of this is boiled off in order to remove the iodine and alcohol. This is repeated with 1 c.c. of water. The concentrated starch solution is treated with 10 c.c. of 0·15N-potassium dichromate and 20 c.c. of concentrated sulphuric acid. If the solution becomes pure green in colour a further addition of 1—2 c.c. of potassium dichromate solution and sulphuric acid must be made. After 15 min. the treatment is complete, and the solution is diluted to about 350 c.c. When no more gas bubbles are visible, 0·1 g. of potassium iodide is added and the iodine liberated is titrated with 0·1N-sodium thiosulphate. A blank test correction is applied. 1 c.c. of 0·1N-solution is equivalent to 0·675 mg. of starch. If the sample contains more than 16% of starch either a smaller quantity of the sample must be used or the quantity of dichromate solution proportionately increased. W. J. Boyd.

Comparative acidimetric investigation of meat extracts, sauces, etc. P. Hirsch and J. Kiesgen (Z. Unters. Lebensm., 1928, **55**, 415—423).—Molar binding power curves of various meat extracts etc. were prepared by electrometric titration. The values obtained for the range p_H 7·0—11·6 were checked by the tropæolin-O, formol, and alcohol titration methods (cf. Tillmans and Kiesgen, B., 1927, 456). Characteristic curves were obtained for different products, so that it should be possible to distinguish meat extracts, meat peptones, and soup preparations thereby. For this it is only necessary to determine the binding power for two p_H ranges, *e.g.*, *a* for p_H 7·0—4·5 and *b* for p_H 7·0—11·6. The value b/a was found to be 5·6 for Rotti soup cubes, 1·02 for Liebig's extract, and 2·27 for a peptone preparation. After preparation of the solution as described the necessary determinations are: (i) titration to p_H 7·0 with neutral-red or phenol-red, (ii) titration to p_H 11·6 with tropæolin-O or by the alcohol or formol methods, (iii) titration to p_H 4·3 with bromophenol-blue using the same coloriscope as for (i) and (ii) and a citrate buffer mixture for comparison. W. J. Boyd.

Comparison of saltpetre and sodium nitrite as pickling agents for flesh wares. G. Riess, R. Meyer, and W. Müller (Z. Unters. Lebensm., 1928, **55**, 325—354).—By using sodium nitrite instead of saltpetre for pickling flesh products, the time required is reduced to one half or even one third, because the nitrate does not act until it has changed into nitrite. The mechanism of this change, which becomes appreciable only after three weeks, has not been determined. Nitrite gives better penetration of the salt than saltpetre. An addition of 0·6% of sodium nitrite to the salt, corresponding to 0·05% on the weight of flesh treated, is sufficient. If the pickling is properly carried out the nitrite content of the flesh is not greater and may even be less than with saltpetre. The sodium nitrite in the outer layers of non-smoked nitrite-pickled flesh seldom exceeds 10—20 mg. in 100 g. of flesh, while the inner layer contains 1—2 mg. In the outer layers of smoked and nitrite-pickled flesh only a few mg. were present at most. Nitrite-pickled flesh wares are at least equal in appearance, odour, taste and keeping qualities to those pickled with saltpetre. W. J. Boyd.

Bacteriology and chemistry of oysters. A. C. Hunter and C. W. Harrison (U.S. Dep. Agric. Tech. Bull., 1928, No. 64, 1—75).—The solids, ash, and sodium chloride contents of oysters, meats, and liquor are recorded. Traces of lead and appreciable quantities of arsenic, copper, and zinc were detected. Chemical Abstracts.

Cuban honey. J. Fiehe (Z. Unters. Lebensm., 1928, **55**, 460—466).—An explanation is given of the finding of de Cardenas and Moreno ("Las Mieles de Abeja de Cuba," Min. Agric., Comm., and Lab. Cuba) that some samples of genuine Cuban honey give a positive reaction with Fiehe's reagent (1 g. of resorcinol in 100 c.c. of hydrochloric acid), which thus erroneously indicates the presence of artificially inverted sugar. It is pointed out that whereas these authors noted the slightest orange-yellow or reddish coloration as positive, only a strong, persistent cherry-red should be so regarded. De Cardenas and Moreno themselves show that honey produced in districts free from factories and distilleries gives no reaction. It is concluded that the "positive" reaction of some Cuban honey is due to the bees having access to molasses in sugar factories and rum distilleries. This is also supported by the high sucrose content of the samples examined. W. J. Boyd.

Vanilla, vanillin, and their mixtures with sugar. J. Pritzker and R. Jungkunz (Z. Unters. Lebensm., 1928, **55**, 424—446).—Methods are described for the analysis of vanilla, synthetic vanillin, and their mixtures with sugar, and analytical data are given for products of various origin and quality. The presence of 0·4—0·7% of a volatile essential oil in some vanillas and its absence in others has been ascertained. Vanillin in vanilla is determined on the aqueous extract by a modification of Hanus' method (B., 1905, 1326). Piperonal is similarly determined in the steam distillate from 20—25 g. of vanilla by extracting it with chloroform after adding alkali. In the gravimetric analysis of synthetic vanillin 0·15 g. is dissolved in 50 c.c. of water at 60° and a solution of 0·3 g. of *m*-nitrobenzhydrazide in 15 c.c. of water is added. After ½ hr. on the water-bath at 60° and 24 hrs. at the ordinary temperature the mixture is filtered and the precipitate washed with cold water, dried for 3 hrs. in the water-oven, and weighed. The factor 0·4829 gives the weight of vanillin. If 0·2 g. of sample is used the result is too high, whilst with 0·1 g. it is too low. A quicker and equally satisfactory method is by titration of 25 c.c. of a solution containing not more than 1% of vanillin with 0·1N-alkali using 4 drops of 2% alcoholic thymolphthalein as indicator. 1 c.c. of 0·1N-alkali corresponds to 0·0152 g. of vanillin. Methods of distinguishing vanillin, bourbonal, and piperonal are given. The above methods of determining vanillin are applicable to vanillin–sugar mixtures. W. J. Boyd.

Effect of sterilisation on the antiscorbutic vitamin. E. Remy (Z. Unters. Lebensm., 1928, **55**, 385—393).—The effect of sterilisation on the vitamin-*C* content of cauliflower, green beans, green peas, carrots, spinach, and tomatoes has been studied by means of feeding experiments on guinea-pigs. The vegetables were boiled in water with salt and sterilised for 1 hr. at 98°. The tomatoes were sliced, covered with salt water, and heated at 80° for 20 min. The animals received 50 g. of basal diet mixed with 70 g. of the sterilised material daily besides sufficient water. The Bezssonoff reaction was positive in all cases, strongest in the tomatoes, medium in the green peas and spinach, weaker in the cauliflower, and very weak in the green beans and carrots. The three last-named failed to prevent avitaminosis, and as regards green beans and carrots much larger daily quantities were insufficient. Tomatoes were most effectual, followed by spinach and green peas in the order named. W. J. Boyd.

Fruit jellies. III. Jelly measurements. L. W. Tarr (Univ. Delaware Agric. Exp. Sta. Bull., 1926, No. 142, 1—33).—A description of a jelly-strength tester and of the use of citric, tartaric, and sulphuric acids in the production of optimal jellies. Jelly was produced at the same p_H with each acid. The p_H at which the optimal jelly was formed varied with the acid employed. The strength of a jelly is decreased by addition of sugar and increased, within certain limits, by addition of pectin. Chemical Abstracts.

Microscopical detection of durian and nillu (Salpamisri). C. Griebel (Z. Unters. Lebensm., 1928, **55**, 453—459; cf. B., 1928, 544).—Further observations are made on the characteristic appearance and chemical reactions of fragments of durian fruit and nillu bulbs under the microscope. W. J. Boyd.

Digestibility trials on Indian feeding stuffs. III. Punjab hays. P. E. Lander and P. L. C. Dharmani (Mem. Dept. Agric. India, 1928, **9**, 235—246).

See also A., Oct., 1154, **Proteins of linseed and cottonseed meals** (Bethke and others). 1158, **Clotting of milk by pepsin** (Clifford). 1161, **Determination of vitamin-*A*** (Sherman). **Colour reactions of substances containing vitamin-*D*** (Sexton).

Corrosion of tin cans. Lueck and Blair.—See X.
Rancid edible fats. Grossfeld.—See XII.

Patents.

Extracting, separating, and utilising the starch and protein contents of rice. O. Jaschke (U.S.P. 1,681,118, 14.8.28. Appl., 4.4.25).—Rice is ground dry to a degree of fineness such that the starch granules are liberated; the powder is macerated for 12 hrs. in 0·25—0·3% sodium hydroxide solution, whereby the gluten and fibre swell out and rise to the surface, leaving a thick suspension from which the starch is recovered by centrifuging and settling. A. R. Powell.

Preservation of eggs, egg yolks, and egg whites. Egg Patents, Ltd., and A. Milroy (B.P. 296,462, 25.5.27 and 23.3.28).—After removal of the shells, the whole egg, egg yolk or white, or their mixture is mixed with glycerin and the product (preferably finely-divided) is desiccated without unduly raising the temperature (cf. B.P. 261,194; B., 1927, 92). B. Fullman.

Treatment of grain, seeds, fruits, and nuts. N.V. Internat. Oxygenium Mij. "Novadel" (B.P. 285,859, 22.2.28. Holl., 23.2.27).—The materials are treated with a solution of sulphur dioxide or a sulphite containing an excess of acid. The residual bleaching agent is removed by centrifuging and washing the grain etc. with alkali, and finally with water, or by oxidation with hydrogen peroxide, heating, steaming, or treating the material under reduced pressure. F. R. Ennos.

Kneading, mixing, and like machines [for bread, confectionery, etc.]. Baker Perkins, Ltd., L. S. Harber, and J. E. Pointon (B.P. 297,197, 9.8.27).

Fatty powders (B.P. 297,256).—See XII.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Stability and value of chlorine water. G. Mikó (Ber. ungar. pharm. Ges., 1926, **2**, 163—170; Chem. Zentr., 1928, i, 1562).—The directions of the Hungarian Pharmacopœia are criticised. A. A. Eldridge.

Bromometric examination of ointments and fats. O. Andriska (Ber. ungar. pharm. Ges., 1927, **3**, 140—143; Chem. Zentr., 1928; I, 1563).—The bromine-iodine values of numerous oils, fats, and ointments of the Hungarian Pharmacopœia (3rd ed.) have been determined. The bromoacetic acid method is preferred to the potassium bromate process. A. A. Eldridge.

Comparative examination of commercial cardamoms. W. Otte and H. Weiss (Pharm. Zentr., 1928, **69**, 613—616).—Seven samples of cardamom fruits of varied origin have been examined. Determinations have been made on powdered samples of the whole fruit, seed, husk, and a mixture of equal parts of the whole fruit and husk of the total mineral matter, water-soluble and insoluble mineral matter, ash insoluble in 10% hydrochloric acid, and of raw fibre. The values for the total mineral matter and raw fibre in the husk were more than double the corresponding values for the seed, and the water-soluble mineral matter was 3—4 times as great. An examination of eight commercial samples of powdered cardamom showed that four were definitely adulterated with powdered husk, but, owing to the numerous varieties of cardamom available commercially, definite proof of adulteration of the remaining four could not be given. In conjunction with microscopic examination, however, the method allows of the detection of gross adulteration with powdered husk. Raw fibre determinations by Huggenberg's method give results 1—3% higher than those obtained by the Weender method (cf. B., 1926, 690). E. H. Sharples.

Determination of alcohol in tinctures. K. Täufel and U. Pankow (Apoth.-Ztg., 1928, **43**, 240—241; Chem. Zentr., 1928, I, 1897).—A receiving cylinder for use with the German Pharmacopœial (6th ed.) method is described. A. A. Eldridge.

Determination of *iso*propyl alcohol in alcoholic preparations. C. Stainier and A. Lauwaet (J. Pharm. Belg., 1928, **10**, 167—169; Chem. Zentr., 1928, I, 1897).—*iso*Propyl alcohol is detected in alcoholic preparations by the production of a yellow precipitate when the distillate is heated with an acid solution of mercuric sulphate. Hydrocarbons react similarly. A. A. Eldridge.

Emetine reaction of ipecacuanha preparations. A. Wollmann (Ber. ungar. pharm. Ges., 1927, **3**, 352—

356; Chem. Zentr., 1928, I, 1564).—The tincture, or the alkaloids extracted from certain preparations, is treated with concentrated hydrochloric acid and 3% hydrogen peroxide; an orange-yellow colour develops slowly in the cold, or more rapidly on warming. The reaction is not accurately quantitative.

A. A. Eldridge.

Determination of morphine in aqueous solution. H. Baggesgaard-Rasmussen and S. A. Schou (Dansk Tidsskr. Farm., 1928, **2**, 233—242).—Morphine dissolves in a mixture of 3 vols. of chloroform and 1 vol. of *iso*propyl alcohol (1 litre dissolves 7·855 g. of morphine) and can be extracted quantitatively by this solvent from aqueous solutions of its salts which have been rendered slightly alkaline with sodium carbonate or bicarbonate. For its determination in aqueous solutions a sample corresponding to a morphine content of 0·1—0·2 g. and not exceeding 20 c.c. in volume is introduced into a separating funnel together with 5 c.c. of 4% sodium bicarbonate solution. A volume of the organic solvent equal to that of the total aqueous solution is added, the whole well shaken for 1 min., and the chloroform layer separated as quickly as possible in order to prevent any crystallisation of morphine from the supersaturated solution. Three further similar extractions are made, the united extracts are filtered, and the solvent is removed by evaporation. The residue is dissolved in 10 c.c. of 0·1*N*-hydrochloric acid, 15 c.c. of water, 2 drops of methyl-red solution, and 1 drop of methylene-blue solution are added, and the excess acid is titrated with 0·1*N*-sodium borate until the colour changes to green. Glycerol and cochineal do not interfere with the method. Fairly accurate results may be obtained when only small amounts (20 mg.) of morphine are present in the solution. H. F. Harwood.

Determination of nicotine and ammonia in tobacco. V. Okuda (J. Biochem. Japan, 1928, **8**, 361—364).—The tobacco (3—6 g.) is mixed with water (50 c.c.) and magnesia and distilled with steam; an aliquot part of the distillate is titrated with standard acid, and the ammonia in another part is determined by formaldehyde titration. Alternatively, the ammonia is determined by liberation of nitrogen from nitrous acid. Chemical Abstracts.

Reactions of novocaine and its distinction from cocaine, alypin, holocaine, and stovaine. L. Ekkert (Pharm. Zentr., 1928, **69**, 616—617).—Novocaine with iodine in alkaline solution forms iodoform; with zinc chloride and with *p*-dimethylaminobenzaldehyde yellow to red colours are formed; with furfuraldehyde–sulphuric acid, furfuraldehyde–phosphoric acid, and alcoholic furfuraldehyde alone violet to red colours are produced. Cocaine, alypin, holocaine, β-eucaine, and stovaine do not give the above colour reactions.

E. H. Sharples.

Crimean anise oil. B. N. Rutovski and P. Leonov (Trav. sci. inst. chim. pharm. Moscow, 1924, **10**, 64—68).—The oil (0·61%) had f.p. 4°, d_4^{20} 0·9705, α_D +12·15°, n_D 1·5405, acid value 0. Phellandrene and methylchavicol, but not fenchone, were detected.

Chemical Abstracts.

See also A., Oct., 1113, **Citronellol and rhodinol** (Grignard and Dœuvre). 1120, **Digitalis glucosides** (Jacobs and Gustus). 1121, **Preparation of histidine** (Vickery and Leavenworth). 1127, **Mustard oils** (Dyson). 1131, **Photo-oxidation of adrenaline.** 1132, **Di(*cyclo*hexylalkyl)acetic acids.** 1136, **Active component of paracoto bark** (Späth and Bretschneider). 1137, **Cornin: glucoside from *Cornus florida*** (Miller). **Sesamin** (Bertram, van der Steur, and Waterman). 1138, **Methylation of shibuol** (Komatsu, Matsunami, and Kurata). **Toad poisons. Chinese drug "Senso"** (Kotake). **Hydrogenation of acyclic terpenes** (Sabetay and Bléger). **Citronellal and rhodinal** (Verley). 1141, **Antiseptic compounds from anilquinoline** (Browning and others). 1143, **Homologues of *dl*-ephedrine** (Hyde, Browning, and Adams). 1144, **Alkaloids of lupins** (Schopf). **Relations between lupinine and cinchona alkaloids** (Schopf). 1145, **Colour reactions of atropine etc.** (Ekkert). **Determination of morphine** (Dávid; Scholtz). **Colour reaction for quinine** (van Urk). 1146, **Thalleioquinine reaction of quinine salts** (Mikó). **Isomerism of *p*-hydroxyphenylarsinic acid** (Gilta). **Condensation of 4-chloro-3-nitrophenylarsinic acid with amines** (Fourneau and Funke). 1155, **Hydrolysis of alkaloids** (Mayeda). **Differentiation of *Solanaceæ* alkaloids** (Garcia). 1160, **Spirochæticidal properties of vanadium** (Levaditi, Lepine, and Schoen). **Crystalline insulin** (Du Vigneaud, Geiling, and Eddy; Jensen and Geiling). 1163, **Alkaloid in seed of *Colchicum autumnale*** (Liptak).

Castor oil. Slashchev.—See XII.

Patents.

Iodine compositions [with anthelmintic properties]. Surgical iodine [compositions]. R. W. James. From Merck & Co. (B.P. 267,557—8, 12.3.27).—(a) Liquids containing proteins, *e.g.*, skim milk or solutions of egg albumin, gelatin, etc., are treated with a quantity of iodine in excess of that required to react with the proteins. The mixture may be administered direct or the adsorption products may be removed by filtration and made up into pills etc. [Stat. ref.] (b) Mixtures of colloidal iodine suspensoids prepared as described in B.P. 293,504 (B., 1928, 670) with carbohydrate syrups, *e.g.*, maize syrup, solutions of sucrose, dextrin, gum arabic, etc., are concentrated to a thick syrup for application by means of swabs, or to dryness for dusting as powder on to wounds. L. A. Coles.

Production of preparations having an antirachitic action. W., K., L., W., and F. Merck [E. Merck] (B.P. 286,665, 23.2.28. Ger., 8.3.27).—Antirachitic provitamin is converted into the vitamin by light of wave-length greater than that of ultra-violet light in the presence of photochemical sensitisers such as iodine or eosin, too intimate contact with oxygen being avoided. These sensitisers also accelerate the similar action of ultra-violet light. *E.g.*, ergosterol is completely converted into the antirachitic vitamin in 2 hrs. if its 0·1% alcoholic solution, containing eosin (5% on the ergosterol), is exposed to the light of a 60-watt lamp. B. Fullman.

Obtaining germ-gland hormones from vegetable organisms. Chem. Fabr. auf. Actien (vorm. E. Schering) (B.P. 277,302, 19.5.27. Ger., 11.9.26. Addn. to B.P. 271,492; B., 1928, 769).—The process previously described is applied to cherries, parsley root, and yeast. B. Fullman.

Preparation of thymol. Rheinische Kampfer-Fabr. Ges.m.b.H. (B.P. 293,753, 2.7.28. Ger., 11.7.27).—*m*-Cresol is heated with propylene at 300—350° and 20—40 atm. for 70 hrs. B. Fullman.

Manufacture of crystalline menthol. Howards & Sons, Ltd., and J. W. Blagden (B.P. 297,019, 8.6.27).—Menthol of m.p. above 34° is obtained by partially esterifying synthetic menthol, *e.g.*, with phthalic acid, removing unchanged menthol by steam distillation, and subsequently hydrolysing the ester. Alternatively, the menthol may be completely esterified and the ester hydrolysed in two or more stages, the menthol formed in each stage being recovered separately. L. A. Coles.

Hydroxy-ω-aminoacetophenone derivatives [hydroxyphenacylamines and their ethers]. H. Legerlotz (U.S.P. 1,680,055, 7.8.28. Appl., 23.3.27. Austr., 22.3.26).—*o*-, *m*-, or *p*-Hydroxyphenacyl halides or their ethers or esters are treated with aliphatic primary or secondary amines ; any *O*-acyl group may be removed during the reaction. The following compounds are described : p-*hydroxyphenacylmethylamine*, m.p. 147—148° (*hydrochloride* m.p. 239—240° ; *methyl ether*) ; p-*hydroxyphenacyldiethylamine*, m.p. 177—178° (*hydrochloride*, m.p. 194° ; *O*-benzoate). C. Hollins.

Pharmaceutical compound. W. Kropp, Assr. to Winthrop Chem. Co., Inc. (U.S.P. 1,675,500, 3.7.28. Appl., 17.9.25. Ger., 12.12.24).—Methyl salicylate is heated with β-aminoethyl alcohol at 180° to give *salicyl-β-hydroxyethylamide*, m.p. 119°. The 4-*methyl* derivative, m.p. 88°, is similarly prepared from methyl *m*-hydroxytoluate. The compounds have antirheumatic and antineuralgic properties. C. Hollins.

Manufacture of 5-iodo-2-aminopyridine. Schering-Kahlbaum A.-G. (B.P. 288,571, 21.3.28. Ger., 12.4.27).—2-Aminopyridine is treated alternately with iodine (or iodine chloride) and alkali in quantities such that several (*e.g.*, three) additions of the reagents are required for complete conversion into 5-iodo-2-aminopyridine. C. Hollins.

Arylazodiaminopyridines useful as bactericides. Pyridium. Neopyridium. Phenyl [benzene] azo-αα-diaminopyridine dihydrochloride. I. Ostromislensky, Assr. to Pyridium Corp. (U.S.P. 1,680,108—1,680,111, 7.8.28. Appl., [A] 24.11.23, [B, C] 26.3.26, [D] 23.9.27).—(A) Non-toxic semi-colloidal bactericides, specific against various cocci, are prepared by coupling 2 : 6-diaminopyridine with diazotised arylamines, especially aniline and *p*-toluidine. The products may be sulphonated and used as soluble sodium salts, or may be applied as hydrochlorides in solution or dispersion, or in ointments. They are without action on the intestinal flora. (B) Either 1 or 2 mols. of diazo compound may be coupled with 1 mol. of diaminopyridine. "*Pyridium*" is the monohydrochloride of benzeneazo-2 : 6-diaminopyridine. (C) Diazotised anthranilic acid gives an azo compound stable in the form of its inner ammonium salt, from which by action of sodium hydroxide "*Neopyridium*" disodium salt, $C_6H_4(CO_2Na)\cdot N:N\cdot C_5H_2N(NH_2):NNa$, is obtained. (D) The crystalline dihydrochlorides of the azo compounds are obtained in presence of more than 6% of hydrochloric acid. C. Hollins.

Production of quinoline-4-carboxylic acids. A. Häussler, Assr. to C. H. Boehringer Sohn Chem. Fabr. (U.S.P. 1,676,862, 10.7.28. Appl., 8.12.26. Ger., 6.2.26).—Optimum yields of atophan, 8-phenyl-β-naphthaquinoline-10-carboxylic acid, and 2-*p*-anisyl-6-methylquinoline-4-carboxylic acid are obtained by Döbner s reaction if 2 mols. of aldehyde–amine (or the mixture) are employed to each mol. of pyruvic acid. C. Hollins.

Manufacture of new substituted 5 : 5′-[di]acylamino-4 : 4′-dihydroxyarsenobenzenes. W. Carpmael. From I. G. Farbenind. A.-G. (B.P. 296,327, 27.5.27).—Chlorinated or alkylated arsinic acids prepared by the method of B.P. 278,789 (B., 1928, 37) are reduced, *e.g.*, by sodium hypophosphite, to arsenobenzenes, which are stable to air and produce no injurious after-effects on the nervous system when taken *per os*. 2 : 2′- and 3 : 3′-*Dichloro*-, and 2 : 2′- and 3 : 3′-*dimethyl*-derivatives of 5 : 5′-diacetamido-4 : 4′-dihydroxyarsenobenzenes are described. 2-*Chloro-5-acetamido-4-hydroxyarsenobenzene* (from 2 : 4-dichlorobenzenearsinic acid), m.p. 187—189°, and 4-*acetamido-5-hydroxytoluene-2-arsinic acid* (from 5-acetamidotoluene-2-arsinic acid) are prepared by nitration, treatment with alkali, reduction, and acetylation. C. Hollins.

Medicinal soap. H. H. von Kornatzki (U.S.P. 1,684,336, 11.9.28. Appl., 7.8.26. Ger., 26.8.25).—See B.P. 279,575 ; B., 1928, 37.

Production of esters of aromatic acids [γ-dialkylaminopropyl aminobenzoates]. R. Adams and E. H. Volwiler, Assrs. to Abbott Laboratories (U.S.P. 1,676,470, 10.7.28. Appl., 9.3.22. U.K., 27.9.21).—See B.P. 191,122 ; B., 1923, 330 A.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Utilisation of organic compounds as sensitive photographic substances. A. Seyewetz (Chim. et Ind., 1928, **20**, 216—220).—The use of organic compounds as sensitive photographic substances is confined mostly to the diazo derivatives. Dyes and their leucobases are unsatisfactory on account of their fugacity, their insensitivity to light even in the presence of catalysts, or the lack of suitable solvents for the removal of the products of insolation. J. W. Glassett.

Formation of the photographic latent image. S. E. Sheppard (Phot. J., 1928, **60**, 397—413).—Evidence in support of the assumption that the primary photochemical process is the liberation and transfer of an electron from a bromide ion in the silver halide lattice to a silver ion, forming a neutral silver atom, is afforded by the inner photoelectric effect given by photoconductance phenomena and by the behaviour of photocells composed of two silver electrodes coated electrolytically with very thin films of silver bromide and immersed in potassium bromide solutions saturated with silver bromide. The form of the photopotential–time curves of such cells, obtained on illumination of one of the electrodes, suggests an immediate liberation of both bromine and electrons, but up to the present the initial negative potential, caused in the first fraction of a second after illumination by the rapidly moving liberated electrons, has not been obtained with wavelengths longer than 365 mμ, even with the thinnest layers of silver bromide. The present theories of the nature and function of the sensitising specks and of the suggested mechanisms by which the silver produced by photodecomposition is concentrated about them are discussed. J. W. Glassett.

See also A., Oct., 1103, **New photographic phenomenon** (Weigert).

Patents.

Production of natural-colour photographic pictures. R. Gschöpf (B.P. 279,381, 27.5.27. Austr., 22.10.26).—A baryta paper, impregnated with a collodion solution to prevent spreading, is coated with gelatin, sensitised by brushing first with a solution of an iron salt followed by silver nitrate, and then exposed under the first of three part negatives (obtained in the usual way on panchromatic plates by exposure through red, green, and blue filters) until the iron–silver print-out image is visible. The print is then treated with a solution of potassium thiocyanate containing a copper salt and ammonium oxalate whereby the iron is removed and the silver is converted into a colourless silver–copper compound which acts as a powerful mordant for basic dyes. The whole process is repeated on the same base for the other two negatives, the image being dyed with the appropriate colour at each stage. In place of the potassium thiocyanate solution, potassium iodide containing either iodine or potassium ferricyanide may be used, in which case silver iodide acts as the mordant. J. W. Glassett.

XXII.—EXPLOSIVES; MATCHES.

See also A., Oct., 1085, **Mixtures of picric acid and mononitronaphthalene** (Jovinet). 1099, **Detonation-wave in gaseous mixtures** (Payman). **Striæ in explosion waves** (Campbell and Finch).

Patents.

[Perchlorate] explosives. C. G. Luis (B.P. 296,794, 9.3. and 18.3.27).—The explosive contains a perchlorate and the powdered husk or flesh of the fruit of *Terminalia chebula* with or without a small quantity of agar-agar or a vegetable oil. The perchlorate may be the sodium or ammonium salt alone or a mixture of the latter with sodium or potassium perchlorate. The explosive may contain 36—86% of perchlorate and 9—36% of the powdered husk or flesh. S. Binning.

XXIII.—SANITATION; WATER PURIFICATION.

Effect of salt on sludge digestion. W. Rudolfs (U.S. Pub. Health Rep., 1928, **43**, 874—881).—The effect of salt on the rate of decomposition of sewage sludge was slight at 5 g. per litre, but with larger quantities the destruction of volatile matter and total gas production markedly decreased, and the composition of the gas changed. With large quantities of salt practically no methane was formed. Mixtures of sodium chloride and sulphate have a stimulating effect. Chemical Abstracts.

Effect of certain trade wastes on sludge digestion. W. Rudolfs (U.S. Pub. Health Rep., 1928, **43**, 945—951).—A study of the detrimental effect of laundry waste. Chemical Abstracts.

Pollution problems in the State of Washington and their solution. H. W. Nightingale (Trans. Amer. Fish Soc., 1927, **57**, 294—300).—The toxicity of sewage and trade wastes to fish life is discussed. Chemical Abstracts.

Toxicity experiments with fish in reference to trade waste pollution. D. L. Belding (Trans. Amer. Fish Soc., 1927, **57**, 100—119).—The minimum lethal dose of nitric, hydrochloric, or sulphuric acid for brook trout is 1 in 10^5; loss of equilibrium and irregular respiration are observed at p_H 4—5. Trout survive immersion in 0·5% acetic acid. The effects of phenol, tannin, alkali hydroxides, calcium hypochlorite, copper sulphate, ferrous sulphate, mercuric chloride, potassium permanganate, and hydrogen sulphide are described. Chemical Abstracts.

Preparation of o-tolidine reagent for free chlorine [in water]. C. S. Boruff, S. J. Vellenga, and R. H. Phelps (J. Amer. Water Works' Assoc., 1928, **20**, 401—406).—Assuming an average laboratory temperature of 23°, 1 g. of *o*-tolidine may be dissolved in a litre of solution containing 178 c.c. of concentrated hydrochloric acid (35%) without depositing crystals on keeping; at lower temperatures a lower concentration of acid is essential (cf. Roake, B., 1925, 333). C. Jepson.

[Use of dimethyl-p-phenylenediamine hydrochloride as] indicator for chlorine [in water]. K. Alfthan (J. Amer. Water Works' Assoc., 1928, **20**, 407—411; cf. Kolthoff, B., 1926, 517).—The compound produces a red coloration with chlorine, which is sensitive to 0·1 p.p.m. The reaction requires a p_H value of 2·6—3·4, and is affected by the presence of iron in quantities exceeding 0·1 p.p.m. The red coloration can be matched by comparison with a dilute solution of methyl-red in acid. The indicator used is a 0·4% solution of the hydrochloride containing 8 c.c. of concentrated hydrochloric acid per 100 c.c. C. Jepson.

See also A., Oct., 1108, **Apparatus for investigation of air** (Buss). 1163, **Gaseous constituents of river waters** (Butcher, Pentelow, and Woodley).

Service pipes for water. Logan and Ewing.—See X.

Patents.

Artifically heating sludge-digestion chambers. M. Prüss (B.P. 297,250, 8.12.27).—The optimum temperature for the production of gas from sewage sludge is about 25°. This temperature may be maintained by heating the fresh sludge before admission and by heat-insulating the digestion tanks above and below ground. If sludge is not available, water may be withdrawn from the digestion tanks and returned at a higher temperature. The loss of heat by the portion of the tank below ground may be minimised by surrounding it with a stream of warm sewage. Fresh sludge of high water content should be densified by a preliminary digestion period, and dense sludge should be diluted with warm digestion-tank liquor before admission to the digestion tank proper. C. Jepson.

Filtering material and [water] filtration. R. M. McKee (U.S.P. 1,676,151, 3.7.28. Appl., 16.9.24).—Waste water is filtered through the absorptive residues produced by distillation of shale oil. C. Hollins.

Insecticide (G.P. 446,530 and F.P. 617,784).—See XVI.