BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JUNE 24 and JULY 1, 1932.*

I.—GENERAL; PLANT; MACHINERY.

Grinding and sifting. F. de M. Tubman (Chem. and Ind., 1932, 330—337).—A review of roller, hammer, attrition, ball, and tube mills, and oscillating, gyrating, and centrifugal sieving machines. The success of roll mills depends on hardness and depth of chill, thickness of roll walls, degree of rapid cooling possible, type of rollshaft, construction and lubrication of gears. The use of gear wheels with double-helical teeth efficiently lubricated for high-speed roll mills is indicated. The advantages of a new type of one-roll mill, in which the roll is totally enclosed in a casing provided with a grinding block on each side of the casing, for use with paint etc. are indicated. D. K. Moore.

Determination of water content by distillation with liquids lighter than water, *e.g.*, toluene and xylene. H. Lundin and M. Lundin (Chem.-Ztg., 1932, **56**, 236).—An apparatus is described for the determination of small quantities (up to 3·7 c.c.) of H_2O. The determination is complete in 30 min. It is recommended for H_2O in hops, PhMe being preferable as the distillation liquid. E. S. Hedges.

Electro-filters in conjunction with rotary-kiln operations [for separating suspended particles from gases]. F. Blass (Metallges. Rev., 1932, No. 6, 16—28).—Electro-filters operating the Cottrell process are particularly applicable wherever a practically complete separation of fine particles is required, especially at high temp., and their use is being extended to rotary kilns operating on a variety of processes, including Portland cement, pyrites roasting, calcination of gypsum, bauxite, and potash products. A recent successful adaptation is to the recovery of volatile metal oxides, *e.g.*, ZnO, SnO_2, Pb_2O_3, and CdO, formed by vaporising the metals by the so-called Walz process. In spite of the higher initial cost the working costs are roughly 33% less than those of a corresponding bag filter-plant. C. A. King.

Rapid determination of dust in air. C. Naeslund (J. Ind. Hygiene, 1932, **14**, 113—116).—Air is sucked through a tube containing glass pellets thinly coated with olive oil. The tube is washed out with Et_2O, which is then centrifuged in a tapering tube, in which the height of the dust column is read. The tube requires calibration for dusts of different kinds.
C. W. Gibby.

Smoke abatement in industry. (Chem. and Ind., 1932, 429—433).—A discussion.

Safety in the chemical industry. J. D. Pratt (Chem. and Ind., 1932, 420—427).

Piezo-electric determination of the breaking strength of fine metal, glass, and quartz fibres. F. Seidl (Z. Physik, 1932, **75**, 735—740).

Solid fuels for boilers.—See II.

Patents.

Gas-fired furnaces. H. Theunissen and H. Helin (B.P. 369,930, 22.12.30. Belg., 21.12.29).—In heating furnaces by means of combustible gases rich in hydrocarbons decomposable by heat, the deposition of C in the heated flues or passages of the furnace is prevented by adding to the gases a material, preferably H_2O, which interacts with the C produced by the decomp., and also with the hydrocarbons, to form other combustible gases. A. B. Manning.

Tube-still furnace. H. Thomas, Assr. to Sun Oil Co. (U.S.P. 1,821,531, 1.9.31. Appl., 28.7.28).—The beams supporting the lower tubes, being subjected to excessive heat, are supported in the middle by vertical rods which are in turn supported by counterweighted levers above the furnace. B. M. Venables.

Drying and roasting furnace. G. E. Connolly, Assr. to Nichols Copper Co. (U.S.P. 1,823,787, 15.9.31. Appl., 1.5.30).—A multi-deck roaster has the upper hearths formed of foraminous material so that draining, complete drying, and roasting all take place in succession.
B. M. Venables.

Heating of decomposable materials. J. R. Schonberg, Assr. to Standard Oil Development Co. (U.S.P. 1,821,326, 1.9.31. Appl., 11.6.27).—A direct-fired oil still is provided with a layer of gases which are semi-opaque to heat radiation between the radiant furnace and the still, permitting efficient, high-temp. combustion to take place without overheating. Afterwards the combined gases are passed in contact with the cooler parts of the still, and finally a portion may be withdrawn by a fan to form the screen layer, CO_2 and H_2O being very suitable for the purpose. B. M. Venables.

Dryer. W. C. Carpenter (U.S.P. 1,823,189, 15.9.31. Appl., 9.10.29).—In a rotary drum dryer, the outlet end is closed by a fixed head having a central aperture to which the dried material is lifted by scoops attached to the interior of the drum. The inlet end also has a fixed head with a central aperture forming the outlet for drying gases, and above that is the inlet for material. Hot gases are admitted through a circumferential series of stationary pipes extending into the dryer and terminating in short, open, return bends so that the gases pass inwards out of contact and return in contact with the material. B. M. Venables.

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

Dryer. [Vacuum pan.] C. C. Heritage, Assr. to Nat. Aniline & Chem. Co., Inc. (U.S.P. 1,822,486, 8.9.31. Appl., 19.2.26).—A vac. pan is provided with a helical stirrer which scrapes the wall in an upward direction and rolls the excess material towards the centre. B. M. Venables.

Apparatus for drying grain and the like. N. G. Moreira (U.S.P. 1,821,983, 8.9.31. Appl., 9.11.29. Brazil, 21.9.29).—The grain (etc.) is placed in a receptacle between two air chambers which are connected (*a*) by inverted troughs open on the underside to the grain, half of them being open to one air chamber and half to the other; and (*b*) by a tunnel (not in communication with the grain) containing a circulating fan. Hot combustion gases are supplied in minor quantity to the air circulation and the grain is kept in slow motion by withdrawing it from the bottom and returning it to the top of the receptacle. B. M. Venables.

Thermostats. Brit. Arca Regulators, Ltd., Assees. of Soc. Franç. des Régulateurs Universels Arca (B.P. 369,741, 17.3.31. Fr., 15.4.30).—In an apparatus heated by steam, a thermostat regulates the supply, and, should the required temp. be exceeded by only a few degrees, the same thermostat operates, through a relay, a valve to release the steam pressure at the exhaust end of the apparatus. B. M. Venables.

Pulverising mill. I. F. Pfeiffer (U.S.P. 1,821,912, 1.9.31. Appl., 31.5.29).—In a mill of the disintegrator type, the swinging arms are diametral, being loosely driven by a hollow cylindrical shaft along the axis of which is a long bolt securing all the arms. Swing hammers are provided at the ends of the arms. B. M. Venables.

Pulverising mill. C. Peters (U.S.P. 1,822,999, 15.9.31. Appl., 24.9.30. Ger., 10.5.28).—The pulveriser of the ball-race type rests on a perforated plate which screens out fine heavy matter, *e.g.*, sand from lignite, from the main gas circulation; any fine lighter matter is lifted to the pulverising zone by a minor current of gas taken from the pressure side of the circulating fan. B. M. Venables.

Grinding ball. W. F. Clements, Assr. to Fuller Lehigh Co. (U.S.P. 1,823,351, 15.9.31. Appl., 6.3.29).—Balls composed of hard Si–Fe chill-cast around a spider of grey Fe, the arms of which extend to or beyond the surface, are claimed. B. M. Venables.

Pulverisation of material. M. D. Jones, Assr. to Fuller Lehigh Co. (U.S.P. 1,822,221, 8.9.31. Appl., 17.10.27).—In an air-borne grinding system the cyclone or other separator is provided with heating coils to effect drying; part or all of the air thus indirectly heated may be run to waste and/or returned to the grinder. B. M. Venables.

Hammer mill. C. F. Schutte (U.S.P. 1,821,482, 1.9.31. Appl., 18.6.30).—A form of hammer head, rotatable to present a number of working faces, is described. B. M. Venables.

Apparatus for sorting granular materials. K. Wolinsky (B.P. 369,706, 28.1.31).—A dry shaking table is provided with riffles which are supported only from above by means of cross-girders and clips so that both the spacing and inclination may be adjusted. Perforated deck plates (if used) may be held in place by the downward pressure of the riffles. B. M. Venables.

Screening apparatus. T. B. Wilkinson (B.P. 369,665, 31.12.30).—A jigging conveyor screen having a trough below the screen is operated in such a way that liquid or sludge in the trough is splashed against the lower side of the screen; if the slope is considerable, inclined transverse baffles are placed in the trough to delay the downward flow of liquid to the necessary extent. B. M. Venables.

Extractor. O. H. Wurster (U.S.P. 1,823,813, 15.9.31. Appl., 26.3.25. Renewed 3.4.30).—A rotary drum for extracting fats, oils, etc. has filter membranes internally at one end and longitudinally over part of the circumference; the former is used for withdrawal of vapours and the latter for liquid extract. B. M. Venables.

Filter. A. R. Bull, Assr. to Handy Governor Corp. (U.S.P. 1,822,006, 8.9.31. Appl., 11.6.29).—A cylindrical filter body is surrounded by a spiral vane which directs the prefilt over the whole surface, and, on rotation, scrapes off the mud. B. M. Venables.

Filter. J. H. Hills, Assr. to Bousman Mfg. Co. (U.S.P. 1,820,974, 1.9.31. Appl., 6.3.29).—A separator for immiscible liquids, *e.g.*, water from dry-cleaning solvent, comprises a vertical casing through which the fluid flows (generally upwards) over inclined transverse baffles, on the surface of which the bulk of the water collects and is drained away, and, at the top, a fibrous filter between two gratings. B. M. Venables.

Filtering apparatus. W. G. Hasley, Assr. to J. H. Downes (U.S.P. 1,821,707, 1.9.31. Appl., 27.9.29). —A strainer for insertion in a circulating water-pipe is described. B. M. Venables.

Filter tank. R. E. Bressler and D. V. Moses, Assrs. to Graver Corp. (U.S.P. 1,822,689, 8.9.31. Appl., 17.5.29).—The perforated plate on which the gravel or other filter medium is supported has the holes situated in straight lines and covered by metallic strips held slightly above the plate by depressions formed at intervals. B. M. Venables.

Dephlegmation apparatus for distilling plants. F. M. Hess (U.S.P. 1,820,741, 25.8.31. Appl., 13.12.26). —Both vapours and hot residuum from a still flow in separate tubes from a lower chamber to an upper chamber through an intermediate chamber to which the crude material is supplied by means of a perforated axial pipe and afterwards joins the reflux condensate (produced by heat exchange with it) from the vapours in the lower compartment, the combined liquid flowing back to the still. (Cf. U.S.P. 1,610,523; B., 1927, 134.) B. M. Venables.

Bubble tower construction. O. C. Brewster, Assr. to Standard Oil Co. (U.S.P. 1,822,609, 8.9.31. Appl., 23.2.28).—The downflows from and to the next plate are adjacent, but separated, and the liquid flows right around a large central opening with an upstanding flange and provided with a serrated cap. B. M. Venables.

Tray for bubble towers. W. A. Stover and W. G. Palmer (U.S.P. 1,822,323, 8.9.31. Appl., 6.3.30).—Troughs covered by inverted troughs are arranged transversely of the tower and the liquid flows the full length of them. The bubbles are broken up by two submerged perforated plates in each trough.

B. M. Venables.

Bubble cap. R. B. Day (U.S.P. 1,821,619, 1.9.31. Appl., 24.9.29).—An inner cap having a serrated edge is surrounded by a dome having an open top and skirt extending below the inner cap; the aperture in the dome is surmounted by an inverted saucer.

B. M. Venables.

Vacuum evaporating apparatus. E. Schuster (U.S.P. 1,821,278, 1.9.31. Appl., 12.8.29. Ger., 5.3.28).—A vac. pan for liquids that are spoiled by heat, *e.g.*, milk, is heated by a steam coil in a jacket, the coil not touching the wall of the pan, but being surrounded by a heat-transmitting liquid. B. M. Venables.

Aëration of liquids. [Treatment of ferrous sulphate solution with gases from the roasting of sulphide ores.] H. E. Keyes (U.S.P. 1,823,831, 15.9.31. Appl., 13.7.27).—The gases, before passing into the solution through a porous medium, are treated to remove only the larger particles, those left being of such a size as to cause partial clogging of the pores and thus to reduce the size of the bubbles. When gases free from suspended particles are used, finely-divided solids are injected to serve the same purpose.

L. A. Coles.

Apparatus for making emulsions. S. B. Drucker (U.S.P. 1,822,275, 8.9.31. Appl., 19.10.28).—A rotating bowl is provided with fixed, vertical stirrers arranged in such a way that the voids behind them are stabilised, and one liquid is dropped into the voids.

B. M. Venables.

Treatment of water for boilers and the like. E. A. Buckle (B.P. 370,263, 18.6.31).—An indicator (*e.g.*, phenolphthalein) is added to an alkaline composition comprising, *e.g.*, Na_2CO_3 and a colloid (starch) for adding to the H_2O. L. A. Coles.

Heating and mingling of fluids. C. P. Tolman, Assr. to Petroleum Conversion Corp. (U.S.P. 1,821,333, 1.9.31. Appl., 3.1.27).—The cracking of oil or other process needing the application of heat within a narrow temp. range is operated by the rapid mixing of a heated carrier gas with the oil, preferably already vaporised, in a series of injectors. B. M. Venables.

Fluid filters or strainers, Lightfoot Refrigeration Co., Ltd., and W. Sinclair (B.P. 369,701, 22.1.31).—The filter medium comprises a wire wound in the thread of a hollow screw and is strong enough to resist the shocks produced, *e.g.*, by rushes of liquid in a gaseous refrigerant on the way to a compressor. A form of filter comprises a group of units arranged in an enlargement of the inlet pipe of a compressor, the whole being supported on a removable header plate which is dished to retain any liquid until it evaporates.

B. M. Venables.

Purification of gases [by scrubbing]. J. Skogmark and M. F. Chase (U.S.P. 1,821,064, 1.9.31. Appl., 30.6.27).—Gases, *e.g.*, burner gases, which are at a raised temp. and of which a desired constituent, as well as the impurities, is sol. in the scrubbing liquid are scrubbed in two stages. In the first, a small quantity of previously used liquid is allowed to reach a considerable temp.; in the second, a large quantity of liquid is circulated, being artificially cooled if necessary, and a small fresh quantity takes the place of that sent to the first stage. B. M. Venables.

Gas washer. J. P. Grilli, Assr. to H. A. Brassert & Co. (U.S.P. 1,823,269, 15.9.31. Appl., 10.6.29).—A tower is filled with wavy plates which are all vertical, but some zones have all the corrugations parallel and horizontal and others have them alternately horizontal and vertical on adjacent plates. B. M. Venables.

Apparatus for dehydrating and purifying [compressed] gases. A. P. Hornor and C. B. Gardenier, Assrs. to E.-K. Medical Gas Laboratories, Inc. (U.S.P. 1,821,549, 1.9.31. Appl., 15.1.27).—The valve plug of a gas bottle is provided with a hollow and perforated extension within the bottle, which contains dehydrating material followed by fibrous screening material.

B. M. Venables.

Production of heat and cold by the aid of atmospheric air, or obtaining the separation of moisture from atmospheric air. E. Altenkirch (B.P. 369,615, 18.9.30).—Unsaturated air is passed isothermally over a moisture-absorbing solution and then over water, in which stages it absorbs moisture up to saturation. It is then passed isothermally at a higher temp. in contact with, and gives up moisture to, the moisture-absorbing solution which is circulated between the two places. The difference in temp. of the solution is obtained by some natural means, such as sunshine and shade, so that the effect is transfer of heat by the air. A modified process may be used for drying the air.

B. M. Venables.

Antifreeze composition. D. F. Smith (U.S.P. 1,823,216, 15.9.31. Appl., 10.7.28).—The composition comprises an alkaline-earth (Mg) acetate, a sol. (Mg) chromate, and an alkaline-earth (Mg) chloride.

L. A. Coles.

Baffle packing for [return-flow tubular] heat exchanger. H. W. How, Assr. to Struthers-Wells Titusville Corp. (U.S.P. 1,822,698, 8.9.31. Appl., 4.9.30).

Continuous reheating furnaces. Rolling-mill alloys.—See X. **Softening H_2O.**—See XXIII.

II.—FUEL; GAS; TAR; MINERAL OILS.

Some problems of the classification and nomenclature of coal. C. A. Seyler (J. Inst. Fuel, 1932, **5**, 248—255).—The author's method is reviewed (cf. B., 1931, 1031). C. B. Marson.

Effect of chemical nature of coal on formation of explosive gas in mixtures in mines. A. I. Tulparov (Trans. All-Russian Sci. Tech. Min. Congr., 1928, **9**, 97—109).—Coals giving a long flame and much volatile matter contain little gas; fat, short-flame coals containing 19—20% of volatile matter contain a max. amount of gas. Anthracites contain gas rich in CH_4. The deeper is the seam, the larger are the amount and the CH_4 content of the gas. In general, non-coking coals contain little gas. Chemical Abstracts.

Form in which water exists in coals. B. G. Simek and R. Kassler (Brennstoff-Chem., 1932, **13**, 121—126). —Peat, boghead coal, brown coal, and bituminous coal have been submitted to isobaric drying at 10 mm. Hg pressure of H_2O vapour, in the absence of air, by means of Hüttig's " tensieudiometer " (A., 1921, ii, 195). The curves illustrating the variation of H_2O content of the material with temp. were of the type characteristic of colloidal substances. The curves for the brown coals and a non-caking bituminous coal, however, showed an inflexion at 25—27° which indicates a transition point in the system and the possibility of the existence of a definite compound between the humic acid of the coal and H_2O. The v.p.-temp. curves obtained by alternately heating and cooling a sample of peat showed the hysteresis effects also associated with the behaviour of colloids. No gas evolution due to decomp. of the peat or brown or bituminous coals was observed below 200°. Tar evolution began at about 160° with peat, 200° with brown coal, and 220° with bituminous coal.

A. B. Manning.

Collection and treatment of [coal-]washery slurry. L. W. Needham (J. Inst. Fuel, 1932, **5**, 260—267).—A *résumé* of the commercial processes for the collection and treatment of slurry is presented. Experiments on the behaviour of clay-like refuse in H_2O and its effect on washery H_2O show that a semi-colloidal refuse hinders the settling of solids. Flocculation by electrolytes and other colloids, to prevent slime formation, is discussed, and experiments indicating the possibility of the successful application of this method are given. C. B. Marson.

Dewatering of coal slurries by filtration. H. Manger (Brennstoff-Chem., 1932, **13**, 147—149).—The economical dewatering of slurries, *e.g.*, those produced in the application of flotation processes to the cleaning of fine coal, was achieved only by the introduction of the rotary vac. filter. Some forms of rotary filter are illustrated. The efficiency of dewatering is greater the cleaner is the coal and the smaller the proportion of very fine material therein. A. B. Manning.

General method for determination of combustible sulphur in fuels. W. J. Müller and H. Hiller [with E. Klaude] (Brennstoff-Chem., 1932, **13**, 145—146). —A weighed sample of the fuel is gasified in a current of N_2 and the mixture of vapour and N_2 is then passed with excess of O_2 over a heated catalyst (700—800°) consisting of pumice impregnated with CeO_2. The products of combustion are absorbed in aq. alkali containing H_2O_2 or Br and the S is determined as $BaSO_4$ in the usual manner. A SiO_2 combustion tube is used, the O_2 being supplied through a side tube or by Dennstedt's double-tube arrangement. If the fuel leaves a non-volatile coke the combustion is completed in a current of of O_2. The method is applicable to all types of fuel.

A. B. Manning.

Comparison of methods of Hackl and Eschka for determination of total sulphur in coals. C. Otin and G. Cotrutz (Brennstoff-Chem., 1932, **13**, 126—127). The vals. obtained for the S content of a brown coal (S 2·1—2·2%), of pure S, and of mixtures of S with wood charcoal, by the methods of Eschka and Hackl respectively (cf. B., 1929, 40), did not differ appreciably. Hackl's method has the disadvantage of requiring a longer time of heating. A. B. Manning.

Utilisation of different solid fuels with special regard to boiler heating. A. Nahoczky (Bán. Kohász. Lapok, 1932, **65**, 27—35).—All types of coal are approx. equally efficient if the final temp. of the smoke gases is normal (150—200°). Chemical Abstracts.

Coal distillation in rotary retorts (internally heated). H. Nielsen (Inst. Chem. Eng., April, 1932. Advance copy. 18 pp.).—A brief description is given of the assay apparatus (cf. B.P. 241,659 ; B., 1926, 4), the Barnsley test-plant, including results of representative tests, and the large-scale plant at Ashby (cf. Fuel Research Board Report, B., 1932, 166). In a recent modification of the process the sensible heat of the gas is utilised in evaporating the effluent liquor, thereby disposing of the bulk of the latter and dispensing with an external supply of cooling water. Further suggested modifications, having as object the production of gases of higher calorific val., consist in using either unburned producer gas at 600—650°, or superheated steam, as the distilling medium ; in the latter case the sensible heat of the steam is employed for coal distillation and the latent heat for generating the steam required for continuing the process. Data relating to a 7 days' run, at a throughput of 108 tons per day, on the Ashby plant are utilised for drawing up a thermal balance. A non-coking Leicestershire bituminous coal was used. The thermal balance indicates that the distillation of the coal is an exothermic reaction, the heat evolved amounting to 88·5 B.Th.U./lb. A. B. Manning.

Improved arrangement of the Bochum crucible [coking] test. R. Vogel (Gas- u. Wasserfach, 1932, **75**, 322—323).—Difficulty in determining the end of coking time in the Bochum test by observation of the flame produced above the crucible leads to errors of 0·5—0·3% in volatile matter content. The error may be reduced to 0·2% by rotating the crucible before heating, to ensure uniform distribution and heating of the contents, and by mounting a detachable SiO_2 tube (about 4 mm. diam. and 50—60 mm. long) over the central hole of the lid by means of a Pt foil collar. The flame produced at the top of the tube is observed through a suitably situated window in a cylinder surrounding the upper portion of the standard Bochum apparatus.

H. E. Blayden.

Improving the quality of Upper Silesian coke. I, III. W. Swientoslawski, M. Chorąży, and B. Roga. **II.** W. Swientoslawski, B. Roga, and M. Chorąży (Przemysl Chem., 1932, **16**, 49—55, 55—62, 73—86).—I. The properties of a no. of Upper Silesian cokes are compared with those of cokes from other basins. The chief defect of Silesian cokes lies in their low mechanical resistance to shock or abrasion. A modification of the drum method of measuring mechanical resistance is described.

II. Upper Silesian coking coal differs from typical coking coals in that its bituminous constituents are relatively less thermostable, as a result of which the duration of the plastic period is comparatively short. In consequence the mass of coke is not so compact and homogeneous as is typical coke. Since these bituminous constituents decompose below their m.p., the rate of heating should be as rapid as possible in order to secure better-quality coke. Further disadvantageous features of Silesian coking coal are its absence of swelling pressure, its evolution of gas during not only the second (plastic) period, but also during the third period of heating, when the coke is already formed, and the tendency to contraction of the already formed mass of coke (even when prepared from compressed briquettes), leading to the production of fissures.

III. The caking index of Upper Silesian vitrain is little lower than that of typical coking-coal vitrain, whence it follows that the inferior mechanical properties of Silesian coke are not due to deficiency in binding substances. As the durain content of durain–vitrain mixtures is raised above 20% the mechanical properties of the coke prepared from them become increasingly unsatisfactory, as is also the case for coke prepared from fusain–vitrain mixtures containing $>2\%$ of fusain. The fusain content of Upper Silesian coking coal varies considerably for different mines and seams, being in some cases $<1\%$, and in others considerably $>2\%$. R. Truszkowski.

Reactivity, graphitisation, and electrical conductivity of coke. H. Koppers and A. Jenkner (Arch. Eisenhüttenw., 1931—2, **5**, 543—547).—Tests on numerous metallurgical cokes show that the electrical conductivity and reactivity are dependent chiefly on the degree of graphitisation, which can therefore be determined by measuring the electrical conductivity; within the usual limits the ash content has no effect on the results. Apart from the conditions under which the coke is made, the degree of graphitisation depends on the caking properties of the coal. In the coking operation graphitisation commences during the plastic stage, the proportion of graphite formed depending on the peculiarities of the plastic state and on the degree of decomp. which occurs in this state. Graphitisation to an extent which reduces the reactivity of the coke commences above 800° when the graphite crystals begin to reach a size which has a low reactivity. A. R. Powell.

Complete gasification at gasworks. L. Litinsky (Feuerfest, 1932, **8**, 49—56).—Disadvantages of complete gasification to give "double gas" are: excessive slag formation on the retort walls, loss of volatile matter, and sticking of the charge; the last-named may be partly overcome by blending with coke or brown coal. Non-caking, non-swelling coals which give off most of their volatile matter at 300—600° and produce an easily cracked tar are best for the process; cheap fines are unsatisfactory. The gas is unsuitable as town's gas owing to its low calorific val. and high sp. gr., but may be used as a diluent. The economics of its use for the winter peak load are discussed relative to price of coal and demand for coke. Gas from vertical chamber ovens, after allowing for the sale of tar and coke, is cheaper thermally than "double gas," which is more poisonous (35—38% CO) and less efficiently produced. A full bibliography of the subject is included. R. N. B. D. Bruce.

Dry purification [of coal gas]. S. L. Wright (Gas J., 1932, **198**, 212—215).—Optimum conditions of working are discussed from the basis of a 4-year test on a unit of 4 oxide purifiers treating a max. of 10^6 cu. ft. daily. R. N. B. D. Bruce.

Separation of the neutral and acid constituents of low-temperature tars from bituminous coals by means of liquid ammonia. K. Gieseler (Brennstoff-Chem., 1932, **13**, 141—145).—The acid constituents of low-temp. tar are sol. and the neutral constituents practically insol. in liquid NH_3; the tar acids are readily recoverable from such solutions. By extraction of a low-temp. tar distillate (b.p. 150—200°/12 mm.; phenols 41%, bases 4%) at room temp. with an equal vol. of liquid NH_3, it was separated into a neutral fraction (neutral oil 94%, phenols 4%, bases 2%) and an acid fraction (phenols 83%, neutral oil 11%, bases 6%); after a second extraction with NH_3, the phenol content of the neutral oil was reduced to 0·5%. Similar results were obtained with other tar oils, but satisfactory separation of the lower-boiling fractions required a lower temp. of extraction, *e.g.*, —30° to —50°. By a suitable arrangement of apparatus the extraction could be carried out continuously. A. B. Manning.

Properties of bitumens either rich or poor in paraffin. J. Manheimer (Petroleum, 1932, **28**, 1—9).—The paraffin appears to take no part in the chemical processes of distilling and oxidising bitumen; tables, diagrams, and photographs show that the paraffin is present in a colloidal state, and that it exerts, according to the proportion of total asphalts and its particular qualities, a more or less unfavourable influence on the qualities of bitumens. E. Doctor.

Tar used in steel-works [as bond for converter lining]. R. François (Chim. et. Ind., 1932, **27**, 780—784).—The tar used as a binder for the lining of dolomite in Thomas converters and Martin furnaces should have a regular distillation curve and yield as much coke as possible. The presence of much $C_{10}H_8$ conflicts with the first requirement and results in cracks; it should contain $\not>1\%$. A suitable tar can be prepared in the Ab-der-Halden continuous still. C. Irwin.

Desulphurisation of Estonian shale oil. P. N. Kogerman (J. Inst. Fuel, 1932, **5**, 278—282).—The most active catalysts for the removal of S from vaporised shale oils and crude C_6H_6 were found to be Cu and Ni, but such catalysts rapidly lose their activity. Chemical treatment of liquid crude shale oils with certain reagents showed that by keeping the refining losses below 12%, the refined product still contained 0·3% S; the use of hypochlorite and other oxidisers gave with certain shale petrols fairly satisfactory results, and it is suggested that such a method merits further investigation. Complete desulphurisation of shale petrols is achieved only by hydrogenation, using a large excess of H_2, at 390—400°, and with the high initial pressure of 90—100 atm. C. B. Marson.

Formation of peroxides in the oxidation of hydrocarbons. P. Mondain-Monval (Chim. et Ind., 1932, **27**, 770—774).—A mixture of air and C_8H_{18} vapour was passed through a heated tube into a cooled flask; when the temp. of the tube reached 270° a reaction commenced which produced white clouds of vapour difficult to condense. The temp. rose and aldehydes and CO_2 were present. A slight bluish flame was observed when the experiment was conducted in the dark. The condensate separated into two layers, the lighter consisting of C_8H_{18}, aldehydes, alcohols, etc. The heavier layer was insol. in hydrocarbons, sol. in H_2O and EtOH, vigorously oxidised KI whether cryst. or in solution, and also oxidised $K_2Cr_2O_7$ etc. in the manner of a peroxide. When heated to 200°, it decomposed explosively with phenomena similar to those seen in its production. The nature of the oil has already been described (A., 1930, 1157). Similar results were obtained with the engine of a motor cycle, and the peroxide theory of "knocking" is thus practically established. C. Irwin.

Colorimetric determination of benzene in air. A. A. Gavrilov (J. Chem. Ind. Russ., 1931, **8**, Nos. 23—24, 26—29).—20—50 litres of air are bubbled through 15 c.c. of a 4 : 1 mixture of conc. H_2SO_4 and HNO_3, which is then neutralised with aq. NH_3 and extracted with Et_2O. 20 c.c. of the extract are heated at 100° with 20 c.c. of 5% H_2SO_4 and Zn dust, thus eliminating Et_2O and reducing $PhNO_2$ to NH_2Ph. The solution is then filtered through glass wool, and the filtrate and washings are made up to 100 c.c., to an aliquot part of which 20% aq. Na_2CO_3 is added until a ppt. of $ZnCO_3,Zn(OH)_2$ appears, which is then dissolved by addition of 20% aq. tartaric acid. Aq. $CaOCl_2$ (0·075%) is now added until further addition does not produce intensification of the violet-red coloration appearing, the vol. is made up to 50 c.c., and the intensity of coloration is compared with that given by a standard solution of NH_2Ph similarly treated. Quantities of 6—70 mg. of C_6H_6 may be determined by this method with an error $\not> 3\%$. This method is also applicable to the determination of the C_6H_6 content of benzine, 3—5 c.c. of which are added in a thin stream to the H_2SO_4–HNO_3 mixture, which is then further treated as above. R. Truszkowski.

Improved methods for examination of mineral oils, especially of the high-boiling constituents. J. C. Vlugter, H. I. Waterman, and H. A. van Westen (Chem. Weekblad, 1932, **29**, 226—232).—The Lorenz–Lorentz sp. refraction val. plotted against mol. wt. gives a series of curves for the various hydrocarbon series; the vals. for a given oil give a point, the position of which in relation to the curves already plotted gives the val. of x for the average composition C_nH_{2n-x}. For an oil free from aromatic hydrocarbons, the NH_2Ph point may be calc. directly from the sp. refraction diagram. Changes in the sp. refraction of the residue after extraction with H_2SO_4 afford information as to the proportion of aromatics present and the extent to which the naphthenes are dissolved by the extraction treatment. S. I. Levy.

Comparison of methods of gum determination in motor fuels. G. Haim (Brennstoff-Chem., 1932, **13**, 128—130).—The methods compared were those of Knöttner (B., 1931, 101) and of Brunschwig and Jacqué (B., 1929, 931; 1931, 187). No considerable differences were observed between the results; the former method has the advantage of being less sensitive to changes in the rate of passage of the air through the sample. Addition of H_2O_2 increased the "gum" formed with PhMe, but not with C_6H_6. Addition of xylene to a motor benzol increased its stability on storage in the light. A. B. Manning.

Talc in fuel slag.—See VII. **Firing clay products**—See VIII. **Sponge-Fe process. Ni [from coal].**—See X. **Cracking of fish oil.**—See XII. **Coal as fertiliser. Mineral oils in insecticides.**—See XVI. **Hydraffin active C for H_2O purification.**—See XXIII.

Patents.

Intermittently operated chamber ovens. Dr. C. Otto & Co., G.m.b.H. (B.P. 370,282, 14.7.31. Ger., 14.7.30).—The ovens are provided with boring rods which can operate through openings in the roof to form vertical ducts in the charge. During the first two thirds to three quarters of the carbonising period the distillation products are withdrawn by suction through tubes inserted into the ducts, whilst during the remainder of the carbonising period steam is introduced through the tubes and passed through the charge. Steam or a mixture of steam with water-gas and distillation gas may be introduced into the upper gas-collecting space at the beginning of the carbonising period. A. B. Manning.

Carbonisation of solid or mixtures of solid and liquid materials. W. E. Trent (B.P. 369,271, 15.12.30).—The material is passed through a horizontal retort on an endless conveyor. The retort is divided into compartments provided with independent heating means, *e.g.*, rows of burners which direct their combustion gases downwardly on to the bed of fuel, and independent vapour and condensate collecting pans below the conveyor. The material is subjected to successively higher temp. in successive compartments. The volatile products formed in each compartment may be collected separately or submitted to further cracking by passage through one of the following compartments, which, however, is at a temp. insufficient to decompose the volatiles completely. Steam may be passed through the material when it has reached its highest temp., and the water-gas so produced may be passed through one of the cooler carbonisation zones. A. B. Manning.

Destructive distillation of coal, shale, lignite, etc. A. A. Macintosh (B.P. 369,305, 5.1.31. Austral., 21.1.30).—The volatile products leaving the retort are condensed in two stages. The first condensation is effected by providing the ascension pipe with a water-jacket in such a manner that it acts as a reflux condenser, returning the tarry condensates to the retort for further gasification. The water-jacket functions also as a boiler, the steam generated therein being utilised for steaming the charge in the retort. The vapours then pass to a second water-cooled condenser, the liquor and tar condensates are separated, and the tar may be returned to the retort or distilled for the recovery of oils therefrom, as desired. The system is provided with a pressure-control device. A. B. Manning.

Production of smokeless fuel. H. E. Powell, and Dorman, Long & Co., Ltd. (B.P. 369,394, 20.3.31).—

Semi-coke is produced in high-temp. by-product coke ovens by first carbonising a layer of coal on the bottom thereof to form a bed of hard coke, then charging the oven with coal, allowing carbonisation to proceed to the required degree, and finally expelling the whole charge of semi-coke and underlying hard coke. Carbonisation may be effected at the normal working temp. of the oven or at a somewhat lower temp., *e.g.*, 700—1000°.
A. B. Manning.

Manufacture of large smokeless fuel from finely-divided carbonaceous material. W. W. White (B.P. 369,971, 24.12.30).—Carbonaceous material which will not burn freely in an open grate, *e.g.*, gas coke or anthracite, is briquetted with an amount of pitch 2—3% (calc. on the material) in excess of that required to give a physically sound briquette, and the briquettes are then stoved at 400—600°. A. B. Manning.

Manufacture of carbon. Gen. Carbonalpha Co. (B.P. 369,415, 31.3.31. Fr., 1.4.30).—C is manufactured by the decomp. of CO ($2CO = CO_2 + C$), which is regenerated by passing the CO_2 formed through the incandescent fuel bed of a gas producer. The gases produced in the latter during the "blow" period are burned and the CO_2 formed is recovered, *e.g.*, by dissolution in aq. K_2CO_3 or in H_2O under pressure, and is utilised in making up losses in or supplying fresh gas for the primary gas circuit. The heat of combustion of the blow gases is recovered, *e.g.*, by means of a waste-heat boiler, and utilised in decomposing the carbonated solution etc. A. B. Manning.

Plant for treatment of moist fuels. Allgem. Elektricitäts-Ges. (B.P. 369,330, 3.2.31. Ger., 15.10.30).—Before delivering the material to the main mill, which effects the required fine grinding, it is passed through one or more similar mills in which the lumps are subjected to a preliminary crushing and drying.
A. B. Manning.

Obtaining sub-products from coal by means of solvents. H. Hardy (B.P. 369,976, 30.12.30. Belg., 20.5.30. Addn. to B.P. 356,236; B., 1931, 1035).—Globular coal particles produced as described in the prior patent are extracted with solvents, *e.g.*, benzol, solvent naphtha, anthracene oil, applied successively either (*a*) in ascending or (*b*) in descending order of their b.p. The residue is (*a*) briquetted and distilled to produce coke or semi-coke, or (*b*) distilled to recover the solvent and then ground for use as pulverised fuel.
A. B. Manning.

Extraction of values from coal and like material. F. C. Greene and I. F. Laucks, Assrs. to Old Ben Coal Corp. (U.S.P. 1,822,142, 8.9.31. Appl., 21.2.18. Renewed 11.4.27).—Finely-divided coal (etc.) is dropped on to the horizontal fins of a rotating screw-conveyor which passes through an externally heated vertical retort. The vapours formed are withdrawn under vac. through a series of holes in the inner tube of the conveyor. A piston sliding in this tube determines the lowest point of withdrawal. R. N. B. D. Bruce.

Gas producer. R. Daae (U.S.P. 1,819,836, 18.8.31. Appl., 10.7.26. Renewed 21.6.29).—A rotary feeding device for a gas producer is described, with automatic means to prevent jamming or breaking of the parts by the introduction of foreign material or large lumps of coal. A. B. Manning.

Manufacture of carburetted gas. A. W. Grant, jun., Assr. to Koppers Co. (U.S.P. 1,819,838—9, 18.8.31. Appl., 22.1.25).—(a) The apparatus consists essentially of a producer, a combustion chamber, and a carburettor. The incandescent fuel bed in the producer is blasted continuously with a mixture of air or other O_2-containing gas and steam. The gas produced is passed to the combustion chamber wherein a part of it is burned with the requisite quantity of air or O_2, the proportion burned being sufficient to supply the heat required to effect the desired enrichment of the gas in the carburettor. (b) An alternative arrangement comprises a producer and two carburettors in parallel. Part of the gas produced is burned in one carburettor while the remainder is being enriched in the other, the operation of the carburettors being periodically reversed. A. B. Manning.

Purification of distillation gases. K. Beuthner (B.P. 369,490, 3.7.31).—The gases are passed through a dry-purifying tower through which the purifying material is continuously recirculated. The material withdrawn from the bottom of the tower is passed through a mill which projects the powdered material into the stream of gas entering at the top of the tower. Within the tower is a series of grating supports, each comprising a no. of rotatable members, which are automatically opened in succession at suitable intervals to allow the material to pass through the tower at the desired rate.
A. B. Manning.

Purification of coke-oven or similar gas. H. Kemmer (B.P. 370,243, 28.5.31).—The gas is purified by fractional cooling combined with oil-washing and scrubbing with an alkaline suspension of $Fe(OH)_3$. Thus a preliminary cooling to 5—20° to remove the major part of the H_2O may be followed by the oil-washing and purification from S compounds at —5° to —20°. The requisite refrigerating plant is operated by the waste heat from the coke oven. A. B. Manning.

[Fuel-]gas purification. G. E. Seil, Assr. to Koppers Co. (U.S.P. 1,822,380, 8.9.31. Appl., 7.5.26).—Gases containing H_2S and NH_3 are treated with an aq. suspension of $Fe(OH)_3$ to remove the H_2S. The spent liquor is blown with air, whereby free S is formed and the $Fe(OH)_3$ regenerated. The air which contains nearly all the NH_3 is passed through a vertical tower down which H_2O or acid flows, to absorb the NH_3. This may be regenerated by known means and returned to the gas washer to keep the $Fe(OH)_3$ suspension alkaline. The whole process is carried out in a closed system which is described. R. N. B. D. Bruce.

Gas-purification apparatus. C. B. Collins, Assr. to Koppers Co. (U.S.P. 1,821,090, 1.9.31. Appl., 2.5.29).—A producer-gas purifier and cooler consists of a tower provided with the usual sprays and hurdles. The gas from a no. of waste-heat boilers is delivered to the bottom of the tower through a corresponding no. of downwardly-inclined inlets, each of which opens into one of a no. of separate compartments formed by transverse partitions in the bottom of the tower. When one of the waste-heat boilers or its producer is shut down the water outlet for the corresponding compartment of the tower is closed, so that the compartment becomes filled with water and forms a seal to shut off gas from the boiler that is out of use.

A. B. Manning.

Gas-purification process. G. A. Bragg, Assr. to Koppers Co. (U.S.P. 1,819,833, 18.8.31. Appl., 31.12.27).—The gas is washed with a suitable liquid, preferably an ammoniacal suspension of $Fe(OH)_3$, which is regenerated by aëration, the air for this purpose being continuously recirculated. The O_2 content of this air is maintained at the requisite level by adding, preferably continuously, a relatively small amount of fresh air thereto, at the same time withdrawing an equal amount of the recirculated air, which, after treatment for removal of the NH_3 therein, is released into the atm.

A. B. Manning.

Gas purification. J. C. Woodhouse, Assr. to Du Pont Ammonia Corp. (U.S.P. 1,821,195, 1.9.31. Appl., 17.6.30).—Gases are freed from CO_2 by passing them, at 150—350° and, if desired, under pressure, over MgO prepared by calcining artificially pptd. $MgCO_3$. The efficiency of absorption is increased by adding 0·2—1·7 vol.-% of steam to the gases. A. B. Manning.

Removal of tar from coal-distillation gases. Dr. C. Otto & Co. G.m.b.H. (B.P. 369,842, 16.7.31. Ger., 25.7.30).—The products of carbonisation are removed from the interior of the coal charge by ducts. They are subjected to tar-separation methods, *e.g.*, electrostatic precipitation or treatment with hot tar above the dew point, so that only those fractions of *d* approx. 1 are removed. R. N. B. D. Bruce.

Wet-process dust collection [for tar-bearing gases]. O. B. Cahoon and E. L. Hogan, Assrs. to Amer. Blower Corp. (U.S.P. 1,823,587, 15.9.31. Appl., 27.9.28).—The gases from a producer are passed through a cyclone-type dust separator at a temp. above that at which tar and oils commence to condense.

B. M. Venables.

Separation of bitumen from bituminous sands and similar bituminous materials. C. T. Langford and A. J. Teplitz, Assrs. to Continental Oil Co. (U.S.P. 1,820,917, 1.9.31. Appl., 29.4.27).—Aq. NaOH is added to the material and the mixture is subjected to an abrasive grinding action, *e.g.*, in a ball mill, at about 70°. The mixture is transferred to a tank and stirred with hot H_2O, whereupon the bitumen rises to the top and the sand collects at the bottom. A. B. Manning.

Filtration of tars. F. J. Gainer, Assr. to Standard Oil Co. (U.S.P. 1,819,745, 18.8.31. Appl., 5.7.28).—Tars are filtered while hot in a press, preferably of the Kelly type, having filter leaves of asbestos, the external surfaces of which are coated with graphite.

A. B. Manning.

Distillation process [for tar]. J. V. E. Dickson, Assr. to Barrett Co. (U.S.P. 1,821,144, 1.9.31. Appl., 13.2.23).—Tar is passed through a heated zone, *e.g.*, a tube heated in a bath of molten metal, wherein its temp. is raised sufficiently to cause at least 58% to volatilise under atm. pressure, and is then discharged into a chamber under relatively low pressure, *e.g.*, 50 mm. Hg, and the vapour and the residual pitch are separated. A high proportion, *e.g.*, 75—80%, of the tar is vaporised with a min. of thermal decomp.

A. B. Manning.

Treatment of [preparing] asphalt mastic and other substances of a similar nature [ready for laying]. W. G. Goldney (B.P. 370,170, 21.3.31).—A portable apparatus is described. A. B. Manning.

Utilisation of raw tar and, generally, of similar mixtures containing both hydrocarbons and phenolic substances. R. M. Jarry (B.P. 369,785, 9.5.31. Fr., 9.5.30).—Tars etc. are agitated with liquid NH_3. After settling, the two layers are separated. The NH_3 is allowed to evaporate from the top layer and may be recovered, leaving an oil rich in O and N compounds, *e.g.*, phenols and pyridine bases. The bottom layer is then essentially a neutral oil.

R. N. B. D. Bruce.

Manufacture of soluble asphaltite. I. J. Novak (B.P. 369,396, 20.3.31).—Asphaltite is rendered completely sol. in gasoline and similar solvents, and its tendency to form highly colloidal solutions is reduced, by maintaining it just above its m.p., *e.g.*, at 160—200°, for at least 30 min, before adding it to the solvent.

A. B. Manning.

Obtaining phenols from coal-tar distillates. R. Cross (U.S.P. 1,820,908, 1.9.31. Appl., 2.5.25).—Coal-tar distillates are subjected to cracking temp. under pressures sufficiently high to prevent vaporisation and are then discharged into an evaporator. The vaporised material is condensed and the phenols are recovered therefrom. With some tars the yield of phenols or cresylic acid may be increased by the addition of EtOH, glycol, or glycerol to the initial material.

A. B. Manning.

Purification of tar acid-bearing oils. S. Caplan, Assr. to Combustion Utilities Corp. (U.S.P. 1,822,842, 8.9.31. Appl., 22.9.26).—Tar oils containing tar acids are rendered suitable for disinfectants etc. by removing colour-producing substances by one or more washings with solutions of borax (approx. 3%) or H_3BO_3–alkali mixtures, heating to approx. 60°, settling, and separating the aq. extract. The washing solution may be regenerated by addition of a $Fe^{\cdot\cdot\cdot}$ salt to ppt. the extracted materials, making alkaline by addition of CaO, and filtering. H. E. Blayden.

Recovery of tar acids. S. P. Miller, Assr. to Barrett Co. (U.S.P. 1,819,687, 18.8.31. Appl., 14.11.24. Renewed 22.8.29).—Tar acids are extracted from tar oils with milk-of-lime. The Ca phenolate solution is then treated with Na_2CO_3 or Na_2SO_3 and the Na phenolate solution, after separation from the pptd. $CaCO_3$ or $CaSO_3$, is blown with CO_2 or SO_2 to set the tar acids free, the Na_2CO_3 or Na_2SO_3 so regenerated being used for the treatment of a further quantity of Ca phenolate. A. B. Manning.

Flooding process for recovering (A) oil, (B) fixed oil, from subterranean oil-bearing strata. (A) M. de Groote, (B) M. de Groote and L. T. Monson, Assrs. to Tretolite Co. (U.S.P. 1,823,439—40, 15.9.31. Appl., [A] 18.4.29, [B] 3.3.30).—The strata are flooded with an aq. solution (A) of a H_2O-sol., substituted, polycyclic sulphonate of the type $XRR'{\cdot}SO_3Z$, where

X is a polycyclic aromatic nucleus, RR' represents one or more alkyl residues below C_{12}, and Z is a H˙ equiv. (*e.g.*, NH_4, Et); or (B) containing wood sulphite liquor preferably neutralised. H. S. Garlick.

Cracking of [hydrocarbon] oil. C. L. Smith, Assr. to Gyro Process Co. (U.S.P. 1,822,753, 8.9.31. Appl., 25.1.29).—Oils are continuously converted by fractionating and cracking the most volatile hydrocarbons in converters at $>$ 540°. The less volatile oils are further fractionated and cracked in separate units, so that each converter receives hydrocarbons of small boiling ranges. The cracked vapours leaving each converter are rapidly chilled by injection into them of cold charging stock to reduce the temp. from $>$ 540° to $\ngtr$ 315°. The vapours from all the converters are fractionated together.

H. E. Blayden.

Soaking drum [for oil-cracking processes] and method of conditioning same for use. J. K. Hencken (U.S.P. 1,823,451, 15.9.31. Appl., 8.1.31).—The carbon previously (and intentionally, if necessary) deposited in the drum by the cracking of oil is removed only to a definite thickness by a scraping and rolling tool. B. M. Venables.

Oil-fractionating apparatus. C. L. Smith and C. B. Watson (U.S.P. 1,822,755, 8.9.31. Appl., 13.5.30. Cf. U.S.P. 1,811,189; B., 1932, 329).—Fractionating towers are provided with long, narrow, horizontal troughs of substantially M-shaped cross-section with the ends closed so as to retain condensed liquid which is subjected to the distilling action of the hot vapours.

H. E. Blayden.

Conversion of hydrocarbon oils. L. Burgess (U.S.P. 1,822,861, 8.9.31. Appl., 13.4.27).—The oils are continuously and isothermally converted into lower-boiling oils by feeding them into a heated still, into which is continuously passed vaporised $AlCl_3$ ($<$ 2% by wt. of oil converted), and condensing the vapours evolved. Provision is made for removal of waste $AlCl_3$ and for control of the composition of the vapours by variation in rate of addition of $AlCl_3$.

H. E. Blayden.

Conversion of [hydrocarbon] oils. N. E. Loomis and L. Burgess, Assrs. to Standard Oil Development Co. (U.S.P. 1,822,862, 8.9.31. Appl., 7.5.27).—The oils are converted into lower-boiling products by heating them under pressure (*e.g.*, 100—300 lb./sq. in.) at a temp. above the normal b.p. (*e.g.*, 345—400°) in the presence of $AlCl_3$ and maintaining pressure and temp. const. by control of feed of oil and $AlCl_3$. H. E. Blayden.

Producing a slurry of lime in [hydrocarbon] oil [for cracking]. E. E. Bartels, Assr. to Standard Oil Co. (U.S.P. 1,823,582, 15.9.31. Appl., 9.7.27).—The oil tank is an open vessel, having an outlet pipe at the base, which passes vertically upwards and terminates in a nozzle. This nozzle is fixed into a collar connected to a pipe leading to the top of the tank, and a hopper for the introduction of powdered hydrated CaO opens into the collar, ahead of the nozzle. H_2O is finally admitted through the hopper to ensure complete admixture of the oil and CaO during circulation.

W. J. Wright.

Separation of wax from wax-containing oily substance. Gulf Refining Co., and C. J. Livingstone (B.P. 370,325, 11.9.31. U.S., 26.9.30).—Wax-bearing material is treated with a differential solvent mixture containing both a good (*A*) and a poor (*B*) solvent for wax, *e.g.*, C_6H_6 and ethylene dichloride, respectively, and the mixture chilled to 6°. The wax is filtered off and the filtrate separated by distillation into wax-free oil and solvents *A* and *B*. The separated wax may be washed by suspension in *B*, or dissolved by heat in *B* and chilled to a temp. at which the wax is practically insol., or dissolved in *A* and pptd. by the addition of *B*, the solvents being subsequently recovered separately and employed in a repetition of the process. Any solvent retained by the wax is removed by a simple stripping process. H. S. Garlick.

Manufacture of oxidation products of paraffin wax. Standard-I.G. Co., Assee. of R. T. Haslam (B.P. 369,852, 8.8.31. U.S., 14.8.30).—Hydrocarbon oils containing paraffin wax are treated with H_2 at 200 atm. and 400—470° in the presence of oxides of group VI mixed with MgO, ZnO, or oxides of groups III and IV. The product is oxidised at 180° and atm. pressure with 0·1—5·0% of a catalyst, *e.g.*, stearates of Mg, Zn, Al, etc., MnO_2, or $KMnO_4$, to form about 50—70% of fatty acids.

R. N. B. D. Bruce.

(A) **Treatment of naphthenic oils.** (B) **Removal of naphthenic acids from hydrocarbon oils.** (A) N. E. Lemmon, (B) N. E. Lemmon and F. V. Grimm, Assrs. to Standard Oil Company (U.S.P. 1,823,614—5, 15.9.31. Appl., [A] 12.5.28, [B] 14.5.28).—(A) The oil is subjected to a light treatment with H_2SO_4 (0·25 lb. of 89% H_2SO_4 per gal. of oil) prior to extracting the naphthenic acid compounds with an aq. solution of the alkaline salts of H_2O-sol. sulphonic acids. The oil is then treated with H_2SO_4 and clay in sufficient quantities to give a finished oil of desired colour and substantially neutralised condition. (B) The oil is treated with 0·1 lb. of 89% H_2SO_4 per gal. and the sour oil subsequently treated with approx. 5 lb. of clay per 100 lb. of oil, at 65—150°. H. S. Garlick.

Manufacture of motor fuels. N. V. de Bataafsche Petroleum Maats. (B.P. 370,287, 21.7.31. Holl., 8.8.30).—An antiknock agent for motor fuels consists of a metal derivative of compounds of the type R·CO·CH⁚CH·X, where X is OH or NH_2, and R is an alkyl or aryl group or the residue of a cyclic radical of which the CO group and the C of the OH·CH⁚ or NH_2·CH⁚ group attached to the CO group form a part, *e.g.*, a metal compound of aminomethyleneacetone, hydroxymethylene-acetophenone or -camphor.

H. S. Garlick.

Lubrication product. S. Cabot (B.P. 369,197, 9.10.30).—A lubricant suitable for closely fitting surfaces comprises a hydrocarbon lubricating oil in which polymerides of the oil are colloidally dispersed, and to which a volatile solvent, *e.g.*, naphtha, is added in amount sufficient to reduce the viscosity to below that of the initial oil. Such polymerides may be derived from the non-volatile residues of the original crude oil. An antioxidant, *e.g.*, NH_2Ph, and an animal grease, *e.g.*, "dégras," may be added in small amounts to the composition. A. B. Manning.

Gas-fired furnaces. Heating decomposable materials. Pulverising mill [for lignite]. Heating etc. of fluids. Purification of gases.—See I. **Wetting etc. agents. High-mol. alcohols.**—See III. **H_2.**—See VII. **Compound sheet material. Dressing for playing fields etc.**—See IX. **Insulation of hydrocarbon oils.**—See XI. **Black pigment.**—See XIII.

III.—ORGANIC INTERMEDIATES.

Photochemical chlorination of acetylene. K. Peters and L. Neumann (Angew. Chem., 1932, **45**, 261—266).—A quant. yield of $C_2H_2Cl_4$ and $C_2H_2Cl_2$ is obtained by irradiating a mixture of C_2H_2 and Cl_2 under reduced pressure, using a quartz–Hg-vapour lamp. An apparatus for continuous production is described, in which the products are removed by freezing. A 1 : 2 C_2H_2–Cl_2 mixture gives about 83% of $C_2H_2Cl_4$ and 17% of $C_2H_2Cl_2$; the 1 : 1 mixture gives 65% and 35% respectively. The process has the advantage of being free from danger of explosion; it may be carried out at atm. pressure, using N_2 as a diluent, but for technical purposes it is necessary to ensure the absence of O_2; the amount of O_2 in commercial N_2 stops the reaction completely. The kinetics of the reaction between C_2H_2 and Cl_2 is discussed, particularly in relation to the photochemical synthesis of HCl, which it closely resembles. When the C_2H_2–Cl_2 mixture is irradiated an initial period of induction is followed by a slight rise in pressure and then an abrupt fall (cf. the Draper effect). E. S. Hedges.

Mechanism of the stabilisation of ether by copper. F. W. Nitardy and E. C. Billheimer (J. Amer. Pharm. Assoc., 1932, **21**, 112—113).—During atm. oxidation of Et_2O an intermediate compound is formed which appears to distil with Et_2O and does not respond to the U.S.P. peroxide test. Et_2O containing either this product or atm. O_2, if stored in containers with a Cu surface, is freed from these substances, and Et_2O containing peroxides if stored in any sealed container will become free from peroxides with simultaneous development of acidity. The presence of Cu accelerates this decomp. Et_2O free from peroxides maintains its purity for an indefinite period if stored in contact with Cu (cf. B., 1929, 72). E. H. Sharples.

Reaction between formic acid and mercuric oxide, and detection of acetic acid in formic acid. K. Brand and F. Strache (Pharm. Zentr., 1932, **73**, 289—291).—HgO reacts quantitatively with HCO_2H at 100°; $2HCO_2H + 2HgO = 2Hg + 2CO_2 + 2H_2O$; no CO is evolved. In presence of AcOH the liquid is acid at the end of the reaction owing to the hydrolysis of the $Hg(OAc)_2$ formed. E. H. Sharples.

Constituents of low-temp. tar.—See II. **[Cooking of] paper.**—See V. **Pure glycerol.**—See XII.

Patents.

Manufacture of carbon tetrachloride. P. S. Brallier, E. J. Dunlop, and G. D. Muggleton, Assrs. to Niagara Smelting Corp. (U.S.P. 1,817,123, 4.8.31. Appl., 30.6.22).—Cl_2 is bubbled into CS_2 containing Fe as a catalyst in a vessel fitted with a reflux condenser until the Cl_2 absorption corresponds with slightly more than that required by the reaction $CS_2 + 3Cl_2 = CCl_4 + S_2Cl_2$. The greater part of the CCl_4 is then distilled off through a fractionating column and the remaining S_2Cl_2 is again refluxed with CS_2 to yield more CCl_4 and free S; the crude CCl_4 from this operation contains excess of CS_2 and is returned to the chlorinating vessels. Final purification of the CCl_4 is effected by steam-distillation over milk-of-lime. A. R. Powell.

Recovering alcohols from alkyl sulphates. Standard Oil Development Co., Assees. of R. B. Lebo (B.P. 367,282, 25.6.31. U.S., 28.8.30).—A H_2SO_4 extract containing substantial amounts of *sec.* and/or *tert.* alkyl sulphates, *e.g.*, the mixture obtained by absorbing olefines from oil-refinery gas in H_2SO_4, is hydrolysed and then passed into the middle portion of a tower maintained at the bottom at 107° or higher by injection of live steam. 35% H_2SO_4 is drawn off at the bottom; alcohols distil from the top. The formation of olefines is minimised. C. Hollins.

Isolation of alcohols of high molecular weight. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 367,003, 5.11.30).—In the manufacture of higher alcohols by hydrogenation of destructive oxidation products of paraffin waxes etc., extraction of the alcohols is effected with H_2O-sol. alcohols or their formic, acetic, or propionic esters. C. Hollins.

Manufacture of agents for wetting, emulsifying, equalising, dispersing, washing, and softening. I. G. Farbenind. A.-G. (B.P. 366,340, 1.4.31. Ger., 2.4.30).—The product from an aliphatic acid chloride above C_9, or the corresponding anhydride, and an aliphatic hydroxy-acid (or derivative) above C_9 is treated with a sulphite or a sulphonating agent. Examples are: castor oil and oleyl chloride, with 100% H_2SO_4 at 20—30°, or with $NaHSO_3$; oxidised paraffin oil treated first with $ClSO_3H$ to give acid chlorides and H_2SO_4, then with castor oil at 20—30°, α-hydroxystearamide and oleyl chloride, with $ClSO_3H$. C. Hollins.

Manufacture of ester-like wetting, foaming, and dispersing agents. I. G. Farbenind. A.-G. (B.P. 366,916, 31.10.30. Ger., 31.10.29).—A fatty acid above C_5 or a derivative is treated with β-hydroxyethanesulphonic acid or a salt thereof, or with ethionic acid or carbyl sulphate; or a salt of the fatty acid is treated with a halogenated ethanesulphonic acid or salt. Suitable starting materials are oleyl chloride, Na ricinoleate, stearic acid, castor oil, C_{6-12} acids from oxidised paraffin oil. C. Hollins.

Manufacture of phenols. T. Griswold, jun., Assr. to Dow Chem. Co. (U.S.P. 1,821,800, 1.9.31. Appl., 29.8.27).—PhCl and an aq. alkali are heated in an autoclave at high temp. and pressure, and when reaction is complete the mixture is released into a zone of lower pressure, whereby the volatile constituents are vaporised and the vapours and residue are removed separately. The process may be continuous. E. H. Sharples.

Manufacture of substances [sulphurised phenols] for use as mordants. Imperial Chem. Industries, Ltd., E. Chapman, and E. B. Robinson (B.P. 369,905, 29.12.30).—Non-dyeing thio-derivatives of PhOH capable of functioning as mordants for basic dyes are prepared by heating PhOH with 1 mol. of S and 2 mols. of Na_2S or K_2S at about 170° until evolution of H_2S has ceased (cf. B.P. 211,108; B., 1925, 605). A. J. Hall.

Manufacture of aromatic hydrocarbons and their substitution products. A. Kaufmann (B.P. 367,292, 13.7.31. Ger., 23.7.30).—In Friedel–Crafts reactions alkyl borates are used in place of halides. Examples are: 5-*tert.*-butyl-*m*-xylene, b.p. 201—203°, from Bu^{β} borate and *m*-xylene; CH_2Ph_2 from benzyl borate and C_6H_6; 4-*tert.*-butylanisole from Bu_{β} borate and anisole. C. Hollins.

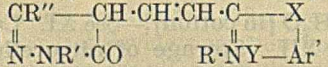
Production of anthraquinone derivatives. Imperial Chem. Industries, Ltd., W. Bradley, R. J. Loveluck, and R. F. Thomson (B.P. 366,990, 14.8.30).—One halogen in 1 : 4-, 1 : 5-, or 1 : 8-dihalogenoanthraquinones is smoothly replaced by an arylsulphonamido-group by interaction with substantially $>$ 2 mols. of an arylsulphonamide (*e.g.*, *o*- or *p*-toluenesulphonamide) in a solvent (*o*-dichlorobenzene) in which the product is insol., preferably in presence of an acid-absorber (K_2CO_3) and/or a Cu catalyst [$Cu(OAc)_2$ or Cu_2Cl_2]. The products on hydrolysis give halogenoaminoanthraquinones. C. Hollins.

Tar acids. Phenols etc. from tar. Oxidation products of paraffin wax. Naphthenic acids from oils. —See II. **EtOH, BuOH–COMe₂, and gluconic acid by fermentation.**—See XVIII.

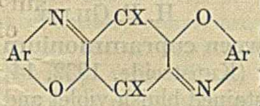
IV.—DYESTUFFS.

New uses for Aniline Black. H. Freytag (Textilber., 1932, **13**, 144).—Irradiation with ultra-violet light of solutions containing NH_2Ph,HCl and suitable oxidising agents and catalysts, as used in Aniline Black dyeing, markedly accelerated formation of Aniline Black pigment. Satisfactory reproduction of images may be obtained by impregnating paper or cotton fabric with a 1—25% solution of NH_2Ph,HCl containing 5 drops of 4% aq. $K_4Fe(CN)_6$ and 18—24 drops of 10% aq. $NaClO_3$ per 30 c.c., covering with a photographic negative, then exposing for about 15 min. to ultra-violet light, and removing unchanged NH_2Ph etc. by washing with H_2O. A. J. Hall.

Patents.

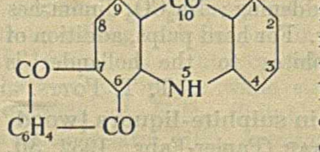
[Manufacture of] basic [polymethine] dyes. Imperial Chem. Industries, Ltd., E. H. Rodd, and G. E. Watts (B.P. 366,964, 10.9.30).—Dyes (annexed formula) 
$$\begin{array}{ccccc} \mathrm{CR''} & \text{——} & \mathrm{CH{\cdot}CH{:}CH{\cdot}C} & \text{——} & \mathrm{X} \\ \| & & | \qquad\qquad\quad \| & & | \\ \mathrm{N{\cdot}NR'{\cdot}CO} & & \mathrm{R{\cdot}NY} & \text{—} & \mathrm{Ar} \end{array}$$
, where R = alkyl, R′ and R″ = relatively inactive groups, Y = an acid radical, and X = dialkylmethylene or vinylene, are obtained by condensing a 4-arylaminomethylene-5-pyrazolone with a 1 : 3 : 3-trialkyl-2-methyleneindoline, or a 2-methyl-3 : 3-dialkylindolenine alkyl salt, or a quinaldine alkyl salt or corresponding methylene base; or by condensing a 2-ω-arylaminovinyl or 2-ω-acylarylaminovinyl derivative of a 3 : 3-dialkylindolenine alkyl salt or of a quinoline alkyl salt with a pyrazolone having a free 4-position. Examples are orange dyes from: 1-phenyl-4-anilinomethylene-3-methyl-5-pyrazolone with 1 : 3 : 3-trimethyl-2-methyleneindoline or its 7-OMe-derivative; 1-β-naphthyl-4-anilinomethylene-3-methyl-5-pyrazolone with quinaldine methiodide. C. Hollins.

Manufacture of dyes [of the benzobisoxazine series]. I. G. Farbenind. A.-G. (B.P. 365,600, 20.10.30. Ger., 19.10.29).—The benzobisoxazines (annexed formula, where X is H or halogen, and Ar is an aromatic or heterocyclic residue), obtainable by heating halogenated 2 : 5-diarylamino-1 : 4-benzoquinones (in which the aryl group may form part of a heterocyclic nucleus, particularly a carbazole nucleus), are halogenated to give blue pigments for paper, varnishes, or rubber, and by subsequent sulphonation blue acid and direct dyes. Examples are: 3 : 6-dichloro-2 : 5-di-(*N*-methyl-, -ethyl-, or -benzyl-2′- or -3′-carbazolylamino)-1 : 4-benzoquinone, heated in a high-boiling solvent, and brominated in boiling $PhNO_2$, with or without sulphonation; 3 : 6-dichloro-2 : 5-di-β-naphthylamino-1 : 4-benzoquinone, heated and chlorinated in hot $PhNO_2$. C. Hollins.



Manufacture of 2-aroyl-1 : 9-*iso*thiazolanthrones. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 366,980, 11. and 13.11.30).—A 2-aroylanthraquinone carrying in position 1 an ·SH, ·SCN, or ·S·CSSR group is treated with NH_3; or a 1-chloro(etc.)-2-aroylanthraquinone or suitably substituted di-2-anthraquinonylbenzene etc. is treated with NH_3 and polysulphide simultaneously. In each case the thiazole ring-formation involves the *meso*-CO to the exclusion of the aroyl CO. Examples are mono*iso*thiazolanthrones from 1-mercapto-2-α-naphthoylanthraquinone (m.p. 272°) and 1-mercapto-2-benzoylanthraquinone (m.p. 258°); bis*iso*thiazoles from 4 : 4′-bis-(1-chloro-2-anthraquinonyl)-diphenyl (fast yellow vat dye) and -diphenyl ether (intense greenish-yellow), and from the mixed diketone prepared by condensing 1-amino- and 1-chloro-anthraquinone-2-carboxylic chlorides with Ph_2 (red-orange); and a pyrazolanthrone*iso*thiazolanthrone from the mixed diketone obtained from pyrazolanthrone-β-carboxylic and 1-chloroanthraquinone-2-carboxylic chlorides with Ph_2 (yellow). C. Hollins.

Manufacture of chloro-derivatives of the anthraquinonebenzacridone series. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 366,055, 23.7.30).—6 : 7-Phthaloylacridones (annexed formula) carrying Cl in positions 1 : 4, 1 : 2 : 3, 2 : 3 : 4, or 1 : 3 : 4 give red to red-orange dyeings very fast to boiling 2% NaOH. Dyes are prepared, *e.g.*, from 1-chloroanthraquinone-2-carboxylic acid and 3 : 4 : 5-, 2 : 4 : 5-, or 2 : 3 : 5-trichloro-, or 2 : 5-dichloro-aniline, or by chlorination of the acridone from 1-chloroanthraquinone and 4 : 5-dichloro- or 6-chloroanthranilic acid. C. Hollins.



V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Cuprammonium solutions. III. Determination of cellulose in cuprammonium salt solutions. N. Ishii (J. Soc. Chem. Ind., Japan, 1932, **35**, 75—78 B;

cf. A., 1932, 476).—The viscosity of cuprammonium solutions of cellulose falls with time, even at room temp., in the dark, and out of contact with O_2; the effect is ascribed to the gradual breakdown of the cellulose particles, until ultimately a characteristic micelle size and viscosity are attained. By observing the rate of fall of viscosity of a given solution, the cellulose content may be determined. H. F. Gillbe.

Test for distinguishing between cuprammonium and viscose rayons. A. Zart (Kunstseide, 1932, **14**, 150).—Cuprammonium rayon is stained bluish-violet and viscose rayon deep pink when immersed for 10 min. in a solution containing 1% of Sirius Blue B and 1% of Eosin at 18—20° and then thoroughly washed with cold H_2O. A. J. Hall.

Factors influencing properties of isolated wood lignin. E. C. Sherrard and E. E. Harris (Ind. Eng. Chem., 1932, **24**, 103—106).—The various methods advocated for the isolation of lignin are criticised. The H_2SO_4 extraction method, in which carbohydrates are first dissolved and subsequently hydrolysed, has been fully examined to find the optimum conditions. With 72% acid charring occurs at 5° and above within 48 hr., giving rise to a lignin-like product so that the results are too high. The lowest yield of lignin was given by extraction with 70% acid for 16 hr. at 10°, and hydrolysing by refluxing for 4 hr. The average yield was 20·8% (oven-dry basis), the product being free from carbohydrates and containing 21·0% OMe, which val. increased to 32·5% after two treatments with Me_2SO_4. The isolated lignin contained 82·4% of the OMe present in the original wood. H. J. Dowden.

Cooking [sulphite pulp] with " passing " of the [residual waste] liquor. O. Hiller (Bumazhn. Prom. 1930, **9**, No. 8—9, 40—45).—Re-use of residual waste liquors is not recommended. In presence of Se an inferior product is obtained. Chemical Abstracts.

Reddening of sulphite wood pulp. H. Alfthan (Papier-Fabr., 1932, **30**, 282—283).—1500 paper samples prepared from 8500 sulphite-pulp digestions have been subjected to artificial reddening by immersion in 1·5% H_2O_2 for 20 sec., the redness being measured 20 min. later by means of a tintometer. Reddening is not influenced by temp. and duration of cook, or by washing unless this be incomplete. That metals have no effect is confirmed. Reddening is principally affected by the hardness (cooking degree) of the pulp. $Al_2(SO)_4)_3$ added to the hollander increases reddening; Na_2CO_3 diminishes it, but gives a yellow colour. For hard pulps, addition of thiosulphates or hyposulphites to the hollander is suggested. T. T. Potts.

Determination of lime in sulphite-liquors [wood-pulp digestion]. E. Graap (Papier-Fabr., 1932, **30**, 289—290; cf. B., 1929, 676).—The method of boiling with excess of $H_2C_2O_4$ and back-titrating with NaOH has been criticised on the ground of possible formation of SO_3. It is shown that the error is $\ngtr$0·005%. T. T. Potts.

Production of paper from oak waste. M. Rech and N. Orlov (Bumazhn. Prom., 1930, **9**, No. 8—9, 57—68).—Cooking with Na_2SO_3 (30% at 5 atm.), or waste from the manufacture of PhOH and β-naphthol (75% Na_2SO_3), gave a good pulp. Bleaching requires 20% of bleaching powder or 7·2% if the pulp is preheated with 1·5% HCl and washed. Chemical Abstracts.

Utilisation of oak waste for manufacture of paper. Y. Chinchin, N. Rosenberger, and P. Larin (Bumazhn. Prom., 1930, **9**, No. 8—9, 68—85).—Residues after extraction of tannin are suitable for the manufacture of pulp; 28—30% alkali at 7—9 atm. gave a pulp which was easily bleached with 5—6·5% of available Cl. The fibres are easily attacked by Cl. The sulphite process gives a less strong pulp. Chemical Abstracts.

Chemical treatment of waste paper. V. Sorokin (Bumazhn. Prom., 1930, **9**, No. 8—9, 95—99).—Treatment for 6—7 hr. at 40—70° in a beater with a mixture of Na_2CO_3 and CaO solutions (3·5—4%), followed by washing for 1 hr., affords a product which can be used directly for paper-making. Chemical Abstracts.

Deteriorative effect of sulphur dioxide on paper in an atmosphere of constant humidity and temperature. A. E. Kimberly (Bur. Stand. J. Res., 1932, **8**, 159—171).—Exposure of book and writing papers for 10 days at 30° to air containing 2—9 p.p.m. of SO_2 and 65% R.H. resulted in considerable embrittlement of the paper, as shown by decrease in folding endurance, although the tensile strength was little affected. The total acidity and Cu no. were appreciably increased, but little change occurred in the α-cellulose content; it is suggested that the hydrolysed portions of the paper fibre are further hydrolysed by the SO_2 and the cementing gel is thereby loosened, causing brittleness. The effect is independent of the initial quality of the paper, since some varieties of low-grade paper suffered less from the exposure than did high-grade record papers. A. R. Powell.

Refraction of light and paper testing. A. Herzog (Papier-Fabr., 1932, **30**, 277—282).—A *résumé* of microscopical methods for investigation of fibrous and mineral constituents of papers, depending on their optical properties. The use of immersion liquids of appropriate n vals. in conjunction with plain and polarised light, and with dark-ground illumination, is described and illustrated with photomicrographs. The optical consts. of the principal fibres and loadings are tabulated, with microchemical reactions for the latter. T. T. Potts.

Comparison of the sizing of paper by the Chinchin process and by size prepared in the cold. N. Ivanov (Bumazhn. Prom., 1930, **9**, No. 8—9, 46—54).

Determining H_2O [in cotton].—See XI. **Canadian hemp oil.**—See XII. **Storage of nitrocellulose.**—See XXII.

Patents

Treatment of fibre-bearing plants. H. Shamp (U.S.P. 1,821,673, 1.9.31. Appl., 8.5.29).—Apparatus is described for the continuous tank-retting of such plants as *Sotol nolina*, *Agave lechuquilla*, *Yucca* grass, leaves of the Joshua tree, etc. D. J. Norman.

Treatment of textile yarns or fibres. A. E. Meyer (B.P. 369,914, 17.10.30).—The material in the form of a hollow package is treated first with a hydrophiling agent (aq. solution of alkali and sulphonated oil) and then with a sizing agent (starch), each liquid being forced through the package under pressure; the resulting yarn is finally detwisted as desired. F. R. Ennos.

Grinding of cellulosic materials. H. Langwell, Assr. to Commercial Solvents Corp. (U.S.P. 1,823,691, 15.9.31. Appl., 9.7.28).—Uniformity of grinding of corncobs is secured by heating the material at 110—180° until nearly all the H_2O is expelled, and then grinding while it is still hot. B. P. Ridge.

Manufacture of cellulose products. H. Dreyfus (B.P. 369,912, 24.9.30).—Wood, straw, grasses, etc., after removal of resin with hot H_2O or alkali, are treated so as to dissolve out the cellulose from the lignin and other impurities, *e.g.*, as Na cellulose xanthate, or cuprammonium cellulose, and the resulting solution is filtered or centrifuged and treated for regeneration of the cellulose. F. R. Ennos.

Manufacture of cellulose derivatives containing nitrogen. Soc. Chem. Ind. in Basle (B.P. 370,355, 9.12.31. Switz., 10.12.30).—Cellulose, which may be swollen with alkali if desired, is washed and treated with a cyanide (KCN), and, after removal of excess of salt solution by centrifuging and pressing, is treated at 0° with Cl_2 or Br in CCl_4; the product has a high affinity for acid and in some cases for basic dyes. F. R. Ennos.

Production of [colourless] cellulose [solutions or shaped objects]. Zellstoff-fabr. Waldhof, and H. Busch (B.P. 370,011, 1.1.31. Ger., 1.2.30).—Bleached or unbleached pulp is boiled with dil. alkali and an alkali-stable reducing agent (Na_2SO_3) and afterwards is converted into the required form by known methods. F. R. Ennos.

Manufacture of cellulose films, strips, and the like. E. Bleibler (B.P. 369,778, 4.5.31. Ger., 21.5.30).—In order to prevent unequal shrinkage during the re-drying of finished films etc. of regenerated viscose after subsequent wetting, the material is treated so that the shrinkage capacity from one dry, or one wet, state to the next is $<12\%$ by (*a*) alternately wetting and drying the strips at least three times prior to the subsequent wetting, at least two drying operations taking place under tension and at least one intermediate drying without tension; (*b*) holding the finished film continuously under tension and removing the marginal portion, thus leaving a central zone of at least 70% of the total width which has a shrinkage capacity of $<10\%$. F. R. Ennos.

Manufacture of films, strips, etc. [from cellulose]. E. Bleibler (B.P. 370,222, 8.5.31. Ger., 22.11.30. Addn. to B.P. 369,778; preceding abstract).—During the last drying operation under tension the film is allowed to shrink, particularly in a transverse direction. F. R. Ennos.

Manufacture of sulphite paper pulp. A. M. Thomsen (U.S.P. 1,823,519, 15.9.31. Appl., 25.3.29).—Acid $Ca(HSO_3)_2$ liquor is decomposed with Na_2SO_4, the pptd. $CaSO_4$ is removed, and the liquor used for the digestion of wood. After separation of the pulp the spent liquor is neutralised, $CaSO_4$ is removed from it as $CaCO_3$ by means of Na_2CO_3, the liquor is evaporated down and then incinerated under reducing conditions, and the Na_2CO_3 and Na_2S in the ash are separated by fractional crystallisation. The Na_2CO_3 is used again in the above process. B. P. Ridge.

Apparatus for measuring the contents of moisture in chemical and mechanical wood pulp. A. C. Andersen (U.S.P. 1,821,605, 1.9.31. Appl., 29.9.27. Norw., 22.5.26).—The electrical conductivity of the moist pulp is measured, intimate contact of substantially const. area with the pulp being obtained by the use of needles which prick completely through the pulp web. These needles are mounted circumferentially at regular intervals on two metal discs placed in axial alinement and insulated from each other, so that as the whole rotates in contact with the travelling web the pulp is pierced at regular intervals by a pair of equally spaced needle electrodes. The moisture content should be thus determined at three separate points across the web, the average moisture content being obtained by connecting the three pairs of electrodes in parallel to a suitable indicating instrument. D. J. Norman.

Measuring the freeness of pulp. F. L. Simons, H. J. Skinner, and R. M. Fuoss, Assrs. to Skinner & Sherman, Inc. (U.S.P. 1,822,604, 8.9.31. Appl., 22.8.29).—After draining the free H_2O from a predetermined amount of aq. pulp, the dielectric capacity of the drained pulp is determined by suitable means. F. R. Ennos.

Treatment of cellulose [in the preparation of purified wood pulp]. S. E. Seaman, Assr. to Eastern Manufg. Co. (U.S.P. 1,822,174, 8.9.31. Appl., 3.7.26).—Wood pulp is treated with an alkaline solution containing Na_2SO_3, washed, bleached, freed from excess H_2O, and passed through a succession of picker rolls to form cellulosic fibre aggregates of $\not>1$ mg. in wt. and containing $\not>$ 40,000 individual fibres, which are finally dried. F. R. Ennos.

Preparation of sulphite-pulp for filaments and films. C. A. Blodgett and H. H. Hanson, Assrs. to Eastern Manufg. Co. (U.S.P. 1,822,126, 8.9.31. Appl., 26.4.27).—Raw wood chips are heated at 140°/60—70 lb. per sq. in. first with sulphite liquor (of stated concn.) containing alkali bisulphite and free H_2SO_3, and, after washing, the product is transferred to a rotary boiler and heated with mixed NaOH, Na_2S, and Na_2SO_3 solutions; the cellulose obtained is finally washed and freed from H_2O. F. R. Ennos.

Paper manufacture. A. L. Clapp (U.S.P. 1,820,962, 1.9.31. Appl., 26.9.28).—Paper closely resembling "glassine" is obtained without prolonged beating by incorporating with the pulp in the beater a H_2O-swollen, H_2O-insol. colloid and calendering or supercalendering the resulting paper while still damp, *e.g.*, containing 15—20% of H_2O. Suitable gels are obtained by treating gelatin (10% solution) or urea (2% solution) with CH_2O and AcOH, or may be prepared from viscose, casein, or silicic acid. 25—50% of prepared gel on the wt. of fibre should be used and should be added at the start of the beating operation. The furnish should be beaten hard for 3—4 hr. D. J. Norman.

Stencil for copying purposes. M. Deseniss, Assr. to A. Feurich (U.S.P. 1,823,260, 15.9.31. Appl., 26.10.29. Ger., 24.7.28).—Porous paper (*e.g.*, Japan paper) is coated with thin layers of products of the chlorination of caoutchouc mixed with a softening agent (castor oil) and a filling agent (Zn white or talc).

B. P. Ridge.

Producing a composite reinforced [pitch-coated paper] sheet. C. Arnold. From Dow Chem. Co. (B.P. 372,039, 19.3.31).

Compound sheet material.—See IX. **Paper insulation.**—See XI. **Waste-liquors from cellulose manufacture.**—See XII. **Splitting of keratin substances.**—See XV. **EtOH etc. by fermentation.**—See XVIII.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Increasing the affinity of wool for dyes by treatment with hydrogen peroxide. L. Kollmann (Textilber., 1932, **13**, 141—143).—The affinity of wool for acid dyes is increased by immersion in warm or cold aq. H_2O_2, and this treatment may be substituted for the usual chlorination process. Brown discoloration of the wool occurs during treatment with acid solutions, but not with alkaline solutions even when they become acidic during the treatment owing to formation of acidic oxidation products from the wool. Simultaneously the tensile strength of the wool increases in cold neutral, alkaline, and acid aq. H_2O_2 up to 30%; serious decreases in strength occur in warm (45°) neutral and acid solutions, but the strength of the wool increases in warm alkaline solutions up to 3% H_2O_2. The addition of water-glass to the alkaline H_2O_2 liquor increases its stability with a corresponding increase of dye affinity; a suitable liquor for treating (at 45° for 24 hr.) wool before dyeing or printing contains, per litre, 5 c.c. of conc. aq. NH_3, 5 c.c. of water-glass (*d* 1·36), and 30 c.c. of 30% H_2O_2. H_2O_2-treated wool yellows slightly with subsequent steaming, and thereby resembles chlorinated wool, but this after-yellowing may be largely prevented by an after-treatment with aq. $NaHSO_3$, and especially with aq. $Na_2S_2O_4$; after-treatment with dil. HCl increases the after-yellowing tendency. An after-treatment of H_2O_2-treated wool with aq. $Na_2S_2O_4$ also increases the affinity of the wool for dyes.

A. J. Hall.

Increasing the lustre of mercerised cotton and viscose silk by dyeing with sulphur dyes; note on the luminescence of naphtholated mercerised cotton. O. Mecheels (Textilber., 1932, **13**, 146).—Cotton yarn, before and after mercerisation, dyed in the usual manner with substantive, basic (on Katanol mordant), indanthrene, and sulphur dyes had lustre proportional to 42 and 80, 42 and 88, 43 and 93, 60 and 105, respectively, thereby indicating the especially large increase of lustre caused by dyeing with S dyes. The lustre vals. of cotton yarn before and after mercerisation, and viscose silk treated in similar indanthrene and S-dye baths but without the addition of dye, were 22, 43, 90 and 21, 49, 112, respectively. Unlike non-mercerised cotton and also cotton after scouring in dil. NaOH or bleaching with Na_2O_2, mercerised cotton shows a strong yellow luminescence in ultra-violet light when treated in a 3% solution of Naphthol AS-RL in 50% EtOH and dried; this luminescence is also evident if the mercerised cotton is acidified after mercerisation and then thoroughly washed (cf. B., 1932, 98).

A. J. Hall.

Delustring of cellulose acetate rayon in hot aqueous liquors. W. Stahl (Kunstseide, 1932, **14**, 153—155).—The loss of lustre produced by immersing cellulose acetate rayon in boiling H_2O is due to rapid swelling of the rayon promoting the liberation of gaseous products and the formation within the fibre mass of small holes and fractures. Curves are given showing that viscose, cuprammonium, and denitrated Chardonnet rayons do not undergo progressive swelling when immersed in H_2O the temp. of which is gradually raised to 100°, whereas cellulose acetate swells to a rapidly increasing extent as the temp. is raised from 70° to 100°. Cellulose acetate rayon delustres less in hot aq. solutions of inorg. salts (B.P. 246,879; B., 1926, 317); it is only slightly delustred in hot 0·2—0·1*N*-NaOH, but delustring increases as the concn. of NaOH is reduced. The viscosity of cellulose acetate is unchanged by delustring treatments, and when delustring is effected in neutral aq. liquors no measurable degree of hydrolysis occurs. Cellulose acetate rayons having a high Ac content (56—57%) are less easily delustred than those less acetylated (53%). In degumming real silk in the presence of cellulose acetate rayon the lustre of the latter fibre may be satisfactorily protected by the addition of a neutral salt to the soap bath.

A. J. Hall.

Preparation of waterproof fabrics. A. V. Botchenkov (Tiba, 1931, **9**, 1171—1177, 1291—1295).—Optimal conditions for waterproofing tent canvas with $Al(OAc)_3$ are recorded.

Chemical Abstracts.

New uses for Aniline Black.—See IV. **Alkaline salts as detergents.**—See VII. **Bleaching of fats and oils.** **Textile oleines etc.**—See XII. **Solvent recovery in rubber-proofing.**—See XIV. **Amylolytic preps.**—See XVIII. **Fumigant against clothes moth etc.**—See XXIII.

Patents.

Dyeing of textiles. A. G. Bloxam. From Soc. Chem. Ind. in Basle (B.P. 366,918, 4.11.30).—Fastness to H_2O and to wet-ironing is enhanced by after-treatment of dyeings obtained with H_2O-sol. colours either with a H_2O-sol. salt of a diamine mono- or di-acylated (on the same N atom) with aliphatic or alicyclic acyl groups above C_9, or with a corresponding quaternary salt. Examples of such "Sapamines" are: oleic or stearic β-dimethylaminoethylamide methosulphate; oleic β-aminoethylamide acetate; oleic β-diethylaminoethylamide methosulphate.

C. Hollins.

Dyeing with mordant colours. H. T. Bucherer (H. Bucherer) (B.P. 367,054, 21.11.30. Ger., 21.11.29).—Wool, which has been premordanted (*e.g.*, with Al_2O_3) or is mordanted with $(NH_4)_2Cr_2O_7$ in the dye-bath, is dyed with a mordant dye (*e.g.*, alizarin or alizarin-yellow 3G) in presence of NH_3 or $(NH_4)_2CO_3$, the bath being maintained ammoniacal until lake-formation is complete. A dil. AcOH bath containing a little chromate may follow.

C. Hollins.

Printing of textiles with vat dyes. Chem. Fabr. vorm. Sandoz (B.P. 367,240, 24.4.31. Ger., 24.4.30).—To vat printing pastes containing alkali-metal carbonate or bicarbonate as the alkali boron compounds (HBO_3 or pyridine borate) are added, whereby deeper prints are obtained after steaming. C. Hollins.

Printing of vat dyes on animal fibres. I. G. Farbenind. A.-G. (B.P. 368,433, 19.12.30. Ger., 20.12.29).—Vat dyes described in B.P. 265,641 (B., 1927, 325) are printed on wool, silk, and weighted silk without deterioration of the fibre by means of a printing paste containing glucose and triethanolamine in addition to the usual assistants including a weak alkali, *e.g.*, NH_3. A. J. Hall.

Treatment of fibrous material and [dispersing, solubilising, cleansing] agents therefor. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 366,961; 9.9.30).—Hydroxyalkyl ethers of aliphatic or alicyclic amino-alcohols, or their salts, are added to dye-baths, stripping, bucking, cleansing baths, etc. Examples are: tri-(β-hydroxyethyl)amine mono- and di-(β-hydroxyethyl) ethers; di-(β-hydroxyethyl)-β-ethylhexylamine di-(β-hydroxyethyl) ether; product from tri-(β-hydroxyethyl)amine and 3 mols. of propylene oxide. C. Hollins.

Manufacture of non-inflammable fabric. A. F. Randolph, Assr. to Celastic Corp. (U.S.P. 1,820,198, 25.8.31. Appl., 9.9.26).—Woven or felted fabric is impregnated with a mixture of pyroxylin 100 pts., camphor 30 pts., tolyl phosphate 33 pts., gypsum (or Ca tartrate) 200 pts., and a volatile solvent (EtOH 90 pts., $COMe_2$ 10 pts.) 650 pts., and pressed into any desired shape; the fabric is then passed through a pptg. bath (usually H_2O) and a liquor, *e.g.*, diacetone alcohol 30 pts. and EtOH 70 pts., to render it flaccid for shaping. A. J. Hall.

Filter [for dry-cleaning solvent].—See I. **Wetting etc. agents. Mordants.**—See III.

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

Elimination of sodium sulphate in the manufacture of boric acid from kernite and rosarite. I. J. Kabatschnik (J. Chem. Ind. Russ., 1931, 8, Nos. 21—22, 52—53).—In the prep. of H_3BO_3 from $Na_2B_4O_7$ by the action of H_2SO_4, the saturated mother-liquor contains 300 g. of Na_2SO_4 and 100 g. of H_3BO_3 per litre at 35°; on cooling to 15° about one half of the Na_2SO_4 crystallises out, together with about 15 g. of H_3BO_5. Loss of H_3BO_3 can be avoided by adding sufficient Na_2CO_3 to convert it into readily sol. $NaHB_4O_7$ (about 16 kg. of Na_2CO_3 per cu. m. of mother-liquor at 60°), and cooling to 15°, when the ppt. of Na_2SO_4 contains $\not>$ 1·2% H_3BO_3. R. Truszkowski.

Oxidation of dilute solutions of sodium sulphide by air. L. Meunier and M. Kapp (J. Soc. Leather Trades' Chem., 1932, **16**, 127—149).—Dil. solutions of Na_2S can be oxidised by agitation with air if they are first diluted and brought to p_H 3·0. The rate of oxidation is diminished if the CO_2 is removed from the air, and increased by the addition of salts of Ni or Mn. The oxidation can be brought about by exposure to ultraviolet light. D. Woodroffe.

Determination of carbon dioxide and of alkalinity in hypochlorite. A. Vassiliev and H. Stutzer (Z. anal. Chem., 1932, **88**, 119—125).—Active Cl in the hypochlorite is first removed by interaction with excess of aq. $FeSO_4$, after which the CO_2 is liberated by aq. HCl, collected in an absorption train by means of a current of air, and weighed. Alkalinity is determined by Philibert's method, modified by substituting direct titration with acid for iodometric determination after addition of KIO_3 and KI. F. L. Usher.

Analysis of hyposulphite by means of azo dyes. V. I. Minaev, S. S. Frolov, and G. M. Maiorov (Bull. Inst. Polytech. Ivanovo-Vosniesensk, 1930, **15**, 151—156).—The material is added to a solution containing excess of an azo dye, the excess being determined colorimetrically. Chemical Abstracts.

Transformations in calcium cyanamide in storage. A. I. Achromeiko (Udobr. Urozhai, 1931, **3**, 728—738).—Apparent losses of N are in fact gains in H_2O and CO_2. Storage of $CaCN_2$ in a moist atm. transforms it into dicyanodiamide and $CO(NH_2)_2$; in air-dry conditions only part is converted into dicyanodiamide and little into $CO(NH_2)_2$. Some of the N becomes unavailable. Chemical Abstracts.

Determination of total nitrogen in calcium cyanamide. W. Lepper (Z. anal. Chem., 1932, **88**, 81—83; cf. B., 1931, 87).—The material is completely decomposed by boiling for 30 min. with H_2SO_4 containing K_2SO_4 and $CuSO_4$. F. L. Usher.

Bromometric determination of total nitrogen in [calcium] cyanamide. M. L. Chepelevetzki and R. D. Fain (J. Appl. Chem., Russia, 1931, **4**, 865—871).—The sample is first mixed with K_2SO_4 and then decomposed with H_2SO_4, affording $(NH_4)_2SO_4$; thereafter, $(NH_4)_2SO_4 + 6Br + 8Na_2HPO_4 = N_2 + 6NaBr + Na_2SO_4 + 8NaH_2PO_4$. Chemical Abstracts.

Change of water-soluble phosphoric acid content of superphosphate during storage in bulk. VI. Reaction between monocalcium phosphate and iron sulphate. T. Shōji, E. Suzuki, and E. Nanai (J. Soc. Chem. Ind., Japan, 1932, **35**, 130—134 B; cf. B., 1932, 420).—$Ca(H_2PO_4)_2$ and $Fe_2(SO_4)_3$ when mixed and allowed to remain in contact with about 10% of H_2O react rapidly to completion independently of the temp. Hence the conversion ratio of superphosphate made from phosphate rock containing easily dissolved Fe compounds will be lowered at the stage immediately after manufacture, but the decline of H_2O-sol. H_3PO_4 content during storage is not affected by such Fe compound. J. W. Smith.

Determination of phosphoric anhydride in phosphates and fertilisers by reducing the molybdenum precipitate with amalgams. M. L. Chepelevetzki and R. A. Fiskina (J. Appl. Chem., Russia, 1931, **4**, 858—864).—$(NH_4)_3PO_4,12MoO_3$ is dissolved in aq. NaOH, the resulting solution being acidified, reduced with Zn–Hg or Bi–Hg, and titrated with $KMnO_4$. Chemical Abstracts.

Chibin apatite and its conversion into fertilisers. L. E. Berlin (Udobr. Urozhai, 1931, **3**, 695—703).—Apatite containing 30% P_2O_5 is suitable for the production of low-grade superphosphate; for 14% superphosphate concn. by flotation or crushing is necessary. For thermophosphates the ore should contain $\not<$ 28% P_2O_5. Chemical Abstracts.

Detergency of alkaline salt solutions. I. Initial and available alkalinity. F. D. SNELL (Ind. Eng. Chem., 1932, **24**, 76—80).—Added alkali acts as a "soap builder" and the detergency of the solution is increased by repression of hydrolysis, by the formation of more colloid, and by the neutralisation of acidity in the dirt. The chief desiderata in a detergent are wetting, deflocculating, and emulsifying powers, and alkalinity. The val. of a "builder" is governed by the length of time it will maintain an alkalinity of p_H 10·0, and the ideal is one which is potentially strong, but buffered to yield its available alkalinity only on reaction. On this basis, NaOH is unsuitable since its initial alkalinity is so great as to be detrimental to fabrics, but Na silicates with high $Na_2O : SiO_2$ ratio are most nearly ideal. Until the orthosilicate is commercially available the most efficient builder is the metasilicate having $Na_2O : SiO_2 = 1$.
H. J. DOWDEN.

Gases obtained from commercial felspars heated *in vacuo*. G. R. SHELTON and H. H. HOLSCHER (Bur. Stand. J. Res., 1932, **8**, 347—356).—Felspar (19 samples, ground) on heating in a vac. evolves H_2O vapour, acidic gases (mainly CO_2), and traces of other gases. The amount of H_2O vapour given off increases with rising temp., attaining a max. at 800—900°. The evolution of acidic gases takes place almost entirely between 400° and 800°. Traces of other gases are also evolved at all temp. At 1000° the gases consist of H_2O 32—96, acidic gases 0—59, other gases 0—36 wt.-%.
J. W. SMITH.

Flotation of bauxite from the beds at Bodayk (Hungary). A. LOTTERMOSER and H. RUMPELT (Kolloid-Beih., 1932, **35**, 372—412).—"T-T" mixture, oleic acid, and Espumin (from Chem. Fabr. E. Schnell; probably a naphthensulphonate) are the most suitable agents for the flotation of bauxite and are most effective in the slightly acid region. Separation of Fe_2O_3 and Al_2O_3 is possible by this process; the amount of Fe_2O_3 can be reduced by 33%; no alteration in the SiO_2 content is effected. A magnetic method of separation appears to be promising, but separation by electrophoresis is not practicable.
E. S. HEDGES.

Inertness of talc mined in Shabrovsk to fuel slag. O. V. NEFEDEV and K. A. KARAYANOTULO (Izvest. Teplotekh. Inst., 1931, No. 9, 54—60).—Analyses of the unburned and burned talc are recorded.
CHEMICAL ABSTRACTS.

Determination of lead peroxide. IV. A. V. PAMFILOV and E. G. IVANČEVA (Z. anal. Chem., 1932, **88**, 94—97; cf. B., 1932, 259).—The use of $Fe(NO_3)_2$, recommended by Bruhns (B., 1931, 246), is unsatisfactory owing to oxidation of the $Fe^{\cdot\cdot}$ by HNO_3. Better results are obtained by using $FeCl_2$ in aq. HCl.
F. L. USHER.

Preparation of colloidal silver iodide; its bactericidal and bacteristatic value. W. A. LOTT and W. G. CHRISTIANSEN (J. Amer. Pharm. Assoc., 1932, **21**, 141—145).—Various methods of prep. of colloidal AgI are discussed. Conversion of the Ag into AgI must be complete and the [OH′] must be kept low. Addition of AcOH to a light-sensitive product renders it stable to light, as also does the addition of small amounts of aq. NH_3. A product pptd. from H_2O by $Pr^{\beta}OH$ is more light-stable than one pptd. by EtOH. Examination of all the samples of colloidal AgI prepared and of those purchased showed that they are not germicidal and have little, if any, antiseptic activity when tested *in vitro* against *B. typhosus* and *S. aureus*.
E. H. SHARPLES.

Determination of sulphur in pyrites. H. A. J. PIETERS and M. J. MANNENS (Chem. Weekblad, 1932, **29**, 261—263).—The volumetric method is found unsatisfactory. After the usual oxidation with aqua regia and repeated evaporation, the solution is treated with insufficient $BaCl_2$, made up to bulk, and the remaining sulphate determined in an aliquot part after filtering. In another method, the mineral is heated with equal parts of Na_2CO_3 and KNO_3, the melt dissolved, an aliquot part evaporated with HCl three times, and the sulphate determined in the filtrate in the usual way.
S. I. LEVY.

Apparatus for determination of carbon dioxide. J. PRITZKER and R. JUNGKUNZ (Chem.-Ztg., 1932, **56**, 364).—A glass flask for the decomp. of the carbonate is provided with a hollow glass stopper carrying two stoppered tubes side by side, one for containing the acid and the other for the $CaCl_2$ for drying the CO_2 evolved.
A. R. POWELL.

Determination of ozone in ozonised air. E. H. RIESENFELD (Angew. Chem., 1932, **45**, 309).—The use of neutral KI solution, as described by Krais and Markert (B., 1932, 383), is criticised: the solution becomes alkaline when it reacts with O_3 and the result will therefore be high; further, NO is formed to a small extent during the ozonisation of air, and as in alkaline solution this is oxidised to NO_3' by I, the result will be low. Occasionally the one error will balance the other, but, in general, the method is inapplicable. Satisfactory results are obtained with aq. KI used in contact with an excess of solid H_3BO_3. The p_H remains const., and neither IO_3' nor H_2O_2 is formed; error due to oxidation of the NO in the solution to NO_2, which at the concn. obtaining is very slow, is obviated by effecting the titration as soon as possible after passage of the gas.
H. F. GILLBE.

[Determination of ozone in ozonised air.] P. KRAIS and H. MARKERT (Angew. Chem., 1932, **45**, 309).—A reply to Riesenfeld (cf. preceding abstract). The original method is intended as a rapid, technical, approx. method. With a large excess of reagent, error due to formation of alkali is negligibly small.
H. F. GILLBE.

Production of sulphurous acid. A. P. SCHULZ and H. SEITH (Z. Spiritusind., 1932, **55**, 66).—By saturating H_2O at 17·5° with gases from the combustion of S in air, the max. concn. obtained was 1·51° B. (≡ approx. 2·0 wt.-% of SO_2). Thus Saare's val. of 2·5° B. was not confirmed. The optimal gas mixture resulted from rapid combustion and consisted (by vol.) of approx. 80% N_2 and 20% SO_2, with no O_2. When other samples of combustion gas were passed through solutions containing 7·7 and 3·15 wt.-% of SO_2, the contents of SO_2 were rapidly reduced to 1·1 and 1·25%, respectively.
C. RANKEN.

Examination of laughing gas. C. G. van Arkel and F. Beek (Pharm. Weekblad, 1932, 69, 469—471).—Analysis by explosion with H_2 showed that the gas as supplied in cylinders contains 2·7—3·1% N_2. The gas escaping when the cylinder is opened is at first much richer in N_2; vals. of 7, 10, and 19·5% were observed.
S. I. Levy.

Use of electro-filters.—See I. **Determining free CaO.**—See IX. **Electrolytic methods [for Cu_2O].**—See X. **Pyrolusite for batteries.**—See XI. **Bleaching clays.**—See XII. **Aq. NH_3 as fertiliser.**—See XVI.

Patents.

Purification of technical ammonium chloride liquors. W. T. Grace, Assr. to Grasselli Chem. Co. (U.S.P. 1,823,097, 15.9.31. Appl., 20.6.29).—About 0·4—0·6% of an oxy-compound of Pb, *e.g.*, Pb_3O_4, is added to the liquors before cooling, in order to ppt. Fe and other heavy-metal salts. W. J. Wright.

Production of [solid] ammonium nitrate. N. Caro and A. R. Frank (B.P. 370,278, 10.7.31).—Conc. HNO_3 and NH_3 or "Divers' liquid" are caused to react by agitation with NH_4NO_3 in H_2O-cooled apparatus. L. A. Coles.

Treatment of tricalcium phosphate. H. E. White (U.S.P. 1,823,015, 15.9.31. Appl., 9.2.28).—Phosphate rock is smelted in an electric furnace, in absence of air, with coke and FeS to give P, the CaS being tapped off at intervals and the volatile products conveyed to a condenser. If H_3PO_4 is desired, air is admitted into the furnace during the reduction, P_2O_5 and SO_2 vapours being treated with H_2O and separated in a precipitator. W. J. Wright.

Restoring moisture and adding acid to re-activated clay. W. S. Baylis, Assr. to Filtrol Co. of California (U.S.P. 1,823,230, 15.9.31. Appl., 3.1.28).—Steam carrying the acid is blown into a stream of air in which the finely-divided clay particles are carried from a pulverising mill to the storage chamber.
J. A. Sugden.

Obtaining beryllium and aluminium compounds [from beryl]. C. B. Sawyer and B. Kjellgren, Assrs. to Brush Beryllium Co. (U.S.P. 1,823,864, 15.9.31. Appl., 14.10.30. Can., 6.1.27).—Beryl is heated above 1000° and cooled rapidly (preferably heated to fusion and quenched in H_2O) and then treated with H_2SO_4, $d \ngtr 1·775$, under conditions of temp. and time such that the Be and Al dissolve as their sulphates and the SiO_2 remains undissolved.
L. A. Coles.

Preparation of chemically pure tungsten and molybdenum trioxides. P. Schwarzkopf, Assr. to Amer. Electro Metal Corp. (U.S.P. 1,815,132, 21.7.31. Appl., 14.7.28. Ger., 20.7.27).—Crude MoO_3 or crude W powder mixed with porous coke is heated in a current of O_2 or air enriched with O_2, whereby pure MoO_3 or WO_3 sublimes, leaving a porous infusible slag containing the impurities. A. R. Powell.

Production of hydrogen. Humphreys & Glasgow, Ltd., Assees. of J. A. Perry (B.P. 370,289, 22.7.31. U.S., 30.8.30).—Gas mixtures containing H_2 and hydrocarbons are treated to separate the hydrocarbons etc. and the fraction containing these is passed through an ignited fuel bed to yield more H_2; the gas mixture obtained is returned to the separation stage and the fuel bed is treated with steam to decompose deposited C with the production of water-gas, from which more H_2 is recovered. Alternatively, the hydrocarbons and steam are passed simultaneously through the fuel bed. L. A. Coles.

Apparatus for splitting up water into hydrogen and oxygen. G. Fuchs and H. Späth (B.P. 370,198, 20.4.31).—H_2O is charged into a vessel provided at the bottom with an evaporator heated electrically at 400—500° and at the top and around the exit pipe with decomposers heated at 1300—1400° and at about 2000°, respectively. L. A. Coles.

Recovery of sulphur [from pyrites etc.]. United Verde Copper Co., Assees. of (a) O. C. Ralston and (a, b) K. M. Baum (B.P. 369,913 and 369,958, 25.9.30. U.S., 25.9.29).—(a) Cu pyrites etc. is roasted in air to yield SO_2 and matte; the matte, mixed with about 2% of Fe, is treated with dil. H_2SO_4 to yield H_2S, and a mixture of the SO_2 and H_2S is caused to react in the presence of a natural or artificial zeolite as catalyst. The pptd. S is separated from the catalyst by leaching with $(NH_4)_2S$ solution or with superheated H_2O, or by extraction with commercial o-$C_6H_4Cl_2$. (b) A catalyst for promoting the interaction of H_2S and SO_2 comprises a mixture of a mineral gel (SiO_2 or a zeolite) and activated C. L. A. Coles.

Treatment of discoloured sulphur. L. S. Bushnell, Assr. to the Freeport Sulphur Co. (U.S.P. 1,823,188, 15.9.31. Appl., 3.9.29).—Molten S is sprayed into a tank, where it meets a spray of H_2SO_4 or of a solution containing H_2SO_4 and an oxidising agent, *e.g.*, KNO_3, $KClO_3$, or $NaNO_3$, the sp. gr. of this solution being lower than that of the S. The S passes through a layer of the solution to the base of the tank, in which are arranged heated coils, and thence is pumped to a spraying nozzle in a washing tank, where it is washed by a spray of superheated H_2O at 320°. The purified S passes over heated coils to an outlet.
W. J. Wright.

Recovery of sulphur dioxide from exit gas. H. F. Merriam, Assr. to Gen. Chem. Co. (U.S.P. 1,823,372, 15.9.31. Appl., 24.8.27).—The exit gas is admitted to a tower in countercurrent to a solvent for the SO_2, the solution passing into a stripping tower, in which the SO_2 is expelled by the action of air. The mixture of SO_2 and air is conveyed to a burner for the production of conc. SO_2 gas (8—12%) suitable for catalytic conversion into SO_3. W. J. Wright.

Treatment of sulphur dioxide gas. B. W. Nordlander, Assr. to Gen. Electric Co. (U.S.P. 1,823,698, 15.9.31. Appl., 1.7.29).—SO_3 is removed by passing the SO_2 through a layer of active S or, preferably, through SeS_2 at 80—85°. The activity of the sulphide may be restored by grinding. W. J. Wright.

Treating aq. $FeSO_4$. Antifreeze composition.—See I. **Gas purification.**—See II. **CCl_4.**—See III. **Metallurgical process. Treating Zn-bearing material.**—See X.

VIII.—GLASS; CERAMICS.

Continuous rotary kiln with stationary hearth and travelling tunnel. C. B. Winser and H. Catterson-Smith (Trans. Ceram. Soc., 1932, **31**, 149—152).—It is claimed that the stationary hearth eliminates all possibility of shock or vibration of the ware during firing. The kiln is electrically fired, and thus no saggars are required, resulting in a corresponding saving of power. H. H. Macey.

Use of natural gas in firing structural clay products. M. W. Blair (J. Amer. Ceram. Soc., 1932, **15**, 261—263).—The advantages and economics of the process are briefly discussed. J. A. Sugden.

Kaolins; effect of firing temperatures on some of their physical properties. R. A. Heindl, W. L. Pendergast, and L. E. Mong (Bur. Stand. J. Res., 1932, **8**, 199—215).—The chemical analysis and softening point of raw, and the thermal expansion, porosity, and *d* of fired (1100—1650°), kaolins from Georgia, N. Carolina, Delaware, Zettlitz, and England have been determined, and petrographic examinations made before and after firing. Georgia and Zettlitz kaolins are the purest and have a higher *d* and, at 100—200°, a higher thermal expansion after firing than the others. Rise of firing temp. and changes in the rate of cooling affect the expansion of the purer clays to a greater extent than they do that of the less pure. Addition of muscovite up to 15% to pure kaolins reduces the thermal expansion after firing at 1400°, but has no effect on the softening point. By adding Al_2O_3 equiv. to the free SiO_2 in the clay firing at 1650° converts the whole into mullite. The high rate of expansion of certain fired clays is caused primarily by the presence of cristobalite formed either from the free quartz present in the raw clay or by the separation of SiO_2 in the reaction involving the formation of mullite during firing; the expansion produced by the $\alpha \rightarrow \beta$ transformation in cristobalite occurs at 150—195° or at 175—230° according to the temp. at which the material was fired. The inversion of cristobalite formed by the devitrification of fused quartz occurs at 235—255° and that of cristobalite prepared from pptd. amorphous SiO_2 at 100—210°. A. R. Powell.

Effect of de-airing on the strength of stiff-mud [clay] products in the wet state. E. Lovejoy (J. Amer. Ceram. Soc., 1932, **15**, 231—233).—The strength of a 1-in. square test-bar (measured as the angle through which it can be bent without breaking) is increased several times when the auger machine is evacuated, and the transverse strength of the dried ware is increased by 80%. J. A. Sugden.

Placing materials for bone china. B. Moore (Trans. Ceram. Soc., 1932, **31**, 153—164).—A 3 : 1 mixture of calcined bone ash and calcined alumina is suggested. Bone china placed in this mixture will withstand an extra cone fire without decomp., whilst the risk of bloating is reduced. Further advantages, *e.g.*, a better product with less loss, and a reduction in saggar breakages, amply repay the increase in original cost. The danger of silicosis which arises from the use of flint is eliminated. H. H. Macey.

Utilisation of granites and sienites in the glass and ceramic industries. B. Granigg (Giorn. Chim. Ind. Appl., 1932, **14**, 121—124).—A prime material of use in making glass and ceramic products is obtained by comminuting granites or sienites and treating the resulting fine sand in a special helical magnetic separator, which eliminates almost completely rock fragments containing Fe, leaving the quartz or felspar. Satisfactory results have been thus obtained with granite, sienite, and monzonite. T. H. Pope.

Some properties of chrome spinel. C. W. Parmelee and A. Ally (J. Amer. Ceram. Soc., 1932, **15**, 213—225).—Data for thermal expansion, refractoriness, density, porosity, composition, and constitution (mineralogical and *X*-ray) are recorded. J. A. Sugden.

Function and action of opacifiers [for white-ware glazes]. L. R. Kirk (J. Amer. Ceram. Soc., 1932, **15**, 226—230).—SnO_2 has twice the covering power of ZrO_2. In a coloured glaze the amount of opacifier should be inversely proportional to the depth of colour. The adjustments necessary to counteract the effect of the opacifier on the fluidity of the glaze are best studied on an inclined test-block. J. A. Sugden.

The "pinch effect" in the crazing of tiles. J. W. Mellor (Trans. Ceram. Soc., 1932, **31**, 129—130).—The stresses set up in tiles by abnormal contraction of the setting cement are liable to cause crazing. A photograph of tiles thus crazed is given.
H. H. Macey.

Buckling of wall tile. H. Wilson (J. Amer. Ceram. Soc., 1932, **15**, 252—262).—A case of failure was attributed to laying the tiles on a green (unshrunk) plaster backing, the use of too much clay plasticiser in the plaster, and the buckling of the partition wall due to movement of the concrete building walls in drying. J. A. Sugden.

Extrusion of refractory oxide insulators for vacuum tubes. L. Navias (J. Amer. Ceram. Soc., 1932, **15**, 234—251).—Non-plastic materials (MgO, ThO_2, ZrO_2, BeO, Al_2O_3) are given a temporary plasticity sufficient for extrusion by the addition of an org. gel (flour or starch paste $+ NH_3$). Full details are given of the pre-firing, grinding, extrusion, firing, and testing of the finished formers for the heating element of a.-c. heated (mains) radio-valves. Successful bodies were made from the pure oxides with and without the addition of fluxes such as talc, clay, alkali silicates, etc. The flux content must be kept low in order to minimise electrical leakage and interaction with the metal filament. Al_2O_3 and BeO even at their m.p. are unaffected by the metal filament, but MgO and ZrO_2 are reduced and leave a deposit of metal on the cooler parts of the tube. The electrical conduction at high temp. decreases in the order ZrO_2, ThO_2 (milliamp.), MgO, Al_2O_3, BeO (micro-amp.). J. A. Sugden.

Testing of commercial glassware. E. J. Gooding (J. Soc. Glass Tech., 1932, **16**, 5—17 T).

Safety glass: its history, manufacture, testing, and development. J. Wilson (J. Soc. Glass Tech., 1932, **16**, 67—79 T).

Gases from felspar.—See VII. **Determination of SiO_2.**—See IX. **Heat insulation of Siemens–Martin furnaces.**—See X.

Patents.

Surface treatment of glassware and apparatus therefor. Brit. Hartford-Fairmont Synd., Ltd., T. Wardley, and J. B. Murgatroyd (B.P. 369,900, 25.9.30 and 4.6.31).—While passing through the lehr the ware is treated with a spray of Pb borate or SO_2 gas in order to eliminate detrimental surface imperfections. Suitable mechanical devices are described.

J. A. Sugden.

Refractory article. R. L. Frink (U.S.P. 1,823,356, 15.9.31. Appl., 20.11.26).—The body of the article is provided with graded or sharply defined zones of decreasing porosity to a dense and sintered face. Material (*e.g.*, SiO_2, sillimanite, mullite, ThO_2, ZrO_2, bonded with B_2O_3, NaCl, $MgCl_2$, etc.) is mixed with sawdust, wax, rosin, or other destructible matter which burns out when the article is fired. J. A. Sugden.

Manufacture of refractory brick. R. P. Heuer (B.P. 370,013, 1.1.31).—Magnesite (containing $\not> 3\%$ CaO) is mixed with a small amount (5%) of finely-divided clay and 1—4% of an acid dispersing electrolyte *e.g.*, $Na_2Cr_2O_7$ or $NaHSO_4$, and dried at a low temp. The particles of magnesite are bonded by the colloidal matter, which is dispersed from the clay and deposited on their surface. J. A. Sugden.

[Pressing process for] manufacture of unsplinterable glass. T. C. Redfern, J. F. W. Stuart, T. W. Holt, and Aeroplex, Ltd. (B.P. 372,219, 1.10.31).

Mould for casting refractory materials. Corhart Refractories Co., Assees. of F. W. Schroeder (B.P. 372,138, 22.6.31. U.S., 9.7.30).

[Making] refractory brickwork [with recessed firebricks]. P. Giese (B.P. 371,724, 13.8.31. Ger., 28.3.31).

IX.—BUILDING MATERIALS.

Operation of lime kilns in Japan. T. Noda, I. Honjō, and S. Oyamada (J. Soc. Chem. Ind., Japan, 1932, **35**, 99—105 b).—Details are given of the temp. in different parts of a lime kiln operating in Japan, analyses of kiln gas, the thermal efficiency, the rate of calcination of the limestone, and the rate of burning of fuels. In order to improve the operation of such kilns it is suggested that some alteration in the lengths of the various zones is necessary, and that the vol. of excess air should be reduced. J. W. Smith.

Cause of acceleration of hardening of gypsum cement in the presence of added substances. S. Yamane (Sci. Papers Inst. Phys. Chem. Res., Tokyo, 1932, **18**, 101—108).—Gypsum cement sets more rapidly in the presence than in the absence of NaCl, Na_2SO_4, or $(NH_4)_2SO_4$. The solubilities of $CaSO_4,0{\cdot}5H_2O$ (S_1) and $CaSO_4,2H_2O$ (S_2) are augmented by addition of NaCl, and diminished by addition of Na_2SO_4 or $(NH_4)_2SO_4$; in all cases S_1—S_2 is greater when salts are present than when they are absent.

R. Truszkowski.

Rôle of hydrated calcium aluminates in the setting of cement. Resistance of calcium sulphoaluminate to sea-water. A. Travers (Chim. et Ind., 1932, **27**, 755—764).—Hydrated Ca aluminates were prepared (1) by the action of lime-water on solutions of K aluminates, (2) by the same reaction in presence of $Ca(NO_3)_2$, (3) by interaction of lime-water and $Al(NO_3)_3$. The most sol. form, $Ca(AlO_2)_2$, is first formed, but more basic salts are then pptd. At $p_H < 11$ the ppt. is $Al(OH)_3$, and at p_H 11·57—11·62 $Al_2O_3,3CaO,21H_2O$. At higher p_H vals. crystals are formed containing 3·1—3·9 mols. CaO to 1 mol. Al_2O_3. These salts dissolve completely in H_2O free from CO_2 and are thought to be solid solutions of $Ca(OH)_2$ and $Al_2O_3,3CaO$. They contain approx. 12 mols. H_2O. Similar cryst. salts were obtained by extracting ciment fondu with H_2O, and it is considered that the setting of the latter represents the same reactions carried out without excess of H_2O. These cryst. aluminates containing > 3 mols. CaO per mol. Al_2O_3 are not acted on by saturated solutions of $CaCl_2$ or $MgCl_2$; they are attacked, however, by saturated aq. NaCl, but the effect of sea-water is negligible. The resistance of ciment fondu is thus due to its composition. The salt $2{\cdot}5CaSO_4,Al_2O_3,3CaO$,aq. is entirely insol. in solutions having $p_H > 11{\cdot}7$. It is very resistant to many solutions, but is not believed to be significant in the behaviour of ciment fondu. It is probably formed in the setting of Portland cement to which $CaSO_4$ has been added, but in this case fails to render it resistant to sea-water. C. Irwin.

Aluminous cement. I. R. Salmoni (Giorn. Chim. Ind. Appl., 1932, **14**, 133—136).—Temp.-time curves, taken during the setting and hardening of aluminous cement, show that the generation of heat is subsequent to the setting and takes place in 3 distinct stages. Since the third stage may be lacking if the % H_2O used falls below a certain val. it seems that the exothermic phenomenon is connected with the formation of well-defined hydrates. Contrary to Killig's statement (1919), the thermal method serves well for determining the completion of setting, failure of the Vicat needle to penetrate synchronising with the commencement of heating; the thermal curve gives, however, no indication of the beginning of setting. The observed independence of the time of setting on the % H_2O used indicates that the end of setting, determined by the Vicat needle, is due to sudden increase in the velocity of hydration, following a const. induction period.

T. H. Pope.

Silicic acid and silicates. III. Determination of silica in soluble silicates. F. W. Meier and O. Fleischmann (Z. anal. Chem., 1932, **88**, 84—92; cf. A., 1931, 445).—In determinations of SiO_2 in Portland cement by nine different methods, 0·6—3·6% of the total SiO_2 was lost in the filtrate. A method in which the material is decomposed by $HClO_4$ gives satisfactory results if the reaction mixture is not allowed to solidify, and the $HClO_4$ is removed by 10% HCl instead of by H_2O. Details are given. F. L. Usher.

Phenol method for determination of free lime, and its application to the analysis of cement. J. Konarzewski and W. Lukaszewicz (Przemysl Chem.,

1932, **16**, 62—69).—One g. of cement is heated during several hr. under reflux with 25 c.c. of a 1 : 1 mixture of PhOH and EtOH. The liquid is filtered, the residue is washed with abs. EtOH, and EtOH is removed from the filtrate by distillation. The residual liquid is now diluted to about 120 c.c., and $Ca(OH)_2$ is determined by titration with $N/15$-HCl, using Me-orange as indicator. The process of burning cement clinker takes place to a large extent in the solid phase, and combination between CaO and clay decomp. products commences before decomp. of $CaCO_3$ is completed. Cements containing $>1\%$ of free CaO are unsatisfactory, as a result of vol. changes taking place on addition of H_2O leading to formation of cracks and fissures in the final product.
R. Truszkowski.

Preservation of wood by silicofluorides. J. König and H. Mengele (Angew. Chem., 1932, **45**, 280—281).—When wood is impregnated with $ZnSiF_6$, $HgSiF_6$, mixtures of these, or $HgCl_2$, about 70—80% of the preservative is fixed by the wood and is not removed by soaking in cold H_2O.
E. S. Hedges.

Use of electro-filters.—See I.

Patents.

Production of porous concrete. K. P. Billner, Assr. to Aerocrete Corp. of America (U.S.P. 1,823,343, 15.9.31. Appl., 26.2.30).—Moistened aggregate is coated with dry cement particles by means of a blast nozzle and is then formed into a conglomerate mass.
C. A. King.

Dressing for playing fields or courts, parks, drives, and roadways. Colbit Roadspray, Ltd., T. Holt, and J. C. Sellars (B.P. 370,046, 3.1.31).—A homogeneous mixture of neat Portland cement and a metal oxide, *e.g.*, Cr_2O_3, is moulded with and matured in H_2O or aq. Na_2CO_3 or Na silicate. The dried slab is then ground and the granules may either be spread as a gravel or used as a dressing on a bituminous foundation.
C. A. King.

Production of weather-proof plastic building material. H. R. S. de la Roche and C. Mathies (B.P. 369,807, 10.6.31. Ger., 26.6.30).—A plastering mixture particularly adapted for applying to wooden buildings consists of a mixture of MgO, filling material, $CaCO_3$, and salts such as $MgSO_4$ or $MgCl_2$. After hardening, the plaster is treated with a H_2O-sol. fluoride. If the plaster contains $MgSO_4$ it is treated with a sol. Ba salt, after hardening and before applying the fluoride solution.
C. A. King.

[Damp-proof] wall lining. G. Desagnat (B.P. 369,686, 8.1.31. Fr., 13.1.30).

Compound sheet material for use in forming floor or wall coverings. F. B. Dehn. From Paraffine Companies, Inc. (B.P. 367,843, 23.9.30).

[Apparatus for] manufacture of bricks and the like. C. Marchant (B.P. 372,259, 27.4.31).

Asphalt mastic.—See II.

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

Permeability, heat insulation, and gas velocities of Siemens-Martin furnaces. F. Kofler (Arch. Eisenhüttenw., 1931—2, **5**, 493—500).—The efficiency and economics of insulating materials for open-hearth furnaces are discussed. The best results are obtained with bricks of low thermal conductivity, low apparent *d*, and max. compression strength; a thickness of 15—25 cm. is advisable and the outer surface should be covered with cement, tar, or asphalt. The rate of gas flow through the furnace is illustrated diagrammatically.
A. R. Powell.

Influence of the construction and method of operation of puddling furnaces on the heat consumption. W. Heiligenstaedt (Arch. Eisenhüttenw., 1931—2, **5**, 559—568).—Expressions are deduced and curves given to show the relations between the heat supplied, the heat utilised, and the heat losses from various sources in the operation of various types and sizes of furnace for the manufacture of wrought Fe.
A. R. Powell.

Effect of work on the results of the bending test on cast iron. G. Meyersberg (Arch. Eisenhüttenw., 1931—2, **5**, 511—512).—Removal of the casting skin improves slightly the bending strength and other bending properties of cast Fe.
A. R. Powell.

Effect of dimensions of the test piece on the results of bending tests on cast iron. G. Meyersberg (Arch. Eisenhüttenw., 1931—2, **5**, 513—517).—The bending strength increases and the other bending properties decrease with decrease in the diam. and length : diam. ratio of the test piece. The correlation of the results with Hooke's law is discussed.
A. R. Powell.

Effects of nickel on the properties of whiteheart malleable cast iron (with special reference to "thin-walled malleable"). II. S. J. E. Dangerfield, F. Johnson, and E. R. Taylor (Iron Steel Inst., Carnegie Schol. Mem., 1931, **20**, 65—85; cf. B., 1931, 67).—Addition of up to 3·23% Ni to whiteheart malleable cast Fe containing C 3·48, Si 0·53, S 0·19, P 0·06, and Mn 0·12% improves the fluidity and has no deleterious effect on the machining quality or fracture. The tensile strength increases up to 1·3% Ni and falls sharply with 3% Ni, whilst the elongation falls progressively with increasing Ni; a bending angle of 180° can be obtained with up to 1% Ni, but with 3·23% Ni the mechanical properties of annealed bars are exceedingly poor. Re-annealing of bars containing 0·65% Si and up to 3·66% Ni (cf. Part I) reduces the tensile strength by 2—4 tons per sq. in. without improving the elongation, but with a slight improvement in the bending properties; Ni accelerates the elimination of C during re-annealing.
A. R. Powell.

Thermodynamic considerations on some of the equilibrium curves in the diagram of the iron-carbon system. F. Körber and W. Oelsen (Arch. Eisenhüttenw., 1931—2, **5**, 569—576).—The theoretical equilibrium diagram of the Fe–C system based on thermodynamical calculations is compared with that obtained experimentally by numerous investigators. The solidus in the γ field and the boundary between γ and $(\gamma + Fe_3C)$ fields are straight lines, whilst the α—γ boundary between 0 and 0·86% C is convex to the axis of composition. The heat of transformation of pearlite is 20·5 g.-cal. per g. and the heat of formation of cementite —5 to —7 kg.-cal. per g.-mol. The shapes of the liquidus and solidus below the eutectic composition indicate that C is present in the liquid chiefly as Fe_3C mols. A. R. Powell.

Manganese equilibrium in the production of steel in open-hearth furnaces and its practical application. E. Maurer and W. Bischof (Arch. Eisenhüttenw., 1931—2, **5**, 549—557).—The val. of $K_{Mn} = Mn(Fe)/(Mn)$, where Mn is the Mn content of the metal bath and (Fe) and (Mn) the Fe and Mn contents of the slag, has been calc. for 1600° for acid and basic open-hearth slags of varying composition. For acid slags with 45—60% SiO_2 K_{Mn} increases from 0·05 to 0·1 linearly with rise in SiO_2; the val. is depressed by increasing CaO content between 1 and 11%. For basic slags with about 40% CaO K_{Mn} falls linearly from 0·7 for 0% SiO_2 to 0·3 for 20% SiO_2. The variation of K_{Mn} with temp. is given by the expression $\log K = -7044/T + (7 \cdot 176 \times 10^{-4})T' + 2$ for the case of a pure FeO–MnO slag. Further expressions are derived for the relations between the composition of the slag, the Mn content of the metal bath, the quantity of slag, and the amount of Mn added, and these are used for the construction of graphs showing the dependence of CaO and SiO_2 in the slag on the K_{Mn} vals. With high K_{Mn} vals. before deoxidation the metal becomes red-short and the failures in rolling are more numerous. In finished steel, *i.e.*, after deoxidation, however, a high K_{Mn} val. increases the ductility and malleability. A. R. Powell.

Effect of annealing on the mechanical and magnetic properties and on the electrical conductivity of cold-drawn steel. W. Köster and H. Tiemann (Arch. Eisenhüttenw., 1931—2, **5**, 579—586).—The effect of annealing at temp. up to 950° on the properties of steel with 0·03—0·95% C has been determined after cold-drawing to 0—80% reduction wires which had previously been annealed or patented. Annealing at 200—300° increases the yield point and tensile strength more in patented than in annealed steel; the increase is independent of the reduction in cold-drawing, but is the greater the higher the C content. With high reductions the high-C steels suffer a sudden decrease in elongation at 450° and a sharp min. is reached at 525°. The reduction in area in the tensile test reaches a min. between 450° and 500° in the case of patented steel. This min. becomes more pronounced with increasing degree of reduction and with increase in C; it appears to be due to simple softening, as during drawing the reduction in area increases. The decrease in coercivity during annealing is retarded between 400° and 550° to an extent which is the greater the more severe the cold-drawing and the higher the C content; this is due to the very fine point-shaped distribution of the cementite throughout this temp. range and is much more marked in patented than in annealed steel. The remanence increases with rise of annealing temp. and the electrical conductivity commences to increase above 400° and reaches a max. at 550—680° according to the composition; above the A1 point it reverts to its original val.; the increase is due to the transformation of lamellar into globular cementite. A. R. Powell.

Manufacture of spring wire from mild ingot steel. H. Wiesecke (Stahl u. Eisen, 1932, **52**, 433—439).—The choice of steel and the various stages in the working and hardening are discussed. Open-hearth steel gives satisfactory springs if carefully worked and evenly hardened; it should contain $\not>$ 0·12% C and $\not>$ 0·5% Mn and should be annealed at and quenched from just above the A3 point by rapid submersion of the whole reel in cold H_2O. A. R. Powell.

Hardening of steel. N. Engel (Ingeniørvidenskab. Skr., A, No. 31, 1931, 190 pp.).—A full account of work the results of which have already been published (cf. Wever, B., 1932, 426). A. R. Powell.

Influence of nickel on the wear of case-hardened steel. J. G. R. Woodvine (Iron Steel Inst. Carnegie Schol. Mem., 1932, **20**, 125—149).—The resistance to wear by abrasion, dry rolling friction, and dry sliding friction of plain case-hardening and of 1, 3, and 5% Ni case-hardening steels has been determined; in all the tests the plain steel gave the best results, the relative wear on the specimens being of the order of 4 : 5 : 4 : 6 (abrasive test), 1 : 5 : 1 : 11 (dry rolling test), and 1 : 8·6 : 6·6 : 1·7 (dry sliding test). The four steels had approx. the same induced hardness in the Herbert pendulum test, hence it seems that work-hardening is not an important factor in determining the wear-resistance of hard materials. A. R. Powell.

Notched toughness on ageing and stress-line etching of steel. F. Nehl (Arch. Eisenhüttenw., 1931—2, **5**, 535). H. Jungbluth (*Ibid.*, 535—536).—Polemical (cf. Nehl, Z. Bayer. Rev.-Ver., 1928, **32**, 315; Jungbluth, Arch. Eisenhüttenw., 1930—1, **4**, 533). A. R. Powell.

Sand addition to Thomas slag. E. Spetzler and A. Harr (Stahl u. Eisen, 1932, **52**, 389—392).—Addition of SiO_2 to the Thomas converter increases the consumption of Mn in the deoxidation, has a deleterious effect on the removal of S during blowing, and tends to increase the viscosity of the slag and thus produce freezing at the mouth of the converter. Its effect on the citric acid-solubility of the P_2O_5 has been claimed to be beneficial, but the authors give details of tests in which the citric acid-solubility of the P_2O_5 of slag made without addition of extra SiO_2 exceeded that of slag in which sand was added; in the first case the $SiO_2 : P_2O_5$ ratio was 0·37—0·39 and in the second $>$0·5. The results with a low SiO_2 ratio were, however, more erratic than with a high ratio, and hence it is concluded that other factors play a part in determining the P_2O_5 solubility. A. R. Powell.

Effect of slag composition on the structure of grey iron alloys. E. Diepschlag and L. Treuheit (Giesserei, 1931, **18**, 705—710; Chem. Zentr., 1931, ii, 3249).—Different kinds of pig Fe melted in lined graphite crucibles showed that SiO_2–CaO slags, with SiO_2 in excess, have no effect on the structure and graphite formation of blast-furnace pig Fe. Addition of CaO or Al_2O_3 to the slags produces a transition to the fine eutectic solidification of the graphite with dendritic formation of mixed crystals. Pure CaO–Al_2O_3 slags make this the most pronounced. The separation of graphite depends not only on overheating, the duration of melting, velocity of cooling and pouring, and concn., but also on the composition of the slag within a certain concn. range. L. S. Theobald.

Effect of cobalt on carbon and high-speed steels. E. Houdremont and H. Schrader (Arch. Eisenhüttenw., 1931—2, **5**, 523—534).—Small percentages of Co raise the transformation points of plain C steels and increase the tendency for γ-Fe to revert to α, thus raising the crit. cooling velocity required in quenching to obtain max. hardness, reducing the residual austenite in the hardened steel, accelerating the decomp. of austenite during annealing, and producing a smaller sensitivity to overheating. Cementation tests show that there is a relation between the fineness of the grain and the hardening capacity induced by the addition of an alloying element which corresponds to the behaviour of abnormal steels. Co does not abstract hardening C to form difficultly sol. stable carbides, nor does it induce pptn. of graphite, but it reduces the affinity of γ-Fe solid solution for C owing to its feebler power of forming carbides. Formation of graphite in high-C Co steels occurs to a large extent only when the metal is annealed for some time just below the transformation temp.; this tendency may be overcome by annealing in the γ-range followed by air-cooling or quenching in H_2O. This behaviour indicates a high rate of diffusion of C in Co steels, which has been confirmed by cementation tests and by the ease of decarburisation; the latter is also governed by the relatively poor stability of Co carbides. Co improves the tensile strength of annealed steel at room as well as at raised temp., probably owing to decrease in the lattice parameter and the consequent greater cohesion between the atoms. Addition of Co to high-speed steel improves the cutting speed and life to a max. with 17% Co, owing to its effect in increasing the stability of the hardened state and in retaining the hardness at high temp.; the stability of the hardness is due to the increased hardness of the ground-mass and to a slowing down of the coagulation of the carbide particles at high temp., which results in an increase of the temp. and time required for softening.

A. R. Powell.

Iron–boron alloys and 18–8-steels plus boron. Their hardening and precipitation-hardening. R. Wasmuht (Met. & Alloys, 1932, 3, 105—110).—The hardening properties of C, Mn, Ni–Cr, and Si steels containing B were examined. The hardness of normalised C steel (0·06—2·5% B) increased with the B content, but no tempering hardness resulted as it did with a 2% Mn steel. No quench-hardening was observed with Ni–Cr–B steels, but subsequent annealing produced pronounced pptn.-hardening. Si–Fe–B alloys were similar to the binary alloys in that no pptn.-hardening nor quench-hardening was noted. C. A. King.

Determination of tin in irons and steels. J. A. Scherrer (Bur. Stand. J. Res., 1932, **8**, 309—320).—The metal (10—50 g.) is dissolved in dil. HNO_3 (1 : 4) or in dil. H_2SO_4 (1 : 5) followed by HNO_3 to oxidise the Fe; org. compounds are destroyed by boiling with $KMnO_4$, any MnO_2 ppt. being redissolved by addition of SO_2. The insol. matter is collected and, together with the filter paper, digested with HNO_3 and H_2SO_4 until fumes of the latter are evolved and all C is burnt off; after dilution with H_2O, tartaric acid is added followed by aq. NH_3 to dissolve WO_3, and the solution is added to the original acid solution. The mixture is diluted to 500—600 c.c. and saturated with H_2S in the cold, the ppt. is collected, redissolved with HNO_3 and conc. H_2SO_4, and, after addition of tartaric acid, repptd. as before. The second H_2S ppt. is dissolved in HNO_3 and H_2SO_4, the solution heated strongly to expel HNO_3, cooled, diluted, and treated with a little $FeCl_3$ and then with aq. NH_3. The ppt. is collected and dissolved in 80 c.c. of conc. HCl and 270 c.c. of H_2O; the solution is reduced with Pb in the presence of $SbCl_3$ and finally titrated with I. The Sn contents of 34 standard steels prepared by the Bureau are tabulated.

A. R. Powell.

Determination of vanadium in steel by the potentiometric titration method of Thanheiser and Dickens. P. L. Blanken (Chem. Weekblad, 1932, **29**, 263—264).—The use of a large excess (100%) of $H_2C_2O_4$ to reduce the $KMnO_4$ left after the final oxidation gives low results for V; a 25% excess is found more satisfactory. S. I. Levy.

Rapid determination of silicon in silicon steel, pig and cast irons. O. Niezoldi (Chem.-Ztg., 1932, **56**, 363—364).—The metal (1 g.) is boiled with HCl (*d* 1·19) until dissolved and the solution evaporated with H_2SO_4 until fumes of the latter are evolved. The cold mass is boiled with 5—10 c.c. of conc. HCl and 100 c.c. of H_2O, and the SiO_2 collected, washed, ignited, and weighed. A. R. Powell.

Corrosion of iron [in waterworks practice]. E. Naumann (Gas- u. Wasserfach, 1932, **75**, 349—351).—The most common cause of corrosion with natural H_2O is CO_2, the reaction resulting in the formation of crusts of Fe_2O_3 and $CaCO_3$. O_2 causes corrosion in absence of CO_2, so that the process goes on more or less with all waters. With high $CaCO_3$ content the scale formed limits the corrosive action. With hot H_2O the main corroding agent is O_2. External corrosion of H_2O mains is associated with the presence of H_2O, and the comparatively low summer temp. of the mains promotes condensation and renders them much more susceptible than gas mains. Corrosion through stray electric currents should cease to be important when d.c. has been replaced by a.c. in public supplies. Cast-Fe pipe is in all cases better than steel, from the viewpoint of corrosion, but the risk of fracture through subsidence must be considered. External protection with Zn is of little val.; bitumen is more satisfactory than tar for the purpose. Corrosive waters are treated by aëration or liming. The corrosion of hot-water pipes is minimised by the provision of an open end at the highest point. Na_2SO_3 is occasionally added to remove O_2. C. Irwin.

Corrosion of metals by [vegetable] tan liquors. I. Introduction. II. Corrosion of metals and alloys submerged in stationary tan liquors. M. P. Balfe and H. Phillips (J. Soc. Leather Trades'

Chem., 1932, **16**, 120—127, 194—201).—I. Tan liquors resemble acid liquors of $p_H < 4\cdot3$ in their action on metals. They corrode metals quickly even in the absence of O_2 and more readily in its presence. Potential differences are set up in Al, Fe, or Zn by differential aëration, and intense localised pitting occurs, thus further aggravating the trouble. On the other hand, the accumulated ions from a more noble metal (Cu) which is differentially aërated are dispersed, and corrosion is thereby set up. Metallic salts produced by corrosion are liable to pptn. by changes in p_H with possible deposition on the hide and consequent staining and discoloration of the leather.

II. Of various metals (etc.) tested, "Staybrite" steel was unaffected by bleach liquors or weak tan liquors. Cu and alloys of Ni were attacked to a greater extent by weak suspender liquor than by bleach liquor, but were more resistant than Fe or its alloys. Methods are given for the colorimetric determination of Ni, Al, Zn, and Cr in vegetable tan liquors, using dimethylglyoxime for Ni, "aluminon" for Al, $K_3Fe(CN)_6$ for Zn, and diphenylsemicarbazide for Cr. D. Woodroffe.

Corrosion of aluminium alloys. H. Gibb (Metal Ind., 1932, **40**, 27—30, 34).—Alloys, cast before or after treatment with Cl_2, were subjected to intermittent (tidal) action of sea-water. The most resistant alloy (loss 1·7 mg. per sq. cm. in 400 days) contained Al 84·28, Zn 14·40, Si 0·39, Fe 0·48, Cr 0·50%. Pb and Si, but not Ca silicide, are suitable addenda. Cu must not exceed 2·5%. Except with alloys containing 5—8% Si and 0·1% Ca, gasification increases the resistance to corrosion of the Al–Zn–Cr alloys.

Chemical Abstracts.

Effect of anodic treatment on the abrasion and corrosion of aluminium alloys. S. Setoh and A. Miyata (Bull. Inst. Phys. Chem. Res., Tokyo, 1932, **11**, 48—49).—Anodic treatment of Al-rich alloys, particularly silumin, Y-alloy, lautal, and no. 12 alloy, increases the resistance to abrasion. Thicker films or steam treatments do not increase this effect. Subsequent steam treatment increases the passivity to *N*-HCl. Alloys with 5% Cu contain $CuAl_2$ and are weaker after anodic treatment, but stronger after subsequent steam treatment. R. S. Cahn.

Beryllium metal from the oxide. G. D. Fitzpatrick (Chem. Trade J., 1932, **90**, 403).—The reaction between BeO and Al cannot be initiated with a fuse, and although it takes place if the mixture is strongly heated it is impossible to separate the reaction products. A mixture of BeO, BaO_2, and Al fires readily with a fuse, and if Na_2BeF_4 or Na_3AlF_6 is added as a flux a button of Be–Al alloy can be obtained containing 60—83% Be, but the proportion of BeO reduced is only 25—40%.

A. R. Powell.

Accelerated weathering tests of soldered and tinned sheet copper. P. R. Kosting (Bur. Stand. J. Res., 1932, **8**, 365—379).—By exposure to a humid atm., rich in SO_2 and CO_2, at 50° and over, the natural pitting and furrowing of tinned and soldered Cu has been duplicated in the laboratory. Extensive attack occurred only after the specimens had been heated to high enough temp. to cause the formation of complex Cu–Sn alloys. Furrowing reduces the strength of soldered joints and impairs the fatigue properties of Cu. Spilt flux may cause pitting of Cu, the pits being formed under very adherent deposits of Cu salts. J. W. Smith.

Copper-welding practice. E. Weese (Z. Metallk., 1932, **24**, 11—15).—Modern methods of Cu welding are described with special reference to their use in the manufacture of locomotive fireboxes. Sound welds of high strength are obtained by the use of welding rods comprising Cu with 1% Ag and 0·04% P; hammering of the welds is essential to obtain satisfactory life.

A. R. Powell.

Nickel welding. C. Canzler (Z. Metallk., 1932, **24**, 15—18).—Various methods of welding Ni and monel metal are briefly discussed and examples of the macro- and micro-structure are illustrated. In gas-welding, Mn is the best deoxidiser, but an excess produces brittleness. At.-H welding of Ni and its alloys gives sound ductile joints. A. R. Powell.

Metallurgy of nickel. E. de Oliveira (Ann. Acad. brasil. Sci., 1931, **3**, 75—77).—The acid liquor obtained by decomp. of S. Brazilian coal high in pyrites (marcasite) by means of heat and H_2O dissolves garnierite in the cold more readily than does H_2SO_4 of the same concn. Ores containing $\nless 2\cdot5\%$ Ni can be successfully treated.

Chemical Abstracts.

Potentiometric determination of zinc in coloured alloys. V. F. Stefanovski (J. Gen. Chem. Russ., 1931, **1**, 991—994).—The accuracy of the results obtained in the electrotitration of Zn by $K_4Fe(CN)_6$ is smaller in the presence than in the absence of neutral salts (KNO_3, NH_4NO_3), and the effect obtained is the more marked the higher is the concn. of these salts, and, in the case of salts undergoing hydrolytic dissociation, the more acid is the resulting solution. The results obtained by potentiometric titration of Zn in solutions prepared from coloured alloys (brass, bronze, brazing-metal) are of the same order of accuracy as are those obtained using other methods. R. Truszkowski.

Physical chemistry of the flotation process. III. Influence of flotation reagents on the selective wetting as the physico-chemical characteristic of their collecting power. M. E. Lipitz and M. M. Rimskaya (Tzvet. Met., 1931, 990—1003).—The collecting ability of flotation reagents was determined by measuring the effect of aq. solutions on the wetting of paraffin. For alcohols, fatty acids, amines, and phenols the flotation activity increases with the lengthening of the hydrocarbon portion of the mol. (with increasing asymmetry) parallel with the surface activity, and with decrease in the solubility of the reagent in H_2O. Only undissociated mols. influence the wetting of paraffin. Xanthates are analogous to other series of surface-active substances. Chemical Abstracts.

Stable gold in the flotation process. G. Reyes (Bol. min. Soc. Nac. Min., 1931, **43**, 165—172; Chem. Zentr., 1932, i, 278).—By direct flotation of material containing Au (30 g. per ton) 25% of the Au was lost. By addition of KCN and Na_2S, with amalgamation, 85% was obtained. The $KAu(CN)_2$ with Na_2S in presence of O_2 probably affords Au_2S_2 or Au_2S_3; when KCN and Na_2S are added simultaneously CNS′ prevents action on the Au. The action of Hg depends either on the formation of HgS or on the action of $K_2Hg(CN)_4$ on the Au sulphide; possibly also Na_2S is reduced to Na which produces Au by interaction with $KAu(CN)_2$.

A. A. Eldridge.

Engineering silver solders. E. A. Smith (Engineering, 1932, **133**, 449—451).—Ag-Cu-Zn solders, m.p. 670—845°, containing 5—80% Ag have a tensile strength of 18—27 tons per sq. in. as cast and are malleable and ductile, but a relatively high Zn content causes a diminution in strength and ductility and a tendency to brittleness. Malleable alloys of medium Ag content can be prepared with a higher content of Zn and Cd combined than of Zn alone, thus giving slightly lower flow points. The addition of small quantities of Ni gives a relatively large increase of strength but a reduction in elongation (cf. Leroux and Raub, B., 1931, 445). The mechanical properties of Ag solders are greatly influenced by impurities, especially Pb. Tables of physical properties and compositions for different purposes are given.

D. K. Moore.

Alloys of platinum with iridium. V. A. Nemilov (Z. anorg. Chem., 1932, **204**, 41—48).—The tensile strength of cold-drawn wires of Pt–Ir increases continuously with concn. of Ir up to 20%. The Brinell hardness–composition curve has a flat max. between 30 and 60% Ir. The microstructure and electrical resistance of the alloys have also been studied, and the results as a whole agree in indicating the existence of a continuous series of mixed crystals.

F. L. Usher.

Hardness, microstructure, and temperature coefficent of electrical resistance of iron–platinum alloys. V. A. Nemilov (Z. anorg. Chem., 1932, **204**, 49—59; cf. preceding abstract).—The results of the study of the above-mentioned properties of Fe–Pt alloys support the conclusion that at high temp. two series of mixed crystals are formed, whilst on cooling, and within the range 35—40 to 65—70 at.-% Pt, these give rise to a new solid phase, viz., the *compound* PtFe.

F. L. Usher.

Elastic limit of metals. P. Vernotte (Chim. et Ind., 1932, **27**, 765—769).—The confusion of definitions existing in the questions of the elastic limit and of metallic fatigue is discussed. Guillaume in 1900 distinguished between a displacement of the physico-chemical equilibrium in a metal, which requires a certain time to establish itself, and a mechanical permanent displacement. This distinction is incapable of experimental definition directly. A further distinction is drawn between reversible and irreversible changes in the physico-chemical equilibrium. It is concluded that no experimental method at present known is capable of yielding results capable of other than empirical interpretation.

C. Irwin.

Development of electrolytic methods of refining metals at the Norddeutsche Affinerie in Hamburg. W. Schopper (Metallges. Rev., 1932, No. 6, 29—39).—The development of methods and plant for producing Cu, Ag, Au, Pb, Bi, Sb, Cd, and Cu_2O electrolytically is described.

C. A. King.

Tensions of electrolytic deposits of metals. C. Marie and N. Thon (J. Chim. phys., 1932, **29**, 11—17; cf. B., 1931, 846).—Whilst a contraction is observed in deposits from $Cu^{\cdot\cdot}$ solutions, a dilatation is always observed in deposits from CuCl in NaCl or HCl. The addition of a trace of NH_2OH to a $Cu^{\cdot\cdot}$ solution transforms the contraction to a dilatation. Dilatation is always observed with Zn.

E. S. Hedges.

Production of zinc by electrolysis. H. Hey (Chem. Eng. Min. Rev., 1932, **24**, 164—169, 197—205).—Zn concentrates containing 45·6% Zn, 4—12% Fe, and some Pb and Ag as sulphides are roasted in two stages partly to ZnO and partly to $ZnSO_4$, the sulphate S in the product being 3%, *i.e.*, sufficient to replenish the loss of H_2SO_4 during leaching. If ZnS and FeS exist as solid solution ZnO,Fe_2O_3, which is not recovered during leaching, is formed, but if not so present the formation of ZnO,Fe_2O_3 is minimised by controlling the roasting temp. Cr-steel rabble arms are used in the furnace. The calcined material is leached with spent liquor from the electrolytic plant containing 65—280 g. H_2SO_4 per litre, the H_2SO_4 content being thereby reduced to 2 g. per litre. The residue is treated for the recovery of Ag and Pb. Fe, SiO_2, Sb, and As are pptd. by the addition of ground limestone and filtered off. Cu and Cd are pptd. by Zn dust. The concn. of Co is limited by heating part of the liquor with Na_3AsO_3, $CuSO_4$, and Zn dust, the Cu, Co, and As being co-pptd.; or, more recently, Na β-naphthoxide, $NaNO_2$, and H_2SO_4 are added, the liquid is neutralised with Na_2CO_3, and Co is pptd. as red Co nitroso-β-naphthoxide. Cl' is removed by Ag_2SO_4 and the AgCl reconverted into Ag_2SO_4. Wherever possible the liquor flows by gravity through Pb pipes. A unit in which the solution containing 100—150 g. Zn per litre is electrolysed consists of 144 cells made of either timber lined with Pb or concrete lined with a mixture of sand and S and fitted with cooling coils. Each cell contains 33 Al cathodes, the submerged area of both sides of each being 13·0 sq. ft., and 34 Pb anodes the corresponding area being 11·15 sq. ft. Each unit requires 12,000 amp. at 520 volts. The current efficiency is 90—93%. The cathode Zn is melted and cast into blocks. Co, Ni, and Sb have an adverse effect on the electrolysis, but this can be counteracted by the addition of a little glue.

D. K. Moore.

Use of electro-filters.—See I. **Tar used in steelworks.**—See II. **Chrome spinel.**—See VIII. **Coatings on Fe. Rust prevention. Black pigments and corrosion.**—See XIII. **Zn in drinking-water.**—See XXIII.

Patents.

Pyrites roasting. J. E. Little, Assr. to Bethlehem Steel Co. (U.S.P. 1,823,907, 22.9.31. Appl., 4.5.28).—Pyrites fines are injected into a combustion chamber where they are burned with sufficient air to oxidise the Fe to Fe_2O_3 and the S to SO_2 as well as provide O_2 for subsequent conversion of SO_2 into SO_3. The heat of the flame is utilised in sintering the Fe_2O_3 formed into a product suitable for the blast furnace.

A. R. Powell.

Sintering of pulverised ores and metallurgical products. Verein. Stahlwerke A.-G. (B.P. 369,981, 28.10.30. Ger., 16.11.29).—Alternate layers of fine-grained ore and coarse-grained fuel are built up in a blast-sintering furnace and air channels are formed in the ore layers so as to permit the passage of the blast through the entire charge. A. R. Powell.

Refining and casting of metals [in a vacuum]. Heræus Vacuumschmelze A.-G., and W. Rohn (B.P. 367,246, 4.5.31. Ger., 5.5.30).—In melting and casting in vac. metals with m.p. $>$ 1200°, the induction furnace is charged with metal melted in another furnace in air and the moulds are contained in an annexe to the furnace which can be closed after the metal is poured, so that a second charge can be melted while the castings cool in vac. and the moulds are changed for the second charge. A. R. Powell.

Refining of molten metals. G. S. Evans, Assr. to Mathieson Alkali Works, Inc. (U.S.P. 1,816,007, 28.7.31. Appl., 18.10.29).—A portion of the molten metal is run into a ladle and there mixed with the molten refining agent, *e.g.*, Na_2CO_3 for removal of S, the mixture is allowed to solidify, and a large quantity (20—25 times the previous amount) of molten metal is poured on top so as to remelt the original casting and cause the refining agent to pass upwards through the entire body of molten metal. A. R. Powell.

Production of metal castings. R. W. Bailey, and Associated Electrical Industries, Ltd. (B.P. 369,640, 23.12.30).—A metal of low m.p. used for filling the shrinkage cavities is introduced into the mould before the pouring of the casting metal. Rings or pieces of the low-m.p. metal may be inserted at different levels in the mould, or a slab in the bottom may be covered with a metal plate to retard the melting until the casting metal has been completely poured. C. A. King.

Casting of [steel] ingots. (Sir) C. A. Parsons, A. Q. Carnegie, and H. M. Duncan (B.P. 367,984, 8.1.31).—In casting large steel ingots by top-pouring and bottom-cooling, a stalk suitable for the attachment of a porter bar is cast integrally with the ingot. A. R. Powell.

Production of pyrophoric iron. H. L. Hartenstein (U.S.P. 1,819,164, 18.8.31. Appl., 18.10.26).—Finely-divided Fe ore is mixed with peat and after keeping in piles for some weeks the mixture is passed through a rotary furnace at $<$ 600° in an atm. of H_2. A. R. Powell.

Production of low-carbon iron. I. R. Valentine, Assr. to Gen. Electric Co. (U.S.P. 1,817,784, 4.8.31. Appl., 28.11.28).—The charge is melted in a cupola the hearth of which is provided with firebrick supports for the charge so as to keep the coke and metal in the charge from coming in contact with the molten metal which collects in the spaces between the firebrick supports. Cast Fe produced in this cupola with a normal charge of coke and scrap contains $<$ 3% C and $<$ 1·4% Si and has a high tensile strength and hardness. A. R. Powell.

Improving iron produced by the aluminothermic reaction for welding purposes. T. Goldschmidt A.-G. (B.P. 369,843, 17.7.31. Ger., 29.7.30).—Up to 3—4% Cr + Co + Ni, up to 1—2% Mo, V, and/or W, and up to 3% Ti, preferably in the form of ferro-alloys, are added to the aluminothermic mixture or to the reaction mass immediately the violent reaction has ceased. A. R. Powell.

Improving the mechanical properties of ingot iron and steel. Verein. Stahlwerke A.-G. (B.P. 370,064, 8.1.31. Ger., 8.1.30).—The mechanical properties of mild steel are improved by simultaneous addition of 0·25—0·7% Cu and 0·1—0·25% P. A. R. Powell.

Beryllium steels. W. Kroll (B.P. 370,033, 30.12.30. Ger., 18.1.30).—Nitrogenised Be steels with or without Ni and/or Cr are claimed; the steels are age-hardened during nitrogenisation at 400—600° if they are first quenched from a high temp. so that a hard core and an extremely hard case may be obtained. A. R. Powell.

Manufacture of alloys of iron and aluminium. Brit. & Dominions Feralloy, Ltd., J. W. Bampfylde, and C. Sykes (B.P. 370,012, 1.1.31).—An alloy of Fe with 9—11·8 (11)% Al, $\not>$ 3·5 (2)% Cr, and $\not>$ 0·6 (0·3)% C is claimed. Small proportions of W or Ti may be added to refine the grain size. A. R. Powell.

Manufacture of polished annealed stainless steels. F. Locke, Assr. to J. D. Crosby Co. (U.S.P. 1,824,608, 22.9.31. Appl., 18.6.29).—The steel is rolled into strip of the desired size, and then run continuously through an annealing furnace with a slightly oxidising atm. so that the steel surface becomes covered with a slight film of oxide which is subsequently removed by passing the metal as anode continuously through 10% H_2SO_4. The washed and dried metal is then buffed. A. R. Powell.

Heat-treating [annealing] metal [steel]. A. T. Kathner (U.S.P. 1,810,612, 16.6.31. Appl., 9.2.29).—Mild-steel sheet is passed continuously through the heating and cooling zones of a furnace having a non-oxidising atm. in such a way that the temp. reaches 870—1065° in the first zone and the metal is at only a dull red heat when it leaves the second zone, the times of transit through each zone being approx. equal. A. R. Powell.

Pickling of stainless steel. N. H. Schermer (U.S.P. 1,824,932, 29.9.31. Appl., 21.8.30).—Scale is removed by pickling in 0·2—40 (1—5)% H_2SO_4 or HNO_3 containing 0·2—40 (1—5)% $NaNO_3$; the bath is used at $>$ 40°, preferably at 80°. The pickled sheets are free from H_2-brittleness. A. R. Powell.

Reclaiming stainless-steel scrap. L. B. Lindemuth (U.S.P. 1,825,463, 29.9.31. Appl., 30.7.30).—The scrap is melted in an electric furnace and the metal tapped into a ladle, treated with 1—2% of Al, and blown in a neutral-lined Bessemer converter until the C is reduced to 0·7% and about 8% of the Cr is oxidised. The air blast is then stopped and Si added to the slag to reduce about 2% Cr back into the metal; a further 3% Cr is added as ferrochromium and the remaining 3% Cr is introduced by means of an aluminothermic reaction. A. R. Powell.

Welding method [for providing wear-resisting surfaces on steel]. H. J. Morgan, Assr. to P. L. & M. Co. (U.S.P. 1,824,166, 22.9.31. Appl., 16.1.29).—The surface to be coated is covered with a mixture of WO_3 or powdered wolframite and a carbonaceous reducing agent, and this is converted into WC which alloys with the surface metal by means of an arc on the arc-welding principle. A. R. POWELL.

Flotation of ores. G. BARSKY and G. B. WALKER, Assrs. to AMER. CYANAMID Co. (U.S.P. 1,825,501, 29.9.31. Appl., 13.12.29).—A promoter for the flotation of Cu and Zn ores comprises an iminothiodiazole compound, preferably di-iminodiphenyltetrahydrothiodiazole hydrochloride (cf. Hector's base, A., 1889, 872). A. R. POWELL.

Flotation recovery of [lead, copper, and zinc] minerals [from oxidised ores]. L. J. CHRISTMANN and S. A. FALCONER, Assrs. to AMER. CYANAMID Co. (U.S.P. 1,823,316, 15.9.31. Appl., 9.1.30).—Flotation is effected by the use of a *cyclo*hexyl xanthate and a dithiophosphate as promoter and conditioner, respectively. A. R. POWELL.

Concentration of ores by flotation. R. L. PERKINS, Assr. to NAT. ANILINE & CHEM. Co., INC. (U.S.P. 1,819,114, 18.8.31. Appl., 29.5.29).—A promoter for use in the flotation of Cu ores comprises the reaction product of C_6H_6 and S at 70° in the presence of anhyd. $AlCl_3$. A. R. POWELL.

Concentration of [copper] ores [by flotation]. F. AYER and A. CROWFOOT, Assrs. to PHELPS DODGE CORP. (U.S.P. 1,820,172, 25.8.31. Appl., 13.6.29).—Cu ore containing CuS and CuO is ground in dil. H_2SO_4 in a mill containing Fe balls so that the sol. Cu which dissolves in the H_2SO_4 is again pptd. by the Fe in a form amenable to flotation. A. R. POWELL.

Recovery of copper from slags. M. G. FOWLER, O. C. RALSTON, and C. B. KUZELL, Assrs. to UNITED VERDE COPPER Co. (U.S.P. 1,822,588, 8.9.31. Appl., 14.1.29).—The Cu content of slags from matte smelting may be reduced below 0·2% by blowing the slag, before separating the matte, with liquid or gaseous reducing agents, preferably producer gas, which reduces magnetite to FeO and liberates Cu, which is collected in the molten matte. A. R. POWELL.

Treatment of zinc-bearing material. W. C. HOOEY, Assr. to NEW JERSEY ZINC Co. (U.S.P. 1,820,455, 25.8.31. Appl., 7.2.29).—Blende concentrates containing dolomite are roasted at 800° to convert the ZnS into ZnO and the dolomite into $CaSO_4$ and $MgSO_4$, which are then removed by leaching with H_2O at 70—80°. A. R. POWELL.

Preparation of coked agglomerates [for zinc retorts]. E. H. BUNCE, Assr. to NEW JERSEY ZINC Co. (U.S.P. 1,810,070, 16.6.31. Appl., 15.11.28).—Concentrates obtained by flotation of Zn ores are roasted, mixed with 6—12% of coke dust, and sintered by blast-roasting. The sinter is crushed and mixed with powdered bituminous coal and coke or anthracite dust, so that at least 50% of the mixture is of graded particle size between 14- and 100-mesh. The mixture is then briquetted and the briquettes are coked before being passed to the reduction retorts. A. R. POWELL.

Reduction of zinciferous material. F. G. BREYER, Assr. to NEW JERSEY ZINC Co. (U.S.P. 1,811,910, 30.6.31. Appl., 1.4.27).—Reduction is effected in an externally heated, long, vertical chamber with a discharge opening for residues at the bottom and a closable charging door at the top just above the flue through which the Zn vapour and CO are removed. Loss of gases through the top and bottom openings is prevented by maintaining a regulated stack draught through the flue and condensers. A. R. POWELL.

Production of zinc. F. R. KEMMER, Assr. to AMER. CYANAMID Co. (U.S.P. 1,815,260, 21.7.31. Appl., 12.6.29). —A stream of CO_2 and N_2 free from H_2O vapour is passed through the Zn condenser to remove CO. A. R. POWELL.

[Zinc] condenser and its operation. F. A. J. FITZGERALD and J. KELLEHER, Assrs. to AMER. CYANAMID Co. (U.S.P. 1,810,557, 16.6.31. Appl., 25.3.29).—Zn vapours are passed through horizontal flues leading from the retorts to a series of condenser flues of refractory material glazed internally through which they are caused to pass in a downward direction while regulated streams of cooling air are passed upwards through flues on either side of the condenser flues and separated from them by thin-walled partitions. A sump for the collection of liquid Zn is provided at the bottom of the series of condenser flues, and ports at the top permit the escape of the accompanying CO. A. R. POWELL.

Dezincing of mattes and slags. M. G. FOWLER and D. NICONOFF, Assrs. to UNITED VERDE COPPER Co. (U.S.P. 1,822,396, 8.9.31. Appl., 14.1.29).—The molten matte and/or slag is blown with a mixture of steam or air and powdered coal or with a gaseous or liquid reducing agent, whereby the Zn is volatilised. A. R. POWELL.

Metallurgical [chloridising] process. R. F. MEYER, Assr. to MEYER MINERAL SEPARATION Co. (U.S.P. 1,822,995, 15.9.31. Appl., 8.10.30).—Sulphide ores are roasted at about 400°, moistened with aq. NaCl, and treated with moist Cl_2 at 400—500° in the presence of $FeCl_2$ and SO_2, whereby conversion of the Cu, Zn, Co, Ni, and Ag into sol. salts and of the Fe into Fe_2O_3 takes place. A. R. POWELL.

Refining of metals [lead]. AMER. SMELTING & REFINING Co., Assees. of J. O. BETTERTON (B.P. 370,026, 31.10.30. U.S., 31.10.29).—Ag is removed by two applications of Zn (Parkes' process) and the Pb is then treated with a Ca–Pb alloy, whereby a dross containing Cu, Bi, Zn, and Pb is formed. This is removed, the metal allowed to cool to 330°, and any further dross which forms is skimmed off. Zn and Ca are then removed from the molten Pb by passing a current of Cl_2 through the metal at 540°. The dross is melted under a $CaCl_2$–$ZnCl_2$ slag which removes the Ca and reduces the Zn from the slag, the resulting metal is liquated, and the Zn alloy distilled to recover Zn for use again. The runnings from the liquation and the residue from the Zn retorts are treated with Cl_2 to remove Zn as $ZnCl_2$, which is returned to the dross-melting stage. A. R. POWELL.

Treatment of waste [lead] alloys for removal of certain [objectionable] constituents [copper]. P. KEMP (U.S.P. 1,819,607, 18.8.31. Appl., 23.6.28. Austr., 23.6.27).—Pb–Sn or Pb–Sn–Sb alloys containing Cu are melted with ferrosilicon to remove the Cu. A. R. POWELL.

Manufacture of porous or non-porous metal articles [bimetal sheets]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 369,964, 18.12.30).—Layers of two different powdered metals or metal mixtures are compressed together without mixing and the composite bar is sintered and forged or rolled to give a bimetal sheet. The process is applicable to the production of Cu-coated carbonyl-Fe sheet and to the manufacture of sheet Fe coated with monel metal. A. R. Powell.

Treatment of metals and agent therefor. F. J. Wilson and A. S. Evans (U.S.P. 1,825,565, 29.9.31. Appl., 17.12.28).—The molten metal is treated with 0·5—15% of powdered andesite; the treatment is stated to increase the tensile strength, hardness, and ductility. A. R. Powell.

Coating of metals by spraying. Brit. Thomson-Houston Co., Ltd. From Gen. Electric Co. (B.P. 369,943, 24.12.30).—A hard wear-resisting coating is applied to steel or other metals by spraying a finely-powdered mixture of WC and Ni or Co at above the m.p. of the Ni or Co, together with a reducing or non-oxidising gas, through an electrically-heated graphite tube on to the heated surface of the metal to be coated. A. R. Powell.

Casting of metals [magnesium]. Amer. Magnesium Corp., Assees. of (a—f) R. T. Wood and (f) F. C. Frary (B.P. 369,580—5, 22.10.30. U.S., 23.10.29). —Sand moulds for casting Mg have incorporated with the sand S and (a) ethylene glycol and $C_{10}H_8$, (b) ethylene glycol and H_3BO_3, (c) NH_4HSO_4 with or without $C_{10}H_8$, or (d) K_2S and $C_{10}H_8$. (e) Ethylene glycol (25—75% solution) is used as a plasticiser for moulding sand. (f) $(NH_4)_2HPO_4$ is incorporated in the sand. A. R. Powell.

Production of rolling-mill products from magnesium and its alloys. I. G. Farbenind. A.-G. (B.P. 369,881, 9.11.31. Ger., 16.12.30).—Cylindrical ingots are forged or extruded hot into flat bars which are then rolled into sheet while still hot. A. R. Powell.

Aluminium type matrix. W. W. Wentz, Assr. to Aluminum Co. of America (U.S.P. 1,823,179, 15.9.31. Appl., 9.9.29).—Matrices for casting type metal are prepared from Al which has been provided with an oxide coating, preferably by immersion at 95° in 3% aq. $NaHCO_3$ containing 0·2% of $K_2Cr_2O_7$. A. R. Powell.

Treatment of aluminium-base alloys which are subject to growth. R. S. Archer and W. L. Fink, Assrs. to Aluminum Co. of America (U.S.P. 1,822,877, 15.9.31. Appl., 22.12.28).—The alloys are heated at 150—265° until the hardness has passed through a max. and no further increase in vol. occurs. The process is especially applicable to the treatment of cast pistons of Al alloys containing Cu and/or Si. A. R. Powell.

[Beryllium-coated molybdenum] resistance wire. Sirian Lamp Co., Assees. of S. Ruben (B.P. 369,909, 22.9.30. U.S., 23.9.29).—Mo wire is coated with a suspension of powdered Be in an amyl acetate solution of nitrocellulose, and then heated in H_2 above the m.p. of Be until the latter diffuses into the surface layer of the Mo. Subsequent heating of the wire in air affords a protective coating of BeO and the wire is then suitable for winding high-temp. resistance furnaces. A. R. Powell.

Manufacture of ductile (a) thorium, (b) vanadium. (a—b) J. W. Marden and (a) H. C. Rentschler, (b) M. N. Rich, Assrs. to Westinghouse Lamp Co. (U.S.P. 1,814,719—20, 14.7.31. Appl., [a] 5.6.24, [b] 6.1.25).—(a) An intimate 4 : 4 : 3 mixture of $CaCl_2$, ThO_2, and Ca filings is heated in a closed vessel to 950°, the reaction product is extracted first with H_2O and then with dil. HNO_3, and residual Th washed with EtOH–Et_2O and dried at room temp. The metal powder is pressed into bars which are sintered electrically in vac.; the bars are placed inside tightly-fitting Fe tubes and the whole is rolled, swaged, and drawn down to fine wire, after which the Fe is removed by treatment with dil. HNO_3. (b) V_2O_5 is reduced similarly to V and the powder converted into wire in the same way as Th. A. R. Powell.

Sintered hard metallic alloys for use in the manufacture of implements and tools. Tool Metal Manufg. Co., Ltd. (B.P. 369,854, 12.8.31. Ger., 14.8.30).—A sintered alloy of equal parts of V and Nb carbides with 2·5—5% Fe or Co as binder is claimed. A. R. Powell.

Preparation of rare refractory metals [chromium]. F. H. Driggs and J. W. Marden, Assrs. to Westinghouse Lamp Co. (U.S.P. 1,821,176, 1.9.31. Appl., 1.10.28).—Cr_2O_3, K_3CrCl_6, or K_3CrF_6 is electrolysed at 900° in a bath of molten $CaCl_2$. A. R. Powell.

Recovery of precious metals from [argentiferous] refractory ores. R. F. Meyer, Assr. to Meyer Mineral Separation Co. (U.S.P. 1,824,093, 22.9.31. Appl., 13.12.28).—Zn-Pb sulphide ore with a high Ag content is ground to pass 150-mesh and roasted first at a low temp. and then at a temp. sufficient to decompose all the Fe and Cu sulphates and part of the $ZnSO_4$. Leaching with cold H_2O affords a solution of $ZnSO_4$ containing 65—70% of the Ag as Ag_2SO_4. The solution is treated with Zn to remove Ag and part of the filtrate is boiled with the leached residue, which is then again roasted to render more Ag sol. The final residue is roasted with NaCl after moistening with $ZnSO_4$ solution, drying, and grinding, and the Ag and Cu are extracted with aq. $(NH_4)_2CO_3$. A. R. Powell.

Electroplating [of endless surfaces]. Celluloid Corp. (B.P. 368,727, 9.10.30. U.S., 9.10.29).—In the continuous plating of endless belts by repeated passage through plating baths, the successive deposits are kept wet while out of the bath by spraying them with electrolyte so that the next layer of metal adheres firmly. A. R. Powell.

Electrolytic refining of copper and other metals. A. G. McGregor (B.P. 367,013, 11.11.30 and 17.4.31).—The anodes are supported on rows of hooks arranged on, but insulated from, a horizontal frame which covers the cells and can be lifted and lowered as required, and means are provided for continuous circulation of the electrolyte from one end of the cell to the other. A. R. Powell.

Electrolytic method and apparatus [for producing copper foil]. R. A. Wilkins, Assr. to Industrial Development Corp. (U.S.P. 1,820,204, 25.8.31. Appl., 12.1.29).—The Cu is deposited from a swiftly flowing acid $CuSO_4$ solution passing continuously through a vessel of insol. conducting material forming the anode and containing a rotating cylindrical cathode which oscillates about its longitudinal axis to an extent which is slightly greater in one direction than in the other. Means are provided for continuously removing the foil deposited. A. R. Powell.

Production of substantially pure metallic magnesium directly by electrolysis of a fused bath. R. M. Hunter, Assr. to Dow Chem. Co. (U.S.P. 1,820,022, 25.8.31. Appl., 31.5.29).—Mg prepared by electrolysis of fused $MgCl_2$–NaCl mixtures on which the metal floats is purified by thorough agitation with the molten electrolyte. A. R. Powell.

Hoppers for blast furnaces. W. Marley (B.P. 372,183, 31.7.31).

Roasting furnace. Grinding ball. Treating aq. $FeSO_4$ from sulphide ores.—See I. **S from pyrites.**—See VII. **Induction furnace. Preventing electrolytic corrosion.**—See XI.

XI.—ELECTROTECHNICS.

Determination of the depolarising portion of pyrolusite for battery-industry practice. C. Drotschmann (Chem.-Ztg., 1932, **56**, 234—236).—Determination of available O in pyrolusite (including MnO_2, Mn_2O_3, and Mn_3O_4) is not satisfactory for the battery industry, where MnO_2 is the only depolarising oxide. A method is described for determining the true MnO_2 content by comparing the loss of O_2 on heating with results by the $H_2C_2O_4$–$KMnO_4$ titration method. Alternatively, the material may be treated with 10% H_2SO_4, in which Mn_2O_3 is sol., Mn_3O_4 partly sol., and MnO_2 insol. E. S. Hedges.

Economic importance of the electrochemical industries. C. L. Mantell (Trans. Amer. Electrochem. Soc., 1932, **62**, 1—11).

Applications of photo-electric cells in chemical engineering. C. J. Smithells (Chem. and Ind., 1932, 446—451).

Use of electro-filters.—See I. **Conductivity of coke.**—See II. **Chlorination of C_2H_2.**—See III. **Vac.-tube insulators.**—See VIII. **Tensions in electrodeposited metals. Metal refining in Hamburg. Sponge-Fe process. Fe–Pt alloys. Zn.**—See X.

Patents.

Electric furnaces of the resistance type. Birmingham Electric Furnaces, Ltd., and A. G. Lobley (B.P. 370,029, 24.12.30).—Resistance elements are arranged in chambers having inclined surfaces immediately under the elements leading into receptacles for scale, located below or at the sides of the resistance chambers and communicating with the outside of the furnace. J. S. G. Thomas.

[Multiple-frequency] induction electric furnace. E. F. Northrup, Assr. to Ajax Electrothermic Corp. (U.S.P. 1,822,539, 8.9.31. Appl., 9.3.29. Renewed 4.2.31).—Metal is successively heated and stirred by current of high and of low frequency, respectively. J. S. G. Thomas.

[Primary] electric batteries. E. S. Calvert and J. L. Russell (B.P. 369,708, 30.1.31).—Solid compact masses of electrolytic materials attached to the electrodes are arranged so that an unobstructed channel is provided for H_2O or other liquid which activates the cell. J. S. G. Thomas.

Manufacture of electric rare-gas discharge lamps. A. Lederer (B.P. 369,596 and 369,987, 12.12.30. Austr., 28.12.29).—(a) A vaporisable, substantially opaque getter, *e.g.*, Mg, is introduced into the lamp envelope containing Hg vapour, in such position that after being vaporised it is deposited on a part of the envelope through which no light is to be transmitted. (b) Liquid Hg is placed in the lamp so as to be shielded from exposure to the heated gas-filling in the discharge space. [Stat. ref. to (b).] J. S. G. Thomas.

Arc-quenching device [for nitrogen-filled lamps]. D. S. Gustin, Assr. to Westinghouse Lamp Co. (U.S.P. 1,821,214, 1.9.31. Appl., 11.1.28).—Gases evolved from $MgCO_3$, arranged in contact with the leading-in wires and heated by the arc, combine with the N_2 filling and quench the arc. J. S. G. Thomas.

Luminous electric-discharge tubes. Gen. Electric Co., Ltd., Assees. of Patent-Treuhand Ges. f. elektr. Glühlampen m.b.H. (B.P. 369,824 and 369,882, [a] 30.6.31, [b] 4.1.32. Ger., [a] 3.9.30, [b] 13.1.31).—(a) The cathode is completely surrounded by an auxiliary electrode containing or covered by electron-emitting substances. (b) A fluorescent layer, *e.g.*, of ZnS, Ca tungstate, Sc_2O_3, coats either or both sides of an axial partition, preferably of fluorescent material, arranged between the electrodes and extending along the length of the tube. J. S. G. Thomas.

Luminous [positive-column] electric-discharge tubes. G. Claude, Assee. of L. L. Beck (B.P. 369,558, 21.11.30. U.S., 7.12.29).—A discharge tube having a refractory-metal cathode coated with an alkali metal and a filling of Kr and/or Xe and Hg vapour is supplied with current of c.d. 0·5—1·5 amp. per sq. cm. of cross-section of gas column. J. S. G. Thomas.

[Grid of] electron-discharge tubes or thermionic valves. N. V. Philips' Gloeilampenfabr. (B.P. 370,297, 30.7.31. Holl., 22.11.30. Addn. to B.P. 327,048).—A refractory core (*e.g.*, of W or Mo) is wound with Zr wire. J. S. G. Thomas.

High electron-emissive cathode. R. E. Miesse, Assr. to Q.R.S. de Vry Corp. (U.S.P. 1,822,359, 8.9.31. Appl., 10.9.28).—A refractory-metal core coated with C and with the oxide or carbonate of Ba, and/or of Sr, and/or of Ca is heated so that the alkaline-earth compound is converted into carbide. J. S. G. Thomas.

Rectifier. H. C. Rentschler and W. W. Merrymon, Assrs. to Westinghouse Lamp Co. (U.S.P. 1,821,238, 1.9.31. Appl., 20.7.27).—A Mo cathode, a Th anode coated with $Ba(NO_3)_2$, and a gas-purifying agent composed of a metal of the Ce group are arranged in an envelope filled with He at 5—20 mm. pressure. J. S. G. Thomas.

Product for preventing [electrolytic] corrosion at the joints of electric conductors. J. Bauza (B.P. 370,036, 31.12.30. Ger., 4.1.30).—The cleaned joints are coated with a mixture containing lanoline, petroleum jelly or paraffin oil (*e.g.*, 70%), graphite (*e.g.*, 20%), and, if desired, an org. solvent, *e.g.*, PhMe, solvent naphtha, or $C_2H_2Cl_4$ (*e.g.*, 10%). J. S. G. Thomas.

Electrical insulation [of hydrocarbon oils]. W. B. Wiegand (U.S.P. 1,822,072, 8.9.31. Appl., 13.3.30).—To improve its insulating properties a hydrocarbon oil is treated with C black, *e.g.*, Micronex, at 25—60°; the C black and adsorbed H_2O are finally removed so that the resulting product contains about 0·005—0·008% of C black. J. S. G. Thomas.

Electrical insulation suitable for paper condensers etc. J. E. G. Lahousse (B.P. 370,199, 21.4.31. Fr., 22.4.30).—Paper insulation impregnated with C_2HCl_3 is contained in an airtight casing. J. S. G. Thomas.

Magnetic separating [seed-sorting] composition. E. Brandus, Assr. to Crawfordsville Seed Co. (U.S.P. 1,823,852, 15.9.31. Appl., 29.4.29).—A finely-powdered mixture of spongy Fe, $CaCO_3$, Fe oxide, and excess of H_2O is centrifuged. J. S. G. Thomas.

Electric-discharge lamps and methods of operating [controlling the light emitted by] the same. Brit. Thomson-Houston Co., Ltd., Assees. of A. W. Hull and J. C. Smith (B.P. 371,673, 22.6.31. U.S., 24.6.30).

Electrodes [indirectly heated cathodes] for thermionic tubes. A. Schwitzer and B. Erber (G. Ganz & Co.) (B.P. 371,419, 14.10.30. Austr., 3.7.30).

[Hermetically-sealable crates for] drying and impregnating of electric cables. Telefonaktiebolaget L. M. Ericsson (B.P. 371,354, 9.1.31. Swed., 7.2.30).

Removal of tar from gases.—See II. **Measuring freeness, and moisture, of pulp.**—See V. **Apparatus for splitting up H_2O.**—See VII. **Stainless steels. Mg. Electro-Cu. Cu foil. Metallurgical process. Electroplating. Cr. Resistance wire.**—See X. **Rubber for cables.**—See XIV.

XII.—FATS; OILS; WAXES.

Adsorption bleaching of vegetable fats and oils. H. Pick and R. Kraus (Kolloid-Beih., 1932, 35, 211—264).—The nature of the colouring matters in oils and the methods of removing them are reviewed. A method of measuring the bleaching power of adsorbents has been developed and used to determine the effect of mixtures of active C and fuller's earth. The adsorption isotherms of these mixtures are abnormal and the effect is not additive; the deviation may be in the direction of greater or less adsorption. A graphical method of representation is introduced, curves connecting points representing the compositions of two adsorbents which have a const. bleaching power being termed "isocolours." Costing diagrams are also constructed. No definite mixture having an optimal bleaching effect has been observed for general application; the bleaching val. of the adsorbent varies with the colouring matter and the oil. E. S. Hedges.

Antioxidants and autoxidation of fats. C. Stiepel (Chem. Umschau, 1932, **39**, 83—84).—The antioxidising effect of the addition of 0·5% of β-naphthol is retained after 6 months' storage of the treated oil. E. Lewkowitsch.

Thiocyanogen number and its application to studies on lard. L. Zeleny and C. H. Bailey (Ind. Eng. Chem., 1932, **24**, 109—110).—The fact that $(CNS)_2$ adds to only one double linking in linoleic acid but adds quantitatively to oleic acid has been used to determine the proportions of the two acids in a mixture, and to follow the changes in lard during progressive hydrogenation and oxidation. A solution of $(CNS)_2$ in AcOH is allowed to act on a thin film of the lard for 17 hr. in the dark and the CNS val. determined by adding KI and titrating immediately with $Na_2S_2O_3$. The % linoleic acid content is given by 0·9 (I val. — CNS val.). In hydrogenation, one of the two unsaturated linkings in lineolic acid is completely reduced before either the other or that in oleic acid is attacked. In oxidation likewise, one double linking in linoleic acid is more reactive than the other or that in oleic acid. A decrease of 16·0% in the total unsaturated acids produced a decrease of 92·4% in the linoleic acid content. H. J. Dowden.

Alligator oil or jacaré [caiman] fat. W. Lühr (Chem. Umschau, 1932, **39**, 85—86; cf. Heller and Ehrlich, Allgem. Oel- u. Fett-Ztg., 1931, **28**, 190).—The viscous (semi-solid) fat from Venezuelan caiman possesses a strong fishy odour and has: $d_{40.5}^{40.5}$ 0·9173, n^{40} 1·4622, sap. val. 195—195·5, I val. 90·4 (96·6 according to Heller), Polenske val. 0·25—0·3, acid val. 8·30° [= 4·7]. The oil oxidises readily on exposure. E. Lewkowitsch.

Losses in distillation of crude and refined glycerol. Removal of arsenic and purification by crystallisation. A. C. Langmuir (Ind. Eng. Chem., 1932, **24**, 378—384).—Steam-distillation in vac. of dil. or pure glycerol causes no loss: the presence of impurities results in varying losses, *e.g.*, 5·0% of Na_2CO_3, 0·5% of alum, and 2% of alum cause losses of 6·0, 2·3, and 10·6%, respectively. The extent of the loss depends also on the time taken in the distillation, but is reduced by the presence of NaCl and Na_2SO_4, so that good-quality saponification and soap-lye crudes could be distilled with losses of 0·25—0·5% and 0·5—1·0% of glycerol, respectively. As can be removed from 20—25% glycerol by treating it (hot) with powdered Fe while blowing with air; 65—70% glycerol is treated, with 0·05—0·1% of $KMnO_4$, made alkaline at 90·6°, and filtered. Analyses of 11 samples of U.S.P. glycerol (made 1911) are given and discussed. A very pure glycerol ($d^{15.6}$ 1·2653) free from fatty acids has been obtained by crystallisation induced by seeding 95—98% glycerol at 1—4° and vac. distillation, and the sp. gr. data for solutions of various concns. prepared from it are tabulated. E. Lewkowitsch.

Preparation and biochemical oxygen demand of pure sodium soaps. G. E. Symons and A. M. Buswell (Ind. Eng. Chem., 1932, **24**, 460—463).—The Na soaps of the fatty acids from HCO_2H to stearic acid and Na oleate can be oxidised biochemically (in dil. solution with sewage cultures). Under suitable conditions the oxidation fits a smooth log. reaction curve, and the 20-day O demand bears a definite relation to the ultimate (10-week) biochemical O demand, the velocity coeffs. having an average val. of 0·0324. The biochemical O demand varies from 55 to 89% of (and apparently bears no relation to) the theoretical amount of O required for complete oxidation of the various soaps to CO_2 and H_2O. E. Lewkowitsch.

Lathering power of soap. J. Augustin (Soap, 1932, **8**, No. 4, 25—27, 69).—The effect of various constituents, stock, alkali, and additions, *e.g.*, sulphonated oils, fatty acids, etc., is discussed. E. Lewkowitsch.

Rapid determination of moisture in oil seeds. V. Druzhinina (Masloboino Zhir. Delo, 1930, No. 3, 17—18).—Cottonseed oil, dried by heating at 120—130°, is added to the ground seeds; the temp. is kept at 130—150° for 10—12 min. and finally raised to 165—170°, with const. stirring. Chemical Abstracts.

[Oil-]bleaching properties of the clays "Tzcho." T. Chursin (Masloboino Zhir. Delo, 1930, No. 3, 18—19).—A comparison of Russian and other clays with respect to the decolorisation of sunflower oil.

Chemical Abstracts.

Oil of Canadian hemp *(Apocynum venetum*, L.*)*. Y. Peive (Masloboino Zhir. Delo, 1930, No. 3, 44—45).—Seeds from Kazakstan, Central Asia, contained H_2O 7·65—8·97, oil (calc. on dry wt.) 21·45—32·40, and tannins 11·7%. The cold-pressed oil had *d* 0·9278, acid val. 3·44, sap. val. 193·62, I val. 134·38—141·40, ester val. 190·18, Hehner val. 94, n^{20} 1·4770—1·4780.

Chemical Abstracts.

Composition of linseed oil. N. E. Cocchinaras (Analyst, 1932, **57**, 233—244).—Separation of the unsaturated acids by fractionation of the Me esters, or by the fractional crystallisation or distillation of the metal salts, was unsatisfactory. The saturated acids were best removed by the Pb-salt method and linolenic acid by bromination in Et_2O solution in the absence of AcOH, and the % of oleic and linoleic acids then found by a determination of Br in the residue. The saturated acids were separated by repeated fractional distillation under reduced pressure. The oil gave I val. 179·9, saturated acids and unsaponifiable matter 9·7%, oleic acid 2·3%, α- and β-linoleic acids 69·6%, α- and β-linolenic acids 18·47%, palmitic acid 6·7%, and stearic acid 3·0%. T. McLachlan.

Stand oil manufacture. Meister (Farben-Ztg., 1932, **37**, 945—947).—The advantages of "closed kettle" methods over the older method of cooking in open varnish pots are discussed, with special reference to improved control and maintenance of pale colour.

S. S. Woolf.

Determination of oil from press-residues in pure olive oil. A. J. Ondovilla (Anal. Fís. Quím., 1932, **30**, 145—147).—This form of adulteration is detected by testing for resins, either (*a*) by emulsifying with 0·2 vol. EtOH saturated with HCl and heating, when darkening occurs, first perceptible with 10% adulteration, or (*b*) by heating the oil, extracting pyroabietic acid free from fatty acids, and testing with H_2SO_4, which gives a violet colour. R. K. Callow.

Composition of Philippine rice oil (Hambas variety). A. O. Cruz, A. P. West, and N. B. Mendiola (Philippine J. Sci., 1932, **47**, 487—496).—Et_2O extraction of rice bran (polishings) yields 14—21% of dark-brown oil. The oil (refined over kieselguhr and Suchar) had: d_4^{30} 0·9073, n_D^{30} 1·4667, I val. (Hanus) 99·5, sap. val. 188·1, unsaponifiable matter 3·98%, acid val. 40·9, saturated acids (corr.) 19·72%, unsaturated acids (corr.) 70·2%. Linolenic acid was absent. The saturated acids consisted of palmitic acid with very minor amounts of stearic, arachidic, lignoceric, and myristic acids.

E. Lewkowitsch.

Fish oils of the Volga-Caspian territory. B. Vuisotzki (Masloboino Zhir. Delo, 1930, No. 3, 26—30).—The oils show high acidity, low I val., much solid glyceride, and unsaponifiable matter up to 0·5%. The colour, odour, acidity, and keeping qualities can be improved by treating the fish wastes with NaOH (0·5%), HCl (0·63%), or NaCl (10%). Chemical Abstracts.

Cracking of fish oil. W. F. Faragher, G. Egloff, and J. C. Morrell (Ind. Eng. Chem., 1932, **24**, 440—441).—Cracking of menhaden oil over the temp. range 402—482° and under 60—100 lb./sq. in. pressure yielded 37·5—47·5% of motor fuel, 17—36% of Diesel oil, and coke and gas. The refined gasoline contained unsaturated hydrocarbons 19%, aromatics 35%, naphthenes 8%, paraffins 38%; lower fatty acids and aldehydes were still present, but refluxing with alkali removed these and increased the octane no. (knock-rating) from 0 to 31. E. Lewkowitsch.

Vitamin potency of various grades of cod-liver oil. W. S. Jones and W. G. Christiansen (J. Amer. Pharm. Assoc., 1932, **21**, 145—147).—Short exposure of the oil to H_2O and air before skimming has a slightly deleterious effect on the vitamin-*A* activity; long exposure gives a marked effect. Rotting livers or livers which have been kept for 12 hr. or more before steaming give oil of low vitamin-*A* potency. Vitamin-*D* is destroyed by exposure of the oil to H_2O and air.

E. H. Sharples.

Evaluation of textile oleines and [spinning] oiling media. M. Kehren (Chem. Umschau, 1931, **39**, 73—83).—The qualities desirable in oils for oiling wool, cotton, etc. are discussed at length, with reference to their composition and analysis. E. Lewkowitsch.

Erratum. On page 233 (B., 1932), col. 1, line 21, for "1931, **5**, 845" read "1930, **5**, 845."

Alkaline salts as detergents.—See VII. **Cultivation and oil content of seeds.**—See XVI. **Fat in milk. Sampling milk for fat tests.**—See XIX.

Patents.

Oil separators for boilers for whale, fish, or other animals. A./S. Kvaerner Brug (B.P. 370,293, 28.7.31. Norw., 29.7.30).—The outlet end of the pipe feeding the boiled-out mass from the boiler into the separator is provided with a flange and a conical guide-plate in order to distribute the inflowing mass and steam laterally and to avoid mixing of the already separated oil by ejector action. E. Lewkowitsch.

Stabilisation of fatty acids and their derivatives. P. I. Murrill, Assr. to R. T. Vanderbilt Co., Inc. (U.S.P. 1,822,934, 15.9.31. Appl., 7.8.28).—0·2—0·3% of an alkylolamine, *e.g.*, tri- or di-ethanolamine, or a salt (soap) thereof with org. acids, is added as stabiliser.

E. Lewkowitsch.

Refining the soap floating on waste liquors obtained in the manufacture of sulphate- or sodium-cellulose, as well as sulphite waste liquor. C. H. Michelson (U.S.P. 1,823,752, 15.9.31. Appl., 19.4.29. Finland, 9.5.28).—The "soap" from the cellulose waste liquors is mixed with sulphite waste liquors (from sulphite-cellulose, -yeast, or -alcohol manufacture) at room temp. or at, *e.g.*, 50°. The fatty layer separates on keeping and is purified, *e.g.*, by extraction with solvents, and separated into fatty acids (63—65%) and resin acids (37—35%). E. Lewkowitsch.

Treatment of sulphonated [fatty] oils. W. Seltzer (B.P. 370,022, 26.9.30. U.S., 4.10.29).—Unsulphonated constituents are removed by mixing the crude (washed) sulphonated oil with H_2O and a H_2O-insol., sulphonatable fatty oil (preferably the same oil as that originally sulphonated). The aq. concentrate of sulphonated oil is separated and salted out etc.; the oil layer is sulphonated further etc. E. Lewkowitsch.

Manufacture of shaving soap [in channelled sticks]. H. Lowenfeld (B.P. 371,680, 27.6.31. Ger., 28.6.30).

Making emulsions. Extractor.—See I. **Lubricant.**—See II. **Wetting etc. agents.**—See III.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Scientific investigation of paintings. A. Eibner (Angew. Chem., 1932, **45**, 301—307).—A review of recent work, with some details of the microchemical detection of the pigments and binding media and of the use of radiation of wave-lengths between 4000 Å. and 3000 Å. for the examination of paint films, and, especially, for the identification of the media by observations of the fluorescence produced. H. F. Gillbe.

Red lead or iron oxide as rust preventer. H. Hebberling (Farbe u. Lack, 1932, 161—162, 182—184).—Red lead is superior to Fe oxide as rust preventer for both inside and outside exposure because (*a*) it contains "active" O which gives rise to a protective oxide film, *i.e.*, anodic passivity; (*b*) it reacts with linseed oil to form stable Pb soaps which increase the resistance and drying rate of the paint. Soap formation suppresses flocculation of the particles and is favoured by their sharp edges. Photomicrographs are given of natural and artificial Fe oxides in paraffin oil and varnish and of red lead in linseed oil. S. Marks.

Black pigments and corrosion. H. Wagner and M. Zipfel (Farben-Ztg., 1932, **37**, 876—878, 912—913, 944—945).—A comprehensive investigation into black pigments (Fe_3O_4, graphite, and bone-, mineral-, gas-, and NH_2Ph-blacks) is described, chemical and physical properties being tabulated. It is shown that Fe_3O_4 accelerates drying, whilst C in any form retards drying to an extent depending on its orientation and degree of dispersion. This retardation is partly compensated when such paints are used on unprimed sheet Fe and, to a lesser extent, when the Fe is treated with a nitrocellulose primer. Wettability and sedimentation observations show distinctions between C blacks of German and American origin. Orientation, dispersion, oil absorption, adsorption, etc. are shown to be interdependent. Photomicrographs illustrating the swelling in H_2O of linseed oil films containing these pigments are given; Fe_3O_4 shows the least effect, C black the greatest. The bearing of these results on corrosion is discussed. S. S. Woolf.

Improvements in paint technology of chrome yellows. G. Draeger (Farbe u. Lack, 1932, 173—174, 185—186, 199—200).—Pure Pb-chromes are not inferior to Pb–Ba- or Pb–Sr-chromes in resistance to light and S gases, brightness, and staining power. Natural and artificial barytes and other diluents reduce the strength of Pb-chromes. Co-pptd. mixtures of Pb–Ba- or Pb–Sr-chromes or of Pb-chromes and $BaSO_4$ are not better than those produced with a modern mill. Pure Ba- or Sr-chromes are more resistant to light than Pb-chromes, but are less resistant to attack by S gases. The brightness of Pb-chromes is not improved by addition of other yellow pigments; Hansa Yellow G is advantageous for light-yellow printing-ink chromes. S. Marks.

Hiding power and drying rates of lead- and mixed chromes. R. Lange (Farbe u. Lack, 1932, 221—223).—In aq. media the hiding power of Pb-chromes is well maintained even when diluted with hydrated Al_2O_3, blanc fixe, kaolin, etc., and it is not increased by addition of Ba- and Sr-chromes. Casein is alkaline and hence attacks the colour; glue tends to thicken the paint. For increasing the spreading power, regulating the drying rate, and preventing the thickening of Pb-chrome paints in oil and spirit media, the addition of Ba- and Sr-chromes is better than that of other diluents. Pure Pb-chromes possess greater hiding power than Ba- and Sr-chromes of the same shade; co-pptn. of Pb–Ba- and Pb–Sr-chromes is without advantage. Ba- and Sr-chromes dry more slowly than Pb-chromes and give softer and more elastic films. S. Marks.

Properties of plasticisers for nitrocellulose lacquers. A. Kraus (Farbe u. Lack, 1932, 158—160, 171—172, 197—198; cf. B., 1932, 392).—Measurements were made with a Schopper dynamometer of the tensile strength and elongation of nitrocellulose films which contained 30, 50, 80, and 100% (calc. on wt. of nitrocellulose) of each of the following plasticisers: tolyl phosphate (I), amyl phthalate (II), Bu_2 phthalate (III), Bu_3 phosphate (IV), Bu stearate (V), castor oil (VI), "casterol" (VII), "ricol 242" (VIII), "sipalin special" (IX), "sipalin M.O.M." (X). The results (tabulated) show that plasticisers convert the almost elastic film into a plastic body. The tensile strength varies inversely with the plasticiser content up to 80%. The elongation increases with the plasticiser content, but not regularly except with (II), (IX), and (X); max. elongation was given with 80% of (V)—(VIII), but 100% of other plasticisers produced further increases. When the plasticised film was kept at 50° for 6 days, both the tensile strength and elongation were reduced except with (V); 7 days' heating at 90° resulted in increased strength and reduced elongation except with (I). (II) and (III) differ markedly in their effects. These abnormalities are partly due to differences in the gelling tendency and volatility. Experiments showed that the order of volatilities of plasticisers is approx. the same whether free or incorporated into a nitrocellulose film. Exposure to ultra-violet light reduces the elongation in all cases, but increases the tensile strength if (III), (VI), (VII), or (VIII) is present; preheating to 90° destroys the latter effect. (I) imparts min. resistance and (IV) max. resistance to ultra-violet light. A method for the prep. of films of definite thicknesses is described. S. Marks.

Solvents and diluents for oil varnishes and paints. H. Wolff and J. Rabinowicz (Farben-Ztg., 1932, **37**, 1050—1052).—The effects on viscosity, drying time, swelling of flatting agents, *e.g.*, Al palmitate, etc. of white spirit (alone or admixed with solvent naphtha), turpentine, and decalin, when used in clear and matt varnishes and various oil paints were studied, and results are detailed. White spirit gives the lowest viscosity in varnishes, but the highest in paints. In general, the properties of decalin lie between those of white spirit and turpentine. Differences in drying time are mainly confined to the tacky stage, turpentine being the slowest from this aspect. The effects of the various solvents on durability of the coatings is being studied. S. S. Woolf.

" Albertate 175A," a new matting agent for oil varnishes. E. Fonrobert (Farben-Ztg., 1932, **37**, 1084—1086).—A general account is given of the nature and properties of " flat " varnishes. The desiderata for matting agents are freedom from coarse particles on swelling, retention of compatibility with oil varnishes, absence of progressive changes in viscosity, etc. The Al salt of an acid resin based on Albertol III L has been found to possess all these qualities, and, in addition, imparts toughness and waterproofness to the film. Comparative trials using Albertate 175A and other matting agents in an Albertol varnish, and also mixtures containing various resins, are detailed and the results illustrated. The risk of fire hazard associated with the use of all such Al salts is pointed out. S. S. Woolf.

Durability of coatings on phosphatised iron plate. F. Kolke (Farben-Ztg., 1932, **37**, 978—980).—The improved adhesion produced by a phosphatised layer (*e.g.*, " parkerising "), protected if necessary by an oiling treatment, is discussed. A series of coatings (shellac, bitumen, synthetic resin (oil-free), and tung oil-synthetic resin), applied on normal and sand-blasted Fe plate, with and without " parkerising " in each case, were exposed in the salt-spray cabinet for 4 weeks. The conditions of the various films are summarised and illustrated. Parkerising was shown to improve corrosion-resistance in all cases, but the effect of a coarse sand-blast was to accelerate corrosion. S. S. Woolf.

Weathering phenomena of varnish films. H. Cortnum (Farbe u. Lack, 1932, 206—208, 218—220).—16 photomicrographs are given to show the effect on the durability of resin–oil varnishes of microscopic gas bubbles formed during either the spreading of the film or its subsequent exposure. H_2O penetrates the film through the smaller pores by capillary attraction, swelling of the undercoat follows, and cracking takes place when the pressure exerted exceeds the cohesion of the constituents of the film. Adhesion of the film to the surface counteracts swelling; flake formation is dependent on cohesion. At the outset these disturbances appear to the naked eye only as loss of lustre. S. Marks.

Synthetic resin finishes. H. H. Morgan (J. Oil Col. Chem. Assoc., 1932, **15**, 106—117).—A general summary is given of the use of synthetic resins in paints and varnishes. The development of " glyptal " and $PhOH-CH_2O$ types of lacquers is traced from the " straight " resin solutions, through the " oil-sol. resin " stage, to the modern " oil-modified " products. The exceptional elasticity and durability of the last-named are illustrated by photographs. S. S. Woolf.

" Enamel " *versus* " varnish." M. Schulz (Farben-Ztg., 1932, **37**, 873—875).—The relative merits of railway-finishing systems involving, respectively, enamel or clear varnish as final coating are discussed. The advantages of the use of pigment in finishing coats are summarised and illustrated by exposure panels. S. S. Woolf.

False claims for "four-hour" varnishes. M. Richter (Farbe u. Lack, 1932, 196).—A 4-hr. varnish (B., 1930, 676) does not necessarily dry hard within 4 hr., but should allow application of a second coat after 4 hr. without difficulty or damage to the undercoat. Such films may set within 1 hr. to the stage at which sand does not adhere and may dry throughout overnight. S. Marks.

Crystallised and distilled rosin from Philippine pine trees (*Pinus insularis*, Endlicher). S. S. Tanchico, A. P. West, and P. D. Esguerra (Philippine J. Sci., 1932, **47**, 481—486).—The crude rosin (residue from steam-distillation of Benguet pine resin), the rosin obtained by crystallisation from an aq. EtOH extract, and the product of redistillation in vac. have been compared (cf. B., 1931, 935). The cryst. rosin had the highest m.p. (118—122°) and acid and sap. vals., but the lowest ester val., unsaponifiable matter, and $[\alpha]_D$. The distilled rosin appears to be a more uniform product than the amorphous crude, and the abietic acid prepared from it is more stable. E. Lewkowitsch.

A new [artificial] resin: " Alkalit." B. Maxorov (Bull. Plastmasstroj, 1931, No. 1—2; Farbe u. Lack, 1932, 223).—Heating the Na salt of phenolphthalein with toluoyl chloride yields a resin which, in oil, gives an almost colourless transparent, glossy, H_2O-resistant film which is also remarkably resistant to mineral acids and caustic alkalis. Other ethers and esters of phenolphthalein are glassy substances which show varying tendency to become cryst. S. Marks.

Working up of synthetic resins. J. Geller (Brennstoff-Chem., 1932, **13**, 130—134).—The methods and apparatus used in the manufacture of articles from $PhOH-CH_2O$ condensation products are briefly described. A. B. Manning.

Grinding [of paint etc.].—See I.

Patents.

Production of [black] pigment. A. B. Cowdery, Assr. to Barrett Co. (U.S.P. 1,820,444, 25.8.31. Appl., 6.11.23).—Coal tar of high " free C " content is distilled until the residue contains $\nless$ 40% of " free C " insol. in C_6H_6. The product forms a suitable pigment for rubber compounding. A. B. Manning.

Resin complex and its production. I. Rosenblum (B.P. 371,850, 24.10.30).—See U.S.P. 1,809,570; B., 1932, 119.

Manufacture of linoleum or like material. Linoleum Manufg. Co., Ltd., and A. A. Godfrey (B.P. 371,457, 28.1.31. Addn. to B.P. 316,646).

Benzobisoxazine [pigment] dyes.—See IV. **Soap from waste liquors.**—See XII.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Rubber content of Philippine plants. I. *Ficus*. J. Marañon and P. Cabato (Philippine J. Sci., 1932, **47**, 525—533).—Stems and leaves of 24 species of *Ficus* were examined. Only *F. calophylloides*, Elm., *F. elastica*, Roxb., and *F. minahassae*, Teysm. and De Vr., yielded appreciable quantities (0·73, 3·55, and 0·52% in the stem, respectively) of rubber, which contains the hydrocarbon (elementary composition $C_{10}H_{16}$) prevailing in Parà rubber. E. Lewkowitsch.

Nephelometric method for rapid determination of moisture in raw rubber and purified balata. H. F. Wilson and J. N. Dean (Trans. Inst. Rubber Ind., 1932, **7**, 349—353).—The greater opacity of raw rubber and deresinated balata containing H_2O can be used as a basis for the nephelometric determination of the moisture content. With a ground-glass screen giving a max. scattering effect equal to $\ngtr$ 3% H_2O in the sample, and working with the latter at 70—100°, the results agree closely with those obtained by oven-drying and the time occupied is $< \frac{1}{2}$ min. D. F. Twiss.

Studies of rubber solutions. C. W. Shacklock (Trans. Inst. Rubber Ind., 1932, **7**, 354—365; cf. B., 1932, 155).—Mastication of rubber for 5 hr. does not appreciably affect the n of rubber itself or of its C_6H_6 solution; the results with the latter do not follow the additive-mixture law, probably on account of solvation, but this is evidently independent of the time of milling. The O_2 which is continually absorbed during mastication in air probably reduces the micellar binding forces and so expedites mechanical disaggregation. The proportion of $COMe_2$-sol. constituents increases progressively with the degree of mastication, but not in a rectilinear course such as is followed by the increase in wt., probably because of the formation of additive products as well as of oxidative degradation products. The surface tension in C_6H_6 solution shows an initial rise with progressive mastication followed by an almost static condition, being affected presumably only by oxidation products of low mol. wt. With progressive mastication rubber gives C_6H_6 solutions of which the dielectric const. first attains a max. and subsequently shows a steady increase, these changes being explained by initial increase in polarity followed by further oxygenation of the long mols. to less unsymmetrical mols. of reduced polar moment. It is probable that the activation of O_2 towards rubber results from the primary ionisation of the mols and not from the subsequent formation of O_3. D. F. Twiss.

Solvent losses and recovery in rubber-proofing. J. C. Liddle (India-Rubber J., 1932, **83**, 531—533).—An illustrated description is given of the recovery of rubber solvent from hooded spreading tables, using absorption plant containing active C. D. F. Twiss.

Rubber manufacture for electric cables compared with rubber manufacture for other purposes. J. R. M. Duncan (Trans. Inst. Rubber Ind., 1932, **7**, 380—396).—A review of the special conditions and general manufacturing procedure in the production of rubber-insulated cable. D. F. Twiss.

Effect of ageing on taut rubber diaphragms. D. H. Strother and H. B. Henrickson (India-Rubber J., 1932, **83**, 562—563).—On account of the advantages that would be possessed by rubber as a diaphragm material for sensitive pressure indicators, the rate of deterioration of diaphragms of varied composition in air-speed indicators has been examined as indicated by the average increase in stiffness resulting from storage for a period of 5 years and from a reduction in temp. from 25° to —10° at the beginning and end of this period. The results are influenced by the composition and degree of vulcanisation, and also probably by the initial tension under which the diaphragms are mounted. D. F. Twiss.

Influence of conditions of storage on the deterioration of rubber articles. M. Sagajllo and Z. Otwinowski (Przemysl Chem., 1932, **16**, 8—20).—The elasticity and breaking load of rubber kept in various media during 32 months in the dark and in diffused daylight have been studied. In O_2 deterioration proceeds gradually during 8 months, followed by transient recovery during the succeeding 4 months, after which steady, increasingly rapid deterioration sets in, amounting to 93% by the end of 32 months. In the dark the mechanical properties of rubber improve during the first 4 months of storage in O_2, after which a decline sets in, interrupted from the 16th to the 20th month by a slight recovery; deterioration after 32 months amounts to 85%. Similar results are obtained in an atm. of air, with the difference that the initial improvement in the dark is absent, and that final deterioration amounts to 42 and 37% in the presence and absence of light, respectively. In an atm. of N_2 a short period of deterioration (4 months) is followed by a marked improvement, the mechanical properties of rubber at the end of 12 months being considerably superior to those of fresh rubber; after 12 months deterioration sets in, amounting to 53% after 32 months. In the dark the quality of the rubber improves steadily during the first 12 months, after which it falls to 66% of the original val. at the end of 32 months. The process of ageing proceeds similarly in atm. of H_2, air containing NH_3, and CO_2 as in air, with the difference in the case of CO_2 that a second transient period of recovery is observed in the absence of light after 24 months of storage. R. Truszkowski.

Rubber-bark renewal.—See XVI.

Patents.

Manufacture of sponge rubber. P. H. Richert (U.S.P. 1,823,335, 15.9.31. Appl., 29.4.29).—$(NH_4)_2CO_3$ decomposes at an undesirably low temp. when used as a gassing agent to develop a cellular structure in rubber, and the somewhat more stable $(NH_4)_2SO_3$ gives greater ease of control and more uniform structure. D. F. Twiss.

Preservation of [rubber] latex. A. A. Nikitin, Assr. to Naugatuck Chem. Co. (U.S.P. 1,823,119, 15.9.31. Appl., 20.3.29).—Stable, uncoagulated, acidic latex is obtained from alkali-preserved latex by adding a glucoside such as saponin and then introducing sufficient strongly acidic material, *e.g.*, HCl, capable of imparting a $p_H < 4 \cdot 5$. D. F. Twiss.

Benzobisoxazine [pigment] dyes.—See IV. **Black pigment.**—See XIII.

XV.—LEATHER; GLUE.

Tanning materials. Report of the 6th International Commission (Indian section). B. M. Das and B. B. Dhavale (J. Soc. Leather Trades' Chem., 1932, **16**, 115—117).—The tannin and sol. non-tan (%) contents of various materials are, respectively: goran bark (*Ceriops Roxburghiana*) 35·68, 9·55; goran leaves 9·1, 18·51; sundari bark (*Heritiera minor*) 12·42, 5·16; sundari leaves 9·65, 11·75; pussur bark (*Carapa moluccensis*) 23·79, 8·37; dhundul bark (*Carapa obovata*) 31·80, 11·62; dhundul wood 4·76, 3·01; kankra bark (*Buguiera gymnorrhiza*) 35·29, 11·95; kankra leaves 11·95, 19·22; gurzan bark (*Rhizophora mucronata*) 35·00, 14·0; gurzan fruits 12·11, 17·06; goria bark (*Kandelia Rheedii*) 20·24, 13·40; golpatta (*Nipa fruticans*) 10·26, 15·18; dhawa leaves (*Arogeissus latifolia*) 12·15, 11·57; babul bark (*Acacia Arabica*) 14·29. 7·49; teri pod (*Cæsalpina digyna*) 41·90, 24·70. The tannin content of a no. of other materials was less than the non-tans. The suitability of South Indian myrobalans and *Hopea* bark for tanning purposes has been investigated. Solid babul, dhawa, and solid (blended) kahua bark extracts are being manufactured in India. D. Woodroffe.

Permanganate–hide-powder graph for tannin analysis of wood barks. L. Baens and A. P. West (Philippine J. Sci., 1932, **47**, 467—480).—The tannin content (calc. as gallotannic acid) of barks as determined by the convenient permanganate method is always higher than, but strictly proportional to, the figure obtained by the hide-powder method (A.O.A.C. method, slightly modified as regards the procedure used to extract the bark). The hide-powder method is accurate, except when interfering substances are present in the bark, which lead to high results; in such cases the converted permanganate figure is more reliable. Should other tannins than gallotannic acid be present in the bark the appropriate reduction equiv. is applied in the permanganate calculation. E. Lewkowitsch.

Effect of concentration, time, temperature, and age of infusions of Rumanian spruce bark (*Picea excelsa*) on the degree of tannage obtained. C. Otin and G. Huidovici (J. Soc. Leather Trades' Chem., 1932, **16**, 173—188).—The degree of tannage obtained on hide powder increased as either the concn. or temp. of the spruce bark infusions was increased, and showed a slight increase to a max. as the liquors were aged. Max. fixation of tannin was obtained in 30 min. with liquors of *d* 1·020 and having the natural p_H 5·5—6·5. The ability of the powder to fix tannin was diminished by increasing the concn. of the liquors; "case-hardening" was found with conc. solutions. D. Woodroffe.

Pickling [of skins]. E. R. Theis and A. W. Goetz (J. Amer. Leather Chem. Assoc., 1932, **27**, 109—126; cf. B., 1931, 1148).—The amount of H_2SO_4 which combined with bated pelt was unaffected by the concn. of the NaCl in the pickle. The $H^{\cdot}$ adsorption by the pelt is probably increased to a greater extent by SO_4'' than by Cl′, and is greater in the presence of anions different from the anion of the acid. Protein hydrolysis is inhibited by sulphates and consequently more protein would be available for combination with the acid, and a more solid and firmer leather should be produced after H_2SO_4 pickles than after HCl pickles, which is confirmed in practice. Max. H_2SO_4 absorption was obtained with 0·0714 mol. of H_2SO_4 per 100 g. of dry bated hide. Samples pickled with 0·0357 mol. of H_2SO_4 per 100 g. of bated stock became slightly putrid after 4 days. The effect of NaCl on the final p_H of the pickle was greater with H_2SO_4 pickles than with HCl pickles owing to the slight effect of NaCl on the H_2SO_4 adsorption. For all concns. of H_2SO_4, 2·4—2·9% of NaCl was sufficient to prevent swelling. The pelts were dehydrated with higher concns. of NaCl. Greater swelling was produced by HCl solutions than by H_2SO_4 of $p_H < 3 \cdot 3$, but the reverse was the case for solutions of $p_H > 3 \cdot 3$. Pelts swollen respectively with HCl and H_2SO_4 solutions of the same concn. were depressed by NaCl to the same extent. D. Woodroffe.

Salt stains on South Indian hides and skins. V. N. Patwardhan and M. S. Sastry (J. Indian Inst. Sci., 1932, **15A**, 1—8).—The hides and skins on the Malabar coast area are cured by the villagers with a mixture of low-grade salt and earth which contains Fe_2O_3, or are kept immersed in saturated brine liquors which are very dirty. The blue or violet stains which appear are not caused by direct bacterial action on the skin, but are the result of pptn. of Fe in the cure as FeS. Stains were not produced when Fe was absent from the cure, but occurred only on mixing the soil of S. India with the cure. D. Woodroffe.

Problems [in leather manufacture], with special reference to the limeyard. D. Burton (J. Soc. Leather Trades' Chem., 1932, **16**, 188—194).—The "degree of liming" of pelt was measured as the sum of the amounts of 0·1*N*-HCl and 0·1*N*-NaOH required to bring the washed, delimed, dried, pelt to p_H 4 and 8·5, respectively. The degree of plumping is not given by the ratio wt. in air/wt. in H_2O. The relationship between the tanning materials used, the properties of the finished leather, and the effect of temp. should be determined. Sole leathers are required which will wear well, have great resistance to H_2O, and have good permeability to air. D. Woodroffe.

Wear-resistance of sole leather. U. J. Thuau (J. Soc. Leather Trades' Chem., 1932, **16**, 118—120; cf. B., 1929, 925; 1931, 129).—Further minor improvements in the use of the author's wear-testing machine are indicated. The wear-resistance is increased by about 20% by removing the grain of the leather. The greatest wear resistance is shown by pieces cut 30 cm. from the backbone of the tanned hide. The higher is the ratio of grain to corium in a sample, the lower is its wear-resistance. D. Woodroffe.

Animal hair. F. O'Flaherty and W. Roddy (J. Amer. Leather Chem. Assoc., 1932, **27**, 126—137).—The structure, size, and form of cattle hair and of root shaft are described. Hair loosening was unaffected by the addition of melanin to the $Ca(OH)_2$ liquors. D. Woodroffe.

Report of the Pan-European Commission No. 7 on the sampling of tanning materials. R. O. Phillips and F. Müller (J. Soc. Leather Trades' Chem., 1932, **16**, 110—115).—See B., 1932, 359.

Tanning materials of the British Empire. Resources and development. J. R. Furlong (J. Soc. Leather Trades' Chem., 1932, **16**, 229—239).

Oak waste.—See V. **Oxidation of aq. Na_2S by air.**—See VII. **Corrosivity of tan liquors.**—See X. **Canadian hemp oil.**—See XII.

Patents.

Preparation of animal skins for tanning. E. J. Maguire, Assr. to Grasselli Chem. Co. (U.S.P. 1,822,898, 15.9.31. Appl., 24.1.30).—The dehaired skins are degreased in a 0·5—3·0% solution of $Na_3PO_4,12H_2O$ at 20—45° and then pickled. D. Woodroffe.

Preliminary tanning process. B. Quendt (U.S.P. 1,823,467, 15.9.31. Appl., 25.1.29. Ger., 19.7.26).—Pelts prepared for tanning are subjected to a preliminary tannage with alum, and/or a neutral salt, and/or a H_2O-sol. non-sulphonated condensation product of an arylamine or a mixture of the amine and a dil. tanning solution. D. Woodroffe.

Tanning of hides and the like. G. V. Wrange, and Aktiebolaget Friberg's Högvacuumpump (B.P. 370,144—5, 28.2.31. Swed., [a] 4.3.30, [b] 11.3.30).—The hides are placed in one of two or more closed tanning tanks, which can be evacuated and each of which is provided with a heating device. The other tanks contain tan liquors of different concns. The tanks are simultaneously evacuated and raised to 30—40°, the tan liquors in turn are brought into contact with the hides by means of a circulating pump, and each is left for 24 hr. D. Woodroffe.

Manufacture and separation of sulphur-containing splitting products of the acid hydrolysis of keratin and keratin substances. R. von Wülfing and E. Möller (J. A. Wülfing) and E. Sturm (B.P. 370,295, 29.7.31).—Keratin or keratinous material (hair, wool, horn) is treated with cold or hot mineral (H_2SO_4, HCl) and org. acids (HCO_2H) of various concns. until it is converted into a gluey mass, then diluted with H_2O, neutralised with aq. NH_3, NaOH, or Na_2CO_3, the solution saturated with $(NH_4)_2SO_4$ or $MgSO_4$, and the ppt. filtered off and boiled with H_2O, whereby the keratinates remain undissolved (and are filtered off), the keratoses separate from the hot filtrate on cooling, and the "lower splitting products" remain in the cold solution. D. Woodroffe.

XVI.—AGRICULTURE.

Laws of soil colloidal behaviour. VIII. Forms and functions of water. S. Mattson (Soil Sci., 1932, **33**, 301—323; cf. B., 1932, 274).—Combined or constitutional H_2O in soils exists in the form of hydrated oxides of Si, Al, and Fe and their combinations. Molecularly attracted (*i.e.*, hygroscopic) H_2O occurs as a thin film ($\not> 5$ mμ) over the particles and gives rise to the heat of wetting. The amount of H_2O so held is a function of the total surface area of the soil particles and is not directly affected by the nature and quantity of the exchangeable ions present. The imbibition of H_2O by soil colloids is dependent on their composition, exchange capacity, charge on the particles, isoelectric point, strength of the free colloid acid (ultimate p_H), and on the concn. of the micellar electrolytes and the valency of their ions. Imbibition is an osmotic phenomenon brought about by the dissociation of diffusible ions by the colloidal particle. The effect of pressure on the H_2O content of soils indicates an increase of the concn. of micellar ions in the direction of the surface, and that the electrolyte concn. is greater outside the micellar solution than within it. The p_H of a negative suspension is lower, and that of a positive suspension higher, than that of the corresponding extracts. The ion concn. of solutions removed from colloids by high pressure is lower than when no pressure is applied. The p.d. between the gel and its extract increases as the H_2O content decreases. A. G. Pollard.

Characteristics of dispersible organic colloids in peats. W. L. Powers (J. Agric. Res., 1932, **44**, 97—111).—The proximate composition of the org. colloid separated from peat varies widely with parent material and climatic conditions. The H_2O-absorption capacity over 3·3% H_2SO_4 is 50% greater than the average for inorg. soil colloids. The colloid contains more N and has a higher base-exchange capacity than the original peat. Addition of sand, clay, or $CaCO_3$ to the peat colloid or to its ligneous fraction may increase base-exchange activity. W. G. Eggleton.

Soil permeability and irrigation. B. G. Ganossis (Ann. Agron., 1931, N.S., **1**, 686—694; Proc. Internat. Soc. Soil Sci., 1932, **7**, 5).—Soils are classified according to their permeability, which serves as a basis for assessing the optimum quantity of irrigation H_2O to be applied. The colloidal condition of the soil, possibly modified by fertiliser treatment, is the principal factor controlling permeability. A. G. Pollard.

Moisture conditions of auto-irrigated soils and plant growth in them as related to soil structure. T. Kôyama and L. Idemitu (Coll. Agric. Imp. Univ. Kyushu Fukuoka, Japan, Bull., 1931, No. 4; Proc. Internat. Soc. Soil Sci., 1932, **7**, 7—8).—Soils were artificially granulated to produce different structures. Coarser samples had smaller pore space and higher H_2O content and H_2O-supplying power when compared under similar conditions. Differences in H_2O-supplying power, as measured by the soil-point method, agreed fairly well with the transpiration rates of plants growing in them. A. G. Pollard.

Relation between water content and crop yields of chernozem soils of Azov. I. I. Samoilov (Bull. Lenin Acad. Agric. Sci., U.S.S.R., 1931, No. 42; Proc. Internat. Soc. Soil Sci., 1932, **7**, 26—27).—Differences in the action of irrigation H_2O on two chernozem soils are recorded and the H_2O content-growth curves are examined on the basis of Mitscherlich's law.

A. G. Pollard.

Effect of temperature on the exchange acidity of lowland soils. K. Kawamura (Utsunomiya Agric. Coll., Japan, Bull., 1931, No. 1; Proc. Internat. Soc. Soil Sci., 1932, **7**, 11—12).—The interaction between soil and KCl solutions used in acidity measurements was complete after shaking for 1 hr. at room temp., but at 4° shaking for 6 hr. was necessary. In highly org. soils $Fe^{\cdot\cdot}$ salts appeared in the KCl extract in amounts which increased with rising temp. The proportion of Al removed by neutral salt extraction and also the titratable acidity of the extracts diminished with rising temp. The titratable acidity corresponded with that calc. from the $Fe^{\cdot\cdot}$ and $Al^{\cdot\cdot\cdot}$ contents, assuming these to be present as chlorides. The action of KCl solution on the mineral acidity was unaffected by temp. Humates of $Fe^{\cdot\cdot}$ and $Al^{\cdot\cdot\cdot}$ prepared from crude peat- or sugar-humus showed temp. effects similar to those observed in org. soils. Treatment of the latter with $AlCl_3$ solution brought $Fe^{\cdot\cdot}$ salts into solution in amounts increasing with rising temp. In soils from which no $FeCl_2$ could be extracted with KCl solution, none appeared on treatment with $AlCl_3$. The $Fe^{\cdot\cdot}$ ion is liberated by base exchange and probably, to some extent, by direct interaction between $AlCl_3$ and $Fe(OH)_2$ present in the soil.

A. G. Pollard.

Replaceable bases in the soils of south-eastern Minnesota and the effect of lime on them. C. O. Rost and J. M. Zetterberg (Soil Sci., 1932, **33**, 249—277).—The exchangeable base contents of these soils decreased with increasing depth. The exchangeable Mg was less affected than Ca by changes in the exchangeable H present. A general parallellism, but no definite relationship, exists between the degree of unsaturation of soils and their p_H val. In the range p_H 5·8—6·2 wide variations in the degree of unsaturation were observed. Treatment with CaO increased the total base capacity of soils and also increased the proportion of exchangeable Ca and Mg, according to the amount of CaO added. This increased Mg and Ca content exceeded in most cases the reduction in exchangeable H. Action of CaO on exchangeable bases was not apparent below the surface 6 in., except in a sandy soil. The degree of unsaturation of soil is not a reliable index of the anticipated response of crops to liming. A. G. Pollard.

Soil solutions. T. Saidel and G. Pavlovski (Ann. Agron., 1931, N.S., **1**, 622—653; Proc. Internat. Soc. Soil Sci., 1932, **7**, 15—16).—The transition of cations from the exchangeable to the sol. condition in soil is examined by the repeated-extraction method. The total H displaced by salts of weak acids (*e.g.*, NaOAc) is the same as that by salts of strong acids (*e.g.*, KCl) in equiv. solutions of concn. $\not< 1{\cdot}0N$. The bearing of this on the general question of soil acidity and base exchange is discussed.

A. G. Pollard.

Influence of lime content on the growth of *Aspergillus* in determinations of the potash requirement of soils. H. Niklas, G. Vilsmeier, and H. Poschenrieder (Z. Pflanz. Düng., 1932, **24A**, 167—178).—Yields of *Aspergillus* both in soil and solution cultures are definitely affected by the amount of Ca available [*e.g.*, as $CaCO_3$ or $Ca(NO_3)_2$]. Determinations of the assimilable K content of calcareous soils, based on the wt. of mycelium produced, probably give unduly high vals.

A. G. Pollard.

Decomposition of vetch green manure in relation to the surrounding soil. H. Humfeld and N. R. Smith (J. Agric. Res., 1932, **44**, 113—120; cf. B., 1932, 124).—The microbiological changes accompanying the decomp. of vetch green manure in the third 2-in. layer of limed and unlimed Leonardstown clay-loam soil were studied. Periodical analyses of successive 2-in. layers during decomp. show that the increase in the no. of bacteria and protozoa is largely confined to the green manure layer. The NH_3 produced during decomp. is nitrified presumably in the upper layers of soil.

W. G. Eggleton.

Presence and significance of yeasts in silage. G. Ruschmann and G. Gräf (Zentr. Bakt. Par., 1932, II, **85**, 436—469).—The activity of yeasts in silage produces substances improving its flavour and aroma. Sugar-free silage contains few yeasts (mainly *Mycoderma*), but in silage from high-sugar material there is a large yeast flora in which *Torula* predominate and *Saccharomyces* occur in smaller nos. Yeast fermentation and sugar consumption limit lactic acid production in silage. Good silage is produced by the inoculation of green matter with yeast and lactic acid bacteria. Efficient exclusion of air is necessary. For protein-rich materials having an unsuitable microflora (*e.g.*, grass from fields treated with sewage), sugar additions are necessary to maintain the lactic acid bacteria and retard the development of protein-decomposing organisms.

A. G. Pollard.

New type of hydrometer for mechanical analysis of soils. A. N. Puri (Soil Sci., 1932, **33**, 241—248).—The hydrometer has a short bulb, long thin stem, and a special attachment for accurate reading. Results obtained agree with those by the pipette method.

A. G. Pollard.

Determination of carbon dioxide production in soils. F. B. Smith and P. E. Brown (Iowa Agric. Exp. Sta. Res. Bull., 1932, No. 147, 27—51).—A no. of methods are compared. Gas-volumetric methods are the most satisfactory for determining CO_2 in the soil air, and the large-type Haldane apparatus is suitable for the purpose. A sampling method is described for use in this process. CO_2 production in soil proceeds in accordance with the growth law of bacteria.

A. G. Pollard.

Rapid determination of water content in undisturbed soil and in bales of cotton. W. L. Balls (Nature, 1932, **129**, 505—506).—Variations in the capacity of a condenser (Hg in wet glass tubing) forms the basis of the method, which can also be applied to determining the concn. of mixtures of liquids with different dielectric consts. L. S. Theobald.

Silt soils of Picardy and their state of fertility. II. G. Joret (Ann. Agron., 1932, **2**, 170—198; cf. B., 1932, 361).—The nutrient contents, fertiliser and lime requirements of these soils are recorded.

A. G. Pollard.

Hygroscopic properties of fertiliser salts and their compounds. Lenglen and Milhiet (Superphosphate, 1932, **5**, 49—56).—Details of the moisture-absorbing power of simple and mixed fertilisers at varying atm. humidities are recorded.

A. G. Pollard.

Colour of magnesium pyrophosphate in the determination of phosphoric acid in phosphate fertilisers. B. A. Skopintzev (Min. Suir., 1930, **5**, 1303—1305).—When aqua regia is used for digestion, the $MgNH_4PO_4$ should be treated with NH_4NO_3 before ignition; when a mixture of HNO_3 and H_2SO_4 is used NH_4NO_3 is unnecessary, but SO_3 must be completely removed by ignition. Chemical Abstracts.

Aqueous ammonia as a nitrogen fertiliser. A. B. Beaumont and G. J. Larsinos (Amer. Fertiliser, 1932, **76**, 9—10, 28—30).—For a no. of crops aq. NH_3 (*d* 0·90, diluted 5, 10, or 20 times) had a N efficiency of approx. 70% of that of $(NH_4)_2SO_4$ or $NaNO_3$. No injury to germination occurred when seeds were sown 5 hr. after the application. The lowered efficiency is ascribed neither to volatilisation nor to reduced nitrification. Fixation by soil colloids is suggested. A. G. Pollard.

Fertilising action of magnesium. C. Brioux and E. Jouis (Ann. Agron., 1932, **2**, 146—169).—In pot cultures, the addition of MgO and $MgSO_4$ to soil increased both crop yields and the Mg content of the plants. Varying proportions of Mg and Ca in the fertiliser were reflected in the ratio of these elements in the plant ash. These effects were not observed in field trials.

A. G. Pollard.

Fertilising action of coal. M. Köhn (Angew. Chem., 1932, **45**, 281; cf. B., 1932, 74).—The deleterious effect of large quantities of coal in the soil is due, not only to a direct acid effect and to reduction, but also to the production of free H_2SO_4 by oxidation of the S compounds and to the decrease in wettability. The effect partly disappears on treatment with NH_3 and the wettability of coal is increased thereby.

E. S. Hedges.

Improvement of pastures. Pasture Sub-Committee of the Advisory Committee on Agricultural Science (J. Min. Agric., 1932, **39**. 24—36).—Results of pasture investigations carried out during 1928—1931 at 14 centres in Great Britain are reported. Substantial increase in yield of dry matter and improvement in quality of herbage follows manuring with artificial fertilisers. W. G. Eggleton.

Fertiliser experiments with ten market-garden crops in Cook County, Illinois. J. W. Lloyd and E. P. Lewis (Illinois Agric. Exp. Sta. Bull., 1932, No. 377, 2—36).—Replacement of one half of the customary dressing of animal manure by artificial fertilisers increased vegetable crops in most cases. A. G. Pollard.

Top-dressing spring grain crops with potash. F. Münter (Ernähr. Pflanze, 1932, **28**, 141—144).—In moist areas top-dressing with potash may be successful, but in a prolonged dry period unfavourable results may follow this practice. In all cases application of K 10—20 days prior to seeding is preferable.

A. G. Pollard.

Rôle of potash in the water economy of plants. B. Rademacher (Ernähr. Pflanze, 1932, **28**, 147—151).—Blanching of the ears (Weissährigkeit) of grain crops induced by nutrient and H_2O deficiency is markedly decreased by applications of K fertilisers, which regulate the H_2O requirements of the plants. A. G. Pollard.

Prevention of "lodging" and the improvement in quality [of cereals] by potash manuring. A. Lochner (Ernähr. Pflanze, 1932, **28**, 121—124).—In a wet season, manuring with K increased grain yields and wt. of grain per bushel, decreased lodging, and improved the resistance of crops to insect and fungal injury. Crops also tended to ripen more evenly throughout the field. A. G. Pollard.

Influence of phosphate manuring on the quality of the crops. P. Holdefleiss (Superphosphat, 1931, **7**, 246—250).—The high protein content of barley induced by heavy N-manuring is reduced by K fertilisers and, to a greater extent, by application of phosphates. The baking quality of flour is improved by the use of these two fertilisers. A. G. Pollard.

Effect of sulphur [on soil]. A. A. Kaluzhski (Udobr. Urozhai, 1931, **3**, 718—724).—S alone does not influence the utilisation of the N by crops; when N is added the S effect is equal to the application of phosphates. The effect of S is attributed to its effect on the solubility of the soil phosphates.

Chemical Abstracts.

Effect of sulphur on certain crops. E. B. Reynolds (Texas Agric. Exp. Sta. Bull., 1930, No. 408, 23 pp.).—Applications of S (up to 4000 lb. per acre) to a calcareous clay soil did not appreciably affect yields of cotton, maize, or oats, and caused no change in soil reaction. On this and other soils the incidence of cotton root rot was not affected by S treatment.

A. G. Pollard.

Use of ammonia- and nitrate-nitrogen by certain crop plants. V. A. Tiedjens and W. R. Robbins (New Jersey Agric. Exp. Sta. Bull., 1931, No. 536, 46 pp.).—The utilisation of NH_3- and NO_3-N by a no. of plants varied with the p_H of the medium. In sand cultures tomatoes made optimum growth at p_H 8 with $(NH_4)_2SO_4$. With soya bean the optimum was p_H 7 for $(NH_4)_2SO_4$, p_H 5—6 for $Ca(NO_3)_2$, and p_H 4—5 for NH_4NO_3. Throughout the range p_H 7·0—8·8, aq. NH_3 produced better growth than did nitrates. Peach and apple seedlings assimilated NH_3-N more readily from alkaline than from acid media. Plants receiving NH_3-N showed no chlorosis even at p_H 9·0, but nitrates induced chlorosis at p_H $>$6·0. Although plants absorbed NH_3-N over a wide range of p_H, assimilation and the efficient elaboration of org. N material in the tissues did not occur until the medium was adjusted to p_H 7—8. Tomato plants in a high-NH_4 medium at p_H 8·0 grew vigorously and contained considerable amounts of free NH_3 which was not toxic. No growth occurred at a lower p_H although the proportion of free NH_3 in the plant had not increased. Plants supplied with nitrates contained little free NH_3 and no appreciable amount of combined NH_3.

A. G. Pollard.

Effect of fertilisers on yields of rice and rape. T. Kôyama and S. Kasiwada (Bull. Coll. Agric. Imp. Univ. Kyushu Fukuoka, 1931, **4**, 319—335).—Applications of N, P, and CaO were more effective in increasing yields of rape than of rice. The action of K was not very marked on either crop. A. G. Pollard.

Citrus and fertilisers. V. Reinicke (Ernähr. Pflanze, 1932, **28**, 105—106).—Applications of K and P fertilisers to soils repeatedly manured with N only produced increased crops of better flavoured fruit, having an increased citric acid content, without a reduction in sugar. Early applications of N tended to accelerate ripening. A. G. Pollard.

Manurial trials with perennial clovers. E. Villax (Ernähr. Pflanze, 1932, **28**, 161—165).—In pot cultures with lucerne, red clover, and sainfoin, K fertilisers increased root development and nodulation with a consequent increase in growth and N fixation in the second and later years. Increased first-year growth was obtained on sandy and peat soils. The action of K on the crops was in the order red clover $>$ lucerne $>$ sainfoin. A. G. Pollard.

Fertiliser experiments with potatoes on high-moor soil. M. Klaus (Ernähr. Pflanze, 1932, **28**, 172—173).—Generous dressings of K are requisite on these soils. To ensure a high starch content and good keeping quality in the tubers, at least two thirds of the K fertiliser used should be in the form of K Mg sulphate. A. G. Pollard.

Soil acidity studies with potatoes, cauliflower, and other vegetables on Long Island. P. H. Wessels (Cornell Univ. Agric. Exp. Sta. Bull., 1932, No. 536, 42 pp.).—Optimum growth of cauliflower occurs in soil having p_H 5·5—6·6. Different varieties show varying resistance to acidity. For the repeated growth of potatoes soil should be maintained between p_H 4·8 and 5·4. Even light dressings of $Ca(OH)_2$ (500—600 lb. per acre) on very acid soils induce scabbiness. A. G. Pollard.

Constancy of the Mitscherlich coefficient for potash. S. P. Molchanov (Udobr. Urozhai, 1931, **3**, 452—457).—In experiments with oats the activity coeff. of K as given by Mitscherlich was not const.; the coeff. for the acid and alkaline media differed. The optimum growth of oats may take place in neutral or acid medium, depending on the rate of application of K. The activity coeff. for K may also depend on the substratum. Chemical Abstracts.

[Soil-]reaction requirements of the soya bean. H. Dobert (Z. Pflanz. Düng., 1932, **11B**, 173—176).—In German soils (unlike those of America) the growth of the soya bean is markedly affected by soil reaction. Disease was prevalent in acid soils ($p_H < 5\cdot0$), moderate growth occurred in soils of p_H 5·5, and at p_H 7·0 good crops were obtained. The optimum p_H is probably $> 7\cdot0$. A. G. Pollard.

Effect of the hydrogen-ion concentration of the soil on the growth of the bean and its susceptibility to dry root rot. W. H. Burkholder (J. Agric. Res., 1932, **44**, 175—181).—The bean plant, *Phaseolus vulgaris*, thrives well in acid or alkaline soil. Its susceptibility to *Fusarium martii phaseoli* is not affected by $[H^{\cdot}]$. W. G. Eggleton.

Testing maize stalks to aid in determining their plant food needs. G. N. Hoffer (Indiana Agric. Exp. Sta. Bull., 1930, No. 298, 31 pp.).—Details are given of field tests for soil nutrient vals. by the examination of maize stems. Nitrates are shown by the $NHPh_2$ test in internodal tissue and K deficiency is indicated by the accumulation of Fe (KCNS test) at the nodes. A. G. Pollard.

Sugar-beet trials in 1931. T. Remy [with E. Ohly and A. Dhein] (Landw. Jahrb., 1932, **75**, 241—309).—The effects of various fertiliser treatments on the yield and composition of roots and tops are recorded. A. G. Pollard.

Physiological characteristics of potassium salts in relation to the sugar beet and absorption of salts through the plant demand. V. V. Butkevich and E. I. Sholochov (Prianischnikov Ergebn. Vegetationsversuch. Lab., 1930, **15**, 341—370).—K salts promote the absorption of SO_4'', Cl', and HPO_4''. $K^{\cdot}$ and NO_3' are absorbed in equiv. quantities. The decreasing energy of absorption is: $K > NO_3 > HPO_4 > Cl > SO_4$. Chemical Abstracts.

Colorimetric methods for determination of manganese in plant materials. J. Davidson and R. G. Capen (J. Assoc. Off. Agric. Chem., 1931, **14**, 547—551).—To facilitate the study of the rôle of Mn in plant and animal life the authors have compared methods for determining Mn in the ash of ten vegetable products and in inorg. compounds. The KIO_4 and $(NH_4)_2S_2O_8$ methods were found to be equally accurate, giving a quick development of non-fading $KMnO_4$ colour. In the presence of appreciable amounts of Cl' the KIO_4 method is to be preferred (cf. B., 1929, 866; also Indian J. Med. Res., 1929, **16**, 788, for modifications overcoming Ca interference and retention by SiO_2). The equiv. contents of Mn_3O_4 recorded were (p.p.m. on the air-dry materials): maize 10, rice 15, broccoli 56, oats 69, wheat 73, rye 99, kale 159, beet tops 175, wheat straw 214, lettuce 214. Colorimetric determinations by means of Na bismuthate gave much lower results and such inaccuracy was confirmed with control tests. The A.O.A.C. method for gravimetric determination of Mn was found to be inaccurate for such materials. H. R. Jensen.

Determination of plant ash constituents in presence of silica. J. Davidson (J. Assoc. Off. Agric. Chem., 1931, **14**, 551—558).—Ash rich in SiO_2, such as that from wheat and rice straw, if extracted directly with dil. HCl is found to give too low vals. for P, K, Ca, Mg, Fe–Al, Mn, acid-sol. and total ash. It is thus necessary first to volatilise the SiO_2. When the quantity of bases retained by the SiO_2 during HCl digestion is appreciable, in order to avoid an apparent high SiO_2 content the residue after extraction should be digested with H_2SO_4, ignited, and weighed before the SiO_2 is volatilised with $HF–H_2SO_4$. The importance of determining acid-sol. and total ash in feeds and fodders is pointed out, as also is the necessity of volatilising SiO_2 therefrom for a true valuation of K and Na. Several analyses are recorded of materials from culture plots. $NaNO_3$ fertiliser was found to increase K and decrease SiO_2 in wheat straw; fertilisers with K, P, and N decreased K and lowered SiO_2 in rice straw. H. R. Jensen.

Hot- and cold-fermented manure. W. Zielstorff and A. Keller (Landw. Jahrb., 1932, **25**, 449—465).—Differences in the composition and efficiency of the two forms of manure were small. A. G. Pollard.

Practical importance of the tillage of soils for plant nutrition and manuring. Opitz (Superphosphat, 1931, **7**, 239—245).—The effects of deep cultivation on the mechanical and nutrient conditions of soils and on their bacterial activity is discussed. Liming (to produce p_H 7·4) of acid soils treated with superphosphate increases the citric and relative solubilities of the phosphate and improves crop yields. A. G. Pollard.

Effects of stable manure and certain fertilisers on the microbiological activities in virgin peat. S. C. Vandecaveye (Soil Sci., 1932, **33**, 279—299).—Additions of stable manure or of straw, with sufficient $NaNO_3$ to produce a similar N content, increased CO_2 production in peat and also increased the nos. of all soil bacteria, fungi, and actinomyces, except cellulose-decomposing bacteria and *Azotobacter*. There was an added NO_3' (but not NH_3) accumulation. Stable manure did not affect the relative numerical distribution of the micro-organisms, and its beneficial action is attributed to the high availability of its org. C and N constituents. No increase in bacterial nos. or activity resulted from applications of superphosphate or $NaNO_3$. CaO increased CO_2 production without appreciable effect on the nos. of organisms present, prevented any decline in the nos. of *Azotobacter*, and increased the availability of carbonaceous matter in the peat. A. G. Pollard.

Use of nitrogenous plant foods. J. G. Lipman, A. W. Blair, and A. L. Prince (New Jersey Agric. Exp. Sta. Bull., 1931, No. 519, 46 pp.).—Among various manures examined fresh cattle manure (solid and liquid) in conjunction with $NaNO_3$ produced the highest average crop yields in a 15-yr. period. The % N in any particular crop was not markedly affected by fertiliser or CaO treatment except in extreme cases. Where CaO was applied the net recovery of added N in the crop was greater from $NaNO_3$ alone than from $NaNO_3$ + farmyard manure. Without CaO the N recovery was smaller after the first 5 years. An average of ⅔ of the added N was lost by various means. The use of artificial fertilisers alone cannot produce a permanent increase in soil-N content. Soils receiving CaO + farmyard manure maintained and even increased their N content. Where $NaNO_3$ is used without manure, CaO has a beneficial effect, but without CaO yields decline steadily. A. G. Pollard.

Manuring of acid soils. F. Münter (Ernähr. Pflanze, 1932, **28**, 125—127).—Sugar-beet crops suffer less from acidity on loams than on sandy soils. Root development of wheat, maize, and peas on acid soils was much restricted. Kainit and KCl reduced barley yields on acid soils, but K_2SO_4 produced a small increase. With potatoes on acid soil, K Mg sulphate and 40% K salts increased the yield. On limed plots, K_2SO_4 and K Mg sulphate increased the yield and starch content of the tubers. A. G. Pollard.

Manuring of winter wheat. H. Schudt and W. Kleberger (Z. Pflanz. Düng., 1932, **11**, **B**, 145—173).—The effects of various combinations of N, P, and K fertilisers applied at various periods are examined. The crop-increasing power of any individual fertiliser is modified by the nature of other fertilisers used in conjunction with it. In general, fertilisers were more effective when applied in autumn than in spring. A. G. Pollard.

Fungus diseases and green manuring. M. Park (Trop. Agric., 1932, **78**, 67—82).—Diseases introduced or fostered by green manuring are discussed and remedial measures indicated. A. G. Pollard.

Manganese-deficiency disease of barley. R. C. Scott (J. Dept. Agric. S. Austral., 1932, **35**, 771—780).—Applications of 14—15 lb. of $MnSO_4$ per acre prevented the failure of barley crops in certain areas. A mixed dressing of 1 pt. $MnSO_4$ and 4 pts. superphosphate is recommended for general use. A. G. Pollard.

Control of bottom rot of lettuce. G. R. Townsend and A. G. Newhall (Cornell Univ. Agric. Exp. Sta. Bull., 1932, No. 535, 11 pp.).—Successful control resulted from one application of Hg Et phosphate dust. A. G. Pollard.

Causes and control of damping-off of tomato seedlings. L. J. Alexander, H. C. Young, and C. M. Kiger (Ohio Agric. Exp. Sta. Bull., 1931, No. 496, 38 pp.).—Seed treatment with $CuSO_4$ gives partial or temporary protection. Formalin dusts (40% CH_2O absorbed in diatomaceous earth or gypsum) applied to soil permit the liberation of the gas at rates requisite to control the disease, without producing in the atm. a concn. toxic to growing plants in the same greenhouse. A. G. Pollard.

" Sand-drown " disease of tobacco and maize and its relation to the lime and magnesia content of the soil. A. Gehring (Ernähr. Pflanze, 1932, **28**, 101—104).—Soils deficient in Mg and therefore liable to cause " sand-drown " are also poor in Ca. Symptoms of this disease are identical with the acid-injury to oat and rye leaves on acid soils. A. G. Pollard.

Vegetable seed treatment. E. E. Clayton (New York State Agric. Sta. Bull., 1931, No. 597, 15 pp.).—Growth stimulation following seed treatment for the prevention of disease is not sp. to any particular chemical substance and cannot be produced at will. Hg dusts are more effective than Cu preps. in protecting seeds from decay in soil. Artificial fertilisers, so applied that they come in contact with seed in soil, are important factors in predisposing seed to decay. Less injury to seed is caused by org. Hg compounds than by $HgCl_2$, HgI_2, or $Hg(CN)_2$. Liquid preps. are more likely than dusts to have a delayed toxic action. A. G. Pollard.

[Effect of cultivation factors on] oil content of seeds. A. Fomin (Masloboino Zhir. Delo, 1929, No. 6, 37—42).—No relation was found between the % of oil and the size of sunflower seed capsule, wt. of seeds, % of husks, location in the capsule, or yield of seeds. The spacing of the plants, planting time, and type of soil had considerable influence. Chemical Abstracts.

Spray injury. I. Injuries from summer applications on apples. II. Secondary effects of spray injury on apple foliage. W. C. Dutton (Michigan

Agric. Exp. Sta. Spec. Bull., 1932, No. 218, 68 pp., and No. 219, 38 pp.).—I. Formation of brown patches on apple leaves following spraying with CaO–S is favoured by high temp. and by weather conditions causing slow drying. Young foliage is more susceptible than the mature. The extent of the injury increases with spray concn. and is accentuated by CaO–S–oil combinations. Some "scald" may occur with any spray treatment, but is marked when S in any form is applied. Dry CaO–S is slightly less injurious than the liquid material. Neither free S nor CaS causes foliage injury. Yellow leaf injury, russetting of fruit, and "blossom-end" injury following the use of CaO–S–Pb arsenate sprays is ascribed to the sol. As formed in the mixture. Leaf injury is minimised by reducing the proportion of CaO–S, but not of Pb arsenate, used. Additions of sugar, $CaSO_4$, or tobacco dust are without effect, but casein spreader increases injury in some cases. Admixture of $FeSO_4$, but not $Al_2(SO_4)_3$, reduces yellow leaf injury, but unless used in large proportions does not prevent true CaO–S "burn." Bordeaux mixture causes little foliage or "blossom-end" injury, but repeated applications in early summer lead to considerable russetting of fruit. Basic Cu sulphate and Cu carbonate preps. cause marked injury to fruit and foliage.

II. Applications of CaO–S or of Bordeaux mixture at customary concns. and periods do not affect fruit setting, but severe spray injury to foliage may result in inhibition of fruit-bud formation, reduced size and colouring of fruit, and diminished growth of wood as indicated by the size of annular rings.

A. G. POLLARD.

Insecticides on shade trees and ornamentals. E. P. FELT and S. W. BROMLEY (J. Econ. Entom., 1932, **25**, 298—304).—High humidity is probably not a factor influencing tree injury by oil sprays. Coating of Pb arsenate with Pb oleate increased its killing action on bark beetles. A. G. POLLARD.

Spraying of hops with Bordeaux mixture. H. W. HARMAN (J. Inst. Brew., 1932, **38**, 197).—If they are protected during spraying with Bordeaux mixture, hops need not contain > 50 p.p.m. of Cu, of which amount approx. one third is lost during mashing and one third during fermentation. Such hops introduce $\frac{1}{300}$ grain per gal. into the finished beer. Although beer with that content of Cu is "safe," the yeast which eliminates the Cu may be injured, especially if other traces of Cu are present from the fermentation vessels, copper mains, etc.

C. RANKEN.

Insecticides for codling-moth control. E. J. NEWCOMER and M. A. YOTHERS (U.S. Dept. Agric. Tech. Bull., 1932, No. 281, 28 pp.).—Among a no. of arsenates examined, those of Ba, Zn, and Mn approached in efficiency most nearly to that of Pb, but in all cases the last-named was superior both in toxicity and freedom from fruit injury. Addition of fish oil to Pb arsenate sprays increased their efficiency, but the residue was more difficult to remove from the fruit. Casein, in small amounts, improved the action of the spray, but large proportions were ineffective. Soap, glue, and flour paste reduced the val. of Pb arsenate. Lubricating oil sprays were effective against eggs, the action persisting to a limited extent for some days after application. No repellent action on the moths was observed. A medium oil (viscosity 65—75 sec., Saybolt) with high unsulphonatable residue is suitable for admixture with Pb arsenate. Nicotine sulphate diluted 1 : 600—800 with 1% lubricating oil emulsion is a valuable substitute for arsenicals. *Derris*, pyrethrum, pyridine sulphate, and benzylpyridine were of low efficiency.

A. G. POLLARD.

Use of mineral oils for better [insecticidal] dusts. W. P. FLINT and M. D. FARRAR (J. Econ. Entom., 1932, **25**, 269—271).—Addition of small amounts ($\ngtr$ 5%) of mineral oil improved the adhesive properties of standard dusting preps. In dusts containing S, a proportion of the S must be replaced by $Ca(OH)_2$ or other flocculent material in order to maintain a suitable physical consistency after the incorporation of 5% of oil. Dusts containing 60% S or 16% $CuSO_4,H_2O$ gave satisfactory control of many orchard diseases. Highly-refined petroleum oils having viscosity 80—100 sec. are most suitable for incorporation in dusts. Drying oils proved unsuccessful. A. G. POLLARD.

Influence of humidity on the effectiveness of certain fumigants against the eggs and adults of *Tribolium confusum*. Duv. D. L. LINDGREEN and H. H. SHEPHERD (J. Econ. Entom., 1932, **25**, 248—253).—The toxicity of ethylene oxide, CS_2, and chloropicrin to adults was not affected by normal variations in atm. humidity, but dry conditions reduced the efficiency of chloropicrin and CS_2 on eggs. Under all conditions ethylene oxide was more toxic to eggs than to adults. The reverse was the case with CS_2 and chloropicrin.

A. G. POLLARD.

Toxicity studies by hypodermic injection of *Celerio lineata* larvæ. G. HOCKENYOS and J. LILLY (J. Econ. Entom., 1932, **25**, 253—261).—The existence is indicated of an optimum concn. at which both org. and inorg. poisons can be used most effectively. The speed of paralysis of the larvæ by nicotine sulphate of any given concn. is proportional to the distance of the point of injection from the head. The temp. and p_H of the nicotine solution influence its efficiency much less than is usually supposed. A. G. POLLARD.

Toxicity of stomach poisons to insects. J. W. BULGER (J. Econ. Entom., 1932, **25**, 261—268).—The toxicity of acid Pb arsenate is increased by admixture with $Ca(OH)_2$, Ca caseinate, and pptd. S and decreased by Bordeaux mixture and hydrated Fe_2O_3.

A. G. POLLARD.

Repellency to the Japanese beetle of extracts made from plants immune to attack. F. W. METZGER and D. H. GRANT (U.S. Dept. Agric. Tech. Bull., 1932, No. 299, 21 pp.).—Records of trials with several hundred extracts are recorded. Few had any possible val. as repellents, and none equalled *Derris* or pyrethrum for this purpose. A. G. POLLARD.

Control of the bean beetle in New Mexico. J. R. DOUGLASS (New Mexico Agric. Exp. Sta. Bull., 1932, No. 199, 14 pp.).—Ca arsenate dusts are more successful if applied to over-wintering beetles than to larvæ.

A. G. POLLARD.

Control of the pea aphid in lucerne fields, with special reference to the chain drag. R. C. SMITH

(J. Econ. Entom., 1932, **25**, 157—164).—Distribution of $Ca(CN)_2$ flakes proved successful. A. G. Pollard.

Control of leaf-hoppers infesting dahlias and asters. C. C. Hamilton (J. Econ. Entom., 1932, **25**, 304—311).—All standard preps. examined, except Bordeaux mixture, caused an effective kill. Bordeaux mixture and pyrethrum were the only materials having a repellent effect. A. G. Pollard.

Leaf curl in currant bushes. F. Vogel and E. Weber (Ernähr. Pflanze, 1932, **28**, 165—167).—Soil around infected bushes had a higher Cl′ content than that of normal bushes. Fruit from the latter was larger and had higher sugar and acid contents. Diseased bushes had a much higher Cl′ content, and less K in the leaf ash, than healthy bushes. The disease is ascribed to K deficiency. A. G. Pollard.

Biology and control of the blueberry maggot in Washington County, Maine. F. H. Lathrop and C. B. Nickels (U.S. Dept. Agric. Tech. Bull., 1932, No. 275, 76 pp.).—Dusting with Ca arsenate (6—7 lb. per acre) is recommended. Applications should be made not later than 2 weeks prior to picking in order to avoid appreciable As residue. A. G. Pollard.

Raspberry mites. R. Hutson (Michigan Agric. Exp. Sta. Quart. Bull., 1932, **14**, 191—193).—Summer oils (1%) with or without Bordeaux mixture gave satisfactory control. A. G. Pollard.

Influence of *Oidium* and of sulphur-dusting on yield and bark renewal [of rubber]. R. K. S. Murray (Trop. Agric., 1932, **78**, 89—98).—Dusting with S increased the yield of rubber and accelerated bark renewal. A. G. Pollard.

Problems confronting the sprayer. I. Volume of liquid needed to spray trees of varying shapes and sizes. II. Volume of spray passing through nozzles of varying diameters at varying spraying pressures. C. W. B. Wright and R. M. Woodman (Chem. News, 1932, **144**, 116—122, 146—147).

Storage of $CaCN_2$. Fertilisers from apatite. Determining P_2O_5 in fertilisers.—See VII. **Determining H_2O [in soil].**—See XI. **Dried carbonatation scums.**—See XVII. **Fat in milk.**—See XIX.

Patents.

Production of means for combating vegetable diseases and vegetable and animal organisms deleterious to plants. J. A. L. Bouma (B.P. 369,917, 20.11.30. Ger., 28.11.29).—The products comprise mixtures of plant extracts having insecticidal or fungicidal properties (*e.g.*, extracts from the root of *Rubiæ tinctorum* or the leaves of *Salvia officinalis*) with $Cu(OBz)_2$ and/or sulphurised unsaturated or ethereal oils; "slimy" material (glue, gelatin, latex) and powders (talc, lycopodium) may also be added. L. A. Coles.

Seed-sorting composition.—See XI.

XVII.—SUGARS; STARCHES; GUMS.

[Sugar-]juice clarification. A. Böhm (Z. Zuckerind. Czechoslov., 1932, **56**, 382—384).—Using 0·2 for the predefecation and 1·7 for the main liming (CaO % of the roots), a lighter-coloured juice was obtained when the diffusion juice was at 75° than when at 78°. Fractional defecation, using 0·5 and 1·10% in the two additions, proved the most satisfactory, as when the amount of CaO was lower than this the colour and purity suffered, besides which the rate of filtration was impeded. J. P. Ogilvie.

Combined application of decolorising carbons in sugar manufacture. J. Šana (Z. Zuckerind. Czechoslov., 1932, **56**, 401—416).—In comparing the decolorisation resulting from addition in one amount as compared with that same amount added in several fractions, it is found that the differences are greater with low- than with high-power carbons. In operating fractional decolorising with two kinds of carbons, it is more advantageous to use the low-power material first. Equal wts. of carboraffin I and Standard Norit were found to give good results in decolorising raw sugar solutions. J. P. Ogilvie.

Economical beet-juice defecation. J. Dědek and J. Vašátko (Z. Zuckerind. Czechoslov., 1932, **56**, 399—400).—A considerable reduction of the amount of CaO can be made by either of the following processes: (1) Milk-of-lime is slowly and continuously run into the beet juice at the optimum temp., while stirring all the time, so as to reach an alkalinity of 0·20—0·30% CaO in about 15 min., the remainder of the CaO being added in any preferred manner, after which carbonatation follows. (2) Juice defecated by the above method is saturated with a continuous stream of CO_2, milk-of-lime being at the same time so run in that during the entire operation the optimum alkalinity (about 0·15% CaO) is maintained; or liming and carbonatating may be operated alternately in such a manner that the alkalinity differs only moderately from the optimum. Both methods show a striking improvement in juice filtrability with scums rapidly sweetened off, using lower pressures. J. P. Ogilvie.

Influence of carbon monoxide on the rate of [beet-juice] carbonatation. T. Nemes (Z. Zuckerind. Czechoslov., 1932, **56**, 385—387).—The presence of CO in the limekiln gases generally accounts for the slowing down of the first carbonatation, and gives rise to the formation of $(HCO_2)_2Ca$, which is partly adsorbed by the $CaCO_3$ in proportion to the amount of CaO which has been added. Experiments showed that with CaO additions of 1, 2, and 3% the amount of $(HCO_2)_2Ca$ removed was 1·3, 7·4, and 8·5%. J. P. Ogilvie.

Removal of calcium formate from solution throughout carbonatation [of beet juice]. T. Nemes (Z. Zuckerind. Czechoslov., 1932, **56**, 388—390).—Removal of the $(HCO_2)_2Ca$ during the formation of $CaCO_3$ in the first carbonatation of beet juices was confirmed by conductometric determinations, which also showed that part of the adsorbed formate again goes into solution as the neutral point is approached. J. P. Ogilvie.

Drying [beet-factory] carbonatation scums. H. Thieler (Centr. Zuckerind., 1931, **34**, 1181).—A plant is described for drying-down carbonatation scums to a product which is readily transported and distributed on the soil, even with 20% H_2O. Calc. on the dry matter, such product would contain $CaCO_3$ 74·80, P_2O_5 1·32, N 0·45%. J. P. OGILVIE.

Re-testing the standard raw sugars on the Prague Merchandise and Stock Exchanges. K. ŠANDERA (Z. Zuckerind. Czechoslov., 1932, 56, 417—421).—Standard sugar samples have been examined after an interval of 2 years, using the objective photocolorimeter and the Stammer colour-measuring apparatus. A fading in colour of $>3\%$ of the adsorption, *i.e.*, the change perceptible to the eye, was observed in 14% of the samples examined (which numbered 43 in all). On the whole the permanency of the standards is considered satisfactory, though it is recommended that the samples should be re-examined every 3 years. J. P. OGILVIE.

Determination of the density of molasses. F. W. HAYES and E. P. HEDLEY (Internat. Sugar J., 1932, 34, 185).—Using undiluted molasses, the refractometer gave the most satisfactory results, the method being rapid and showing an experimental error $<0·05\%$. Operating on a 50% solution, the pyknometer and hydrometer showed results uniformly higher.

J. P. OGILVIE.

Determination of the apparent density of refined sugars. V. STANĚK and K. ŠANDERA (Z. Zuckerind. Czechoslov., 1932, 56, 396—399).—An apparatus, depending on the measurement of the air remaining after dissolution of the sugar, is described, average results obtained with it being 0·90—0·99 for pilé and 1·10—1·17 for cubes. J. P. OGILVIE.

Physicochemical properties of edible-canna and potato starches. J. C. RIPPERTON (Hawaii Agric. Exp. Sta. Bull., 1931, No. 63, 48 pp.).—New methods for determining the swelling power, viscosity, and $[H^{\cdot}]$ of starches are described. Swelling and viscosity are not proportional, but there is a general parallelism between viscosity and the product swelling power×concn. Reliable determinations of $[H^{\cdot}]$ can be made with starch suspensions, but filtered extracts give unsatisfactory results. The depressive effect of neutral salts on swelling and viscosity is proportional to the valency of the cation, anions having little effect. NaOH causes an initial increase and a subsequent decrease. Substitution of univalent cations in raw starches increases swelling and viscosity in all cases; bivalent and tervalent ions cause a decrease. Removal of cations by acid treatment or electrodialysis causes the granules to burst when cooked. Among starches of one kind, greatest swelling and viscosity is associated with low saturation with cations and low p_H. Low-viscosity starches have relatively high Ca contents. In general properties potato and edible-canna starches are similar, but the former is somewhat superior in swelling properties and viscosity and contains larger proportions of PO_4''' and of cations.

A. G. POLLARD.

Sugar beet.—See XVI. **Effect of salts on diastatic enzymes. BuOH-COMe$_2$ by fermentation.**—See XVIII.

XVIII.—FERMENTATION INDUSTRIES.

Antiseptic constituents of hops. T. K. WALKER (J. Inst. Brew., 1932, 38, 198—205).—The researches carried out from 1921 to the present time are outlined, and a modification of the previous method of analysis is given. A val. higher than that given by other methods is obtained for the α-resin by the method of initially extracting the hop sample with cold MeOH. The discrepancy is due to the presence of an acidic substance which is not a true α-resin, but is sol. in MeOH and is pptd. as a Pb compound by $Pb(OAc)_2$. This " extra " Pb salt is insol. in light petroleum, and is removed by treating the soft resin with that liquid before pptn. of the α-fraction by $Pb(OAc)_2$.

C. RANKEN.

Oat and barley malts in mashing. W. KILP (Z. Spiritusind., 1932, 55, 75—77).—The saccharifying power of green malted oats is only 10—15% of that of malted barley, but its liquefying power is twice as great. If potato flakes are mashed with malted oats or barley and the mash is fermented, the max. yield of EtOH from 100 g. of flaked potatoes is obtained with the addition of 6·25 g. of barley (malted), whereas 7·5 g. of oats are required. Hence, provided the germinative capacity of the oats is at least 90%, 8—10% of oats or barley will equally provide the max. yield of EtOH. Fermentations from mashes made with 1·50% of oats were infected and gave a wort of higher acidity, which, however, was partly due to the greater content of AcOH in the oats.

C. RANKEN.

Development of diastatic enzymes of malt and flour. Effect of certain salts, carbohydrates, and papain. S. JÓZSA and H. C. GORE (Ind. Eng. Chem., 1932, 24, 95—98).—NaCl and many other salts are able greatly to increase the diastatic liquefying power when added to flour–H_2O suspensions. The rate of increase reaches a max. of 60% with 0·5% of NaCl, the subsequent increase being slow and reaching 66% with 1·0% of NaCl. Addition of the salt to the filtered suspension has but little effect. Except when p_H is changed other salts give increases of 14·5—44·3%; KIO_3 (p_H 4·3) and K_3PO_4 (p_H 6·3) gave liquefying powers of 0·40 and 0·96, respectively. The diastatic power also is increased by NaCl, small amounts such as 0·04% (of the flour) giving an increase of 9·8%, the increase thereafter being linear until when 2% NaCl is present the increase is 105·2%. Higher flour–H_2O ratios likewise increased the liquefying power, a ratio of 1 : 2 giving an increase of 27·8%. Papain increases both liquefying and saccharifying powers, the rate of increase of the former being less when NaCl also is present. With plain flour–H_2O suspensions the saccharifying enzyme is released and then reabsorbed, but when NaCl is present the full diastatic power is released rapidly and no reabsorption occurs. Analogous increases in liquefying power were obtained with barley malt, and in this case carbohydrates were also found effective. H. J. DOWDEN.

Malt analysis and diastatic activity. F. E. B. MORITZ (J. Inst. Brew., 1932, 38, 179—186).—For the determination of extract the malt should be mashed in the 515-c.c. flask and the extract calc. on the dry malt. A trace of kieselguhr added to the filtered mash, which is then refiltered, permits the determination of the colour of hazy solutions of malt. The standard method for determining the diastatic power of malt should be supplemented by a determination, by the Lane and

Eynon method, of the amounts of apparent maltose in the hot and cold mashes of the malt. The difference between the vals. gives the amount of starch-conversion products formed by the diastatic action of the malt on its own starch during mashing at 65·5° for 1 hr. The val. expressed as a % of maltose of the starch-conversion products is termed the conversion power %, and varies from 65 to 80%. It diminishes markedly with rising mashing temp., but decreases only slightly during kilning. C. Ranken.

Sugar formation by diastatic enzymes of flour. H. C. Gore and S. Jozsa (Ind. Eng. Chem., 1932, **24**, 99—102).—The saccharifying power as determined by the rate of formation of reducing sugar (as maltose) has been found to follow closely the decline in polarisation. In a series of 11 commercial flours high liquefying and saccharifying powers were found, the average val. for the former being 0·804, and this was increased to 1·11 in the presence of 2·5% of NaCl. The average saccharifying power of the flour filtrates was 33·1° Lintner and 88·4° (L.) with 2% of NaCl. The average % increases in liquefying and saccharifying powers by addition of NaCl (2%) were 38 and 160, respectively. Papain and NaCl, alone or together, had no appreciable effect on the formation of sugar by malt-syrup enzymes. H. J. Dowden.

Organic acids of wines and natural or fermented fruit juices. I. Definition of acidity and determination of organic acids. L. Semichon and M. Flanzy (Ann. Agron., 1932, **2**, 199—214).—Total acidity is defined as the quantity of CO_2 liberated from excess of $CaCO_3$ per unit vol. of liquor. The sample is treated with $CaCO_3$, and after all reaction has ceased the mixture is boiled for 5 min. Residual $CaCO_3$ is determined by decomp. with acid, the CO_2 being trapped in aq. KOH, which is subsequently titrated with acid, using phenolphthalein. A. G. Pollard.

Sugars and dry extract in Malaga wines. J. M. Clavera and M. O. López (Anal. Fís. Quím., 1932, **30**, 140—144; cf. B., 1931, 218).—Genuine Malaga, like port, wines contain no sucrose. Slightly more glucose than fructose is present. The "dry extract" vals. are given by $k(d - d')$, where k has vals. of 2500—2680 corresponding to vals. of $d - d'$ (sp. gr. of wine — sp. gr. of distillate) of 0·05 – 0·11. R. K. Callow.

Overclarified wines. C. Luckow (Pharm. Zentr., 1932, **73**, 225—226).—The precautions necessary in the Möslinger process for the clarification of Fe-containing wines by treatment with $K_4Fe(CN)_6$ are discussed.

E. H. Sharples.

Consumption of heat in the manufacture of absolute alcohol. W. Falkenthal (Z. Spiritusind., 1932, **55**, 66—67).—Guinot's view that the use of latent heat from the slop to preheat the mash permits the dehydration portion of the process to be effected without consumption of steam is erroneous. With a combined distillation and dehydration plant at Kostheim, 145 kg. of steam per cu. m. of mash are required for the combination, and with another plant 110—120 kg. are required for distillation only. The difference allows the calculation that dehydration requires 200—300 kg. of steam per hectolitre of EtOH. C. Ranken.

Commercial amylolytic preparations and their varying activity. O. T. Rotini (Giorn. Chim. Ind. Appl., 1932, **14**, 117—121).—The liquefying and saccharifying actions of a no. of amylases of vegetable and animal origins have been investigated, the products being classified into groups in accordance with the vals. of the relative crit. energy of the reactions they promote. Digestion of malt amylase with papain increases the amylolytic activity and yields an amylase distinct from the original one, the relative crit. energy for saccharification being changed from 10,000 to 4000 g-cal. In contact with dissolved phosphate, such activated malt amylase may increase or decrease in activity, but its nature is markedly changed—probably by the action of a phosphatase. A no. of commercial amylase preps. for use in the textile industry have been examined and are arranged in order of (1) the proportions of starch they transform and (2) the proportions of maltose they yield. The results obtained render it possible, by a series of chemico-kinetic determinations, to fix the nature and origin of an enzyme prep. T. H. Pope.

Determining H_2O [in hops].—See I. **Spraying of hops.**—See XVI. **Diastatic enzymes in foods.**—See XIX.

Patents.

Direct distillation and rectification of wines with the double effect of the heating steam. E. A. Barbet (B.P. 369,623, 15.12.30).—The wines are distilled under vac. at low temp., whereas the continuous rectifier works at atm. pressure. EtOH vapour of 96·5° (Gay-Lussac) is produced at the top of the apparatus at approx. 79°, which furnishes more heat than is sufficient to operate the distilling column. The tubular heater is placed above the rectifier instead of at the base of the column, thus giving a direct influx into the top of the rectifier and facilitating the circulation of the vinasses and the heating EtOH vapour. C. Ranken.

Manufacture of alcohol [etc.] by fermentation. S. D. Wells, Assr. to Paper Mill Laboratories, Inc. (U.S.P. 1,823,014, 15.9.31. Appl., 11.5.27).—The liquor from straw or other fibrous plant material heated with an alkaline carbonate or sulphite until the material is softened, but not pulped, is made slightly acid before being fermented and distilled. The flow-sheet of a process, in which the products are EtOH, BuOH, and $COMe_2$, is given. C. Ranken.

Production of butyl alcohol and acetone by fermentation. F. J. Funk, Assr. to Eastern Alcohol Corp. (U.S.P. 1,822,139, 8.9.31. Appl., 1.10.20. Renewed 26.3.25).—A sterilised sugar mash containing maize protein is inoculated at 57—77° with a culture of *B. acetobutylicum* mainly in the spore form. It is then cooled to 30—40° and allowed to ferment.

C. Ranken.

Production of organic compounds [gluconic acid] by biochemical action. K. Bernhauer (B.P. 370,039, 1.1.31. Ger., 3.1.30).—A carbohydrate mash containing glucose and a germicide such as an org. Hg compound which will not check the enzymic action of the fungi is fermented with fungi of the *Penicillium* or *Aspergillus* type, or by bacteria of the *B. xylinum* group. The liquid is stirred with added $CaCO_3$, and the film of fungi or bacteria formed on the surface of the fermenting liquid is periodically raised on a sieve to facilitate the escape of CO_2. Ca gluconate is separated by filtration after evaporation of the liquid in vac., and is freed from traces of citrates and oxalates. C. Ranken.

Treating sulphite waste liquors.—See XII.

XIX.—FOODS.

Distribution of organic phosphorus in wheat. J. S. Andrews and C. H. Bailey (Ind. Eng. Chem., 1932, 24, 80—82).—Phytin, phospholipins, nucleic acid derivatives, and inorg. P compounds have been determined in various portions of the wheat berry. Phytin was extracted with 2% aq. HCl and titrated with $FeCl_3$, filtering just before the end-point; lipins were extracted with 4 : 1 $EtOH-Et_2O$ mixture, and P was determined by the molybdate method. The P vals. for bran (commercially pure) and germ (estimated 90—95% pure) were, respectively: total 1·646, 1·244; phytin 1·415, 0·597; lipin 0·028, 0·071; inorg. and nucleic acid derivatives 0·203, 0·576; extracted by 2% HCl 1·61, 1·004%. Pure commercial endosperm contained 0·35% ash, but the phytin content was too small to be detected. H. J. Dowden.

Diastatic enzymes in certain foods. H. C. Gore and S. Józsa (Ind. Eng. Chem., 1932, 24, 102).—A no. of cereal grains and vegetables have been found to possess considerable starch-liquefying power, varying from 0·10 for scarlet-runner beans to 5·75 for rye. In all cases except cow peas the presence of NaCl increased the liquefying power, the increase with potatoes being 0·26—0·42, and that for beans 1·15. Of the legumes, soya beans alone exhibited saccharifying power, and this was of the same order as that of barley and malt, but was not increased by NaCl. H. J. Dowden.

Detection of powders used as aids to bakery. L. Pap (Mühlenlab., 1932, 25—27).—Aids to baking capacity may be classified as those which do not affect colour, *e.g.*, persulphates, bromates, iodates, and perborates, and those which bleach, *e.g.*, NO_2, Bz_2O_2, Cl_2 containing NOCl, NCl_3 (cf. B., 1928, 585). The powders are often diluted with $MgCO_3$, K_2CO_3, K_2HPO_4, or starch. Modified Pekár tests are described for the presence in flour of the above powders and their diluents, in which benzidine, KI–starch, and $Pb(NO_3)_2$ are used as colorimetric reagents, and also for their selective decomp. when more than one is present in the same sample. J. Grant.

Rice and its by-products for feeding livestock. E. W. Sheets and A. T. Semple (U.S. Dept. Agric., Misc. Publ., 1931, No. 132, 9 pp.).—Analyses of milling products are recorded and their uses in various livestock rations described. A. G. Pollard.

Pasteurising and cooling milk in the vat to secure maximum creaming. J. C. Marquardt and A. C. Dahlberg (N.Y. State Agric. Exp. Sta., Tech. Bull. No. 189, Feb., 1932, 19 pp.).—The creaming of milk, usually affected by pasteurisation and cooling processes, was little, if at all, impaired if the heating and cooling processes were made sufficiently rapid. Cooling from 61·7° to 4·4° was best effected in 20 min. or less; the crit. period of cooling from 15·0° to 4·4° was $\ngtr$ 10 min. The holding period necessary while bottling a batch of milk adversely affected the creaming properties. E. B. Hughes.

Sampling milk for fat test at milk plants. J. C. Marquardt and H. L. Durham (N.Y. State Agric. Exp. Sta., Bull. No. 605, Feb., 1932, 13 pp.).—The fat content of milk samples taken immediately after "dumping" shows no difference, whether the milk is stirred or not. Cream adhering to churns is not a significant factor in affecting the fat content of milk after "dumping." Each plant should check its own method of routine sampling against the samples obtained after vigorous stirring. E. B. Hughes.

Dry solid content of milk. L. C. Janse (Chem. Weekblad, 1932, 29, 219—220; cf. de Waal, B., 1932, 127).—For fat contents $>$ 4·30% no formula is satisfactory, and the dry solids must be determined by experiment; for lower fat contents, the Codex formula and that of Moeslinger are satisfactory. S. I. Levy.

Fat percentage of milk as affected by feeding milk to dairy cows. N. N. Allen (J. Dairy Sci., 1932, 15, 132—141).—The feeding of whole milk or cream, but not skim milk, to cows in addition to the customary ration increased the % and total production of milk fat to an extent which was $<$ 20% of the amount fed. No injurious physiological effects resulted from the use of 40 lb. of whole milk per day. A. G. Pollard.

Supplemental value of fish meal as a feed for dairy cattle. M. H. Campbell (Vermont Agric. Exp. Sta. Bull., 1931, No. 333, 19 pp.).—Fish meal was comparable with linseed oil meal on a basis of protein and total digestible nutrients required per 1 lb. live-wt. increase in calves. There was a slight tendency for fish meal to lower the % of butter fat when fed to milch cows, but differences in milk or fat production per unit digestible protein or total digestible nutrient between fish and linseed oil meals were not significant. A. G. Pollard.

Food value of frozen evaporated milk. E. A. Louder and L. S. Smith (J. Dairy Sci., 1932, 15, 113—115).—No loss of food val. for rats resulted from the freezing of evaporated milk. H. G. Pollard.

Cheese spreads. H. L. Templeton and H. H. Sommer (J. Dairy Sci., 1932, 15, 155—162).—The desirable spreading quality of cream- and soft-cheeses is associated with high H_2O and moderately low fat contents and p_H 5·8—6·1. A. G. Pollard.

Relation of hydrophilic colloids to hardiness in the apple as shown by the dye-adsorption test. S. Dunn (New Hampshire Agric. Exp. Sta. Tech. Bull., 1930, No. 44, 18 pp.).—The dye-adsorption method is insufficiently consistent for use as a rapid test for hardiness but, used in conjunction with freezing tests, serves to differentiate unknown varieties if a no. of determinations are made. The hydrophilic colloid content is not the only factor responsible for hardiness in apples. A. G. Pollard.

Increasing the colour of cranberries after removal from the vines. B. R. Fudge (New Jersey Agric.

Exp. Sta. Bull., 1930, No. 504, 24 pp.).—Attempts to induce colouring of picked cranberries by treatment with C_2H_4 were all negative. No effect on the red anthocyanin pigment was observed, but the chlorophyll was killed. Changes in the sugar and acid contents and in respiratory activity of the treated berries were small.
A. G. Pollard.

Sulphur dioxide injury of tomatoes. G. B. Ramsey (Phytopath., 1932, **22**, 267—268).—Tomatoes fumigated with SO_2 during transit showed considerable injury around the stem scar or other surface wounds.
A. G. Pollard.

Significance of Fiehe's reaction in the examination of honey. H. W. de Boer and E. D. Wertheim (Chem. Weekblad, 1932, **29**, 254—260).—Fiehe's reaction for the presence of hydroxymethylfurfuraldehyde cannot distinguish natural from artificial honey, since the former after keeping at raised temp. is found to contain the furfuraldehyde derivative, in quantities varying with the temp. and time of heating. Results of determinations by the volumetric and gravimetric methods are not in agreement. S. I. Levy.

Detection of added lecithin in chocolate products. W. O. Winkler and J. W. Sale (J. Assoc. Off. Agric. Chem., 1931, **14**, 537—547).—Several methods for extracting and determining lecithin in cacao and similar products have been investigated. Results with control mixtures show that such amounts as are added to increase chocolate liquidity (0·3%) can be closely calc. The authors found no material reduction in the solubility and amount of natural cacao phosphatide as a result of typical roastings (100—180°). The % lecithin found in 10 varieties of cacao (ground mass and nib), as determined by the preferred method, was: raw nibs 0·26—0·46 (in nibs), 0·47—0·88 (in fat); roast nibs 0·25—0·39 (nibs), 0·47—0·72 (fat). The average for Accra nibs was low, and that for Sanchez and Java (Criollo) high. 0·1—0·13% lecithin was found in cacao husk, with a proportion in the fat much higher than for nib fat. Cacao-lecithin vals. already recorded by Jackle, Fincke, Rewald, and others are evidently much too low owing to imperfect extraction. A commercial lecithin was found to contain 58·5—59·5% phosphatide, and a milk powder 0·23%. The authors obtained max. vals. by extracting with light petroleum followed by EtOH. Thus 15—20 g. of chocolate etc. are given a rotary shake with 100 c.c. of light petroleum, separated by centrifuge and decantation, and the residue is digested with 30—35 c.c. of warm EtOH (95%), cooled, and 60—70 c.c. of light petroleum are added. The tentative egg-lipin method is then followed (*ibid.*, 1926, **9**, 58). Solvents are distilled off below 50°, the residue is taken up by $CHCl_3$, the solution filtered through cotton, saponified with 5 c.c. of alcoholic KOH, evaporated to dryness, and the soaps are dissolved in H_2O. After acidification with HNO_3 (1 : 3) and keeping, the fatty acids are filtered off and P is determined in the acid aq. liquor after evaporating to dryness (see A.O.A.C. Methods of Analysis, 1925, 3, 7, 10, and 322). The factor (org. P found × 26) is used for conversion to lecithin. Light petroleum extraction followed by EtOH also gave high vals., as did 10 hrs.' extraction with abs. EtOH in a Soxhlet apparatus (except with commercial lecithin). Light petroleum alone gave low vals. with chocolate, but is suitable for cacao butter. The pptn. of lecithin from $CHCl_3$ solution by chilled $COMe_2$ and Et-alcoholic $MgCl_2$ etc. gave figures much too low. H. R. Jensen.

Relative milling and baking quality of Western Canadian spring wheat varieties. J. G. Malloch, W. F. Geddes, and R. K. Larmour (Canad. J. Res., 1932, **6**, 333—361).

CNS no. of lard. Rice oil. Fish oils.—See XII. **Determining plant ash constituents, and Mn in plant materials.**—See XVI. **Effect of salts on diastatic enzymes. Amylolytic preps.**—See XVIII.

Patents.

Treatment of cereals for animal and human consumption. D. I. Thomas (B.P. 369,556, 20.11.30).—The grain is crushed into flakes by close-set rollers, and then passed through a steriliser at 100°, to destroy ova and larvæ. E. B. Hughes.

Pasteurisation of milk. C. S. Bedford (B.P. 369,877, 28.10.31).—Milk for household use is pasteurised by heating in a vessel placed in a boiling-H_2O bath. When pasteurising temp. is reached this is maintained for 30 min. by inserting an air-jacket between the vessel and the boiling H_2O. E. B. Hughes.

Vitamin fruit compositions. W. W. Triggs. From Tropical Vitamin Co., Inc. (B.P. 369,633, 23.12.30).—Pulped fruit and sugar are blended with vitamin concentrates in varying proportions to produce confections which retain their vitamin properties when sealed from contact with air, *e.g.*, by means of a coating of chocolate, sugar, etc. E. B. Hughes.

Drying grain etc. Vac. evaporator [for milk]. Making emulsions.—See I.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Further development of diacolation. H. Breddin (Pharm. Ztg., 1932, **77**, 435).—The faults of diacolation described by Ihbe (B., 1932, 400) are due to the use of vessels which are too short. Complete extraction of the drug and quant. recovery of the menstruum are dependent on the correct dimensions of the apparatus. The uses of EtOH and H_2O as menstrua are compared.
E. H. Sharples.

Viscosity of pharmaceutical syrups. E. Canals and R. Baumelou (J. Pharm. Chim., 1932, [viii], **15**, 345—348).—The influence of variations of temp., concn. of sugar, and addition of EtOH, gum, salts, and various tinctures on the viscosity of a simple syrup are recorded.
E. H. Sharples.

Evaluation of solutions of potassium and ammonium acetate. S. von Bari (Arch. Pharm., 1932, **270**, 201—202).—Aq. KOAc is evaporated to dryness, and the residue dissolved in abs. EtOH and treated with 0·1N-$AgNO_3$ in EtOH; after filtration the excess $AgNO_3$ is determined. Aq. NH_4OAc is treated with EtOH, anhyd. Na_2SO_4, and 0·1N-$AgNO_3$ in EtOH, and the excess of $AgNO_3$ similarly determined. AgOAc is insol. in EtOH. R. S. Cahn.

Assay of spirit of ethyl nitrite. W. F. Reindollar and J. C. Krantz, jun. (J. Amer. Pharm. Assoc., 1932,

21, 136—138).—A preliminary comparison of the results obtained by both the argentometric and gasometric methods indicate that they are in reasonable agreement, the former giving the slightly higher results. The vapour tension of the reaction mixture in the latter method has been determined. E. H. SHARPLES.

Determination of some local anæsthetics. I. Novocaine and anæsthesine. J. FIJALKOV and M. JAMPOLSKA (Arch. Pharm., 1932, **270**, 203—205). Rapid and accurate bromometric methods of determining these two anæsthetics in H_2O are described. R. S. CAHN.

Use of " nipasol " and " nipagin " for preservation of sterile solutions for injection. W. BONDE (Pharm. Zentr., 1932, **73**, 273—276).—The bactericidal properties and the compatability towards various substances of " nipasol " and " nipagin " (Pr and Me *p*-hydroxybenzoates) and their mixtures were investigated. F. O. HOWITT.

Standardisation and stabilisation of ergot preparations. VII. E. E. SWANSON, C. E. POWELL, A. N. STEVENS, and E. H. STUART (J. Amer. Pharm. Assoc., 1932, **21**, 229—239).—Three methods of assay by the epinephrine-reversal method are further discussed (cf. B., 1930, 217) and compared with the cock's-comb method. The latter is the less accurate and more costly of the two and the epinephrine-reversal method should be considered as supplementary to the cock's-comb method in a determination of the potency. Smith's chemical (colorimetric) method gives correlative results with the epinephrine-reversal method. An ergot drug containing 0·05—0·10% of histamine, tyramine, or choline apparently has no synergistic or antagonistic effect on the physiological assay of the ergot alkaloid. The p_H of fluid extracts of ergot appears to influence the stability for at least 6 months, providing they are not exposed to air, but if the extracts are frequently exposed to air or excessive heat the p_H has no influence on the rate of deterioration. In some fluid extracts a p_H of about 3·0 appears to be the most suitable in preventing deterioration. E. H. SHARPLES.

Evaluation of ergot. W. KÜSSNER and P. WOLFF (Pharm. Ztg., 1932, **77**, 342—343).—The powdered drug (25 g.) is shaken for 1 hr. with 120 g. of $CHCl_3$; 60 g. of the clear $CHCl_3$ extract are evaporated, and the residue, dissolved in 15 c.c. of Et_2O, is filtered into a 25-c.c. cylinder graduated in $\frac{1}{10}$ths c.c. With the washings, the filtrate is made up to 24 c.c. and 1 c.c. of a 5% solution of picric acid in C_6H_6 is added. The liquids are carefully mixed, set aside for 24 hr., and the height of the ppt. is measured. The colour of the ppt. varies from yellow (fresh) to dirty green (old) according to the age of the ergot, and the vol. of the ppt. is directly proportional to the alkaloid content (as determined by a modified D.A.B. VI method). E. H. SHARPLES.

Tincture and fluid extract of digitalis. L. W. ROWE and W. L. SCOVILLE (J. Amer. Pharm. Assoc., 1932, **21**, 160—163).—The stability of the tincture is apparently increased by sterilisation of the leaves with hot EtOH. Heat and exposure during concn. and the acidity all affect the stability of the fluid extract; addition of HCl to give p_H about 4·0 appeared to favour stability, but H_3PO_2 was unsuitable. The only preps. (of tinctures and extracts) which showed no loss in six months were those containing NaOAc and AcOH, but these had a low initial assay (possibly due to the AcOH content). E. H. SHARPLES.

Biological assay of digitalis tinctures prepared by different [official] methods. A. STASIAK and B. ZBORAY (Arch. Pharm., 1932, **270**, 224—231).—Abs. EtOH does not extract all the glucosides, but other methods give similar extracts. Determinations on cats and frogs do not give parallel results. R. S. CAHN.

Biological assay of digitalis preparations containing glycerin. J. W. HAMNER (Dansk Tidsskr. Farm., 1932, **6**, 65—74).—A 1% glycerin solution has no effect on a perfused frog's heart; injection of a 35% glycerin solution intravenously does not produce a concn. of 1% in the blood, so that the presence of glycerin in such preps. has no pharmacological significance. H. DAVSON.

Santonin: its solubility [in commercial benzene] and extraction [from benzene solution by sodium carbonate solutions]. J. COUTTS (Pharm. J., 1932, **128**, 262—263).—The solubility of santonin, m.p. 171°, in commercial, crystallisable C_6H_6, d^{19} 0·87915, at 19° is 4·0207 g. per 100 g. An 8% aq. solution (wt./vol.) of $Na_2CO_3,10H_2O$ extracts no santonin from a C_6H_6 solution; a 15% solution extracts an appreciable amount of santonin, apparently by combining with it, because it cannot be re-extracted with C_6H_6. E. H. SHARPLES.

Nicotine and the denicotinisation of tobacco smoke. I. Discussion of the work of Hahn and Ehrismann. A. VAN DRUTEN. **Reply to above.** O. EHRISMANN and M. HAHN (Z. Hyg., 1932, **113**, 754—755, 756—757).—I. The nicotine content of tobacco smoke is dependent on the rate of passage of air and method of manufacture of cigars. The efficiency of the Bonicot process is discussed (cf. B., 1932, 48). A. G. POLLARD.

Determination of morphine in opium. N. RUSTING (Pharm. Weekblad, 1932, **69**, 433—441; cf. B., 1931, 905).—Improvements in the CaO–Mn method are described. The Ca meconate which is generally present in the alkaloid obtained may be separated by extracting the impure product with MeOH, in which morphine is readily sol. No Ca meconate is present if the mixture is not set aside after the CaO treatment; the salt remains in the filtrate, from which it separates only slowly on keeping. The detailed manipulation is described. S. I. LEVY.

Iodometric determination of the total alkaloids of cinchona. F. STERNON (Bull. Soc. chim. Belg., 1932, **41**, 85—94).—Wattiez's method (Bull. Acad. roy. med. Belg., 1926, 748) is easier and more rapid than Dubreuil's (Bull. Sci. Pharm., 1928, 634). Details are given for obtaining colourless solutions by the former method. In the latter 0·01*N*-$Na_2S_2O_3$ gives more accurate results than a 0·1*N* solution. R. S. CAHN.

Influence of the alkaloidal purification procedure in assay of alkaloidal drugs. G. B. EWE (J. Amer. Pharm. Assoc., 1932, **21**, 108—111).—Incomplete purification of the initial immiscible solvent extract in the assay of alkaloidal drugs may lead to inaccurate results owing to contamination of the residue with Ca, Mg, and NH_4 compounds, which have titration vals. Replacement of aq. NH_3 by Na_2CO_3 or $NaHCO_3$ is unsatisfactory, due to the low efficiency of the latter in liberating alkaloids. The U.S.P. alkaloidal-purification process may still give residues containing these impurities, but not in any significant amount. Assays of various drugs, using both the "short" and official methods, are given. E. H. SHARPLES.

Stabilisation of solution of arsenious and mercuric iodide, U.S.P. X. W. J. HUSA (J. Amer. Pharm. Assoc., 1932, **21**, 211—216).—Adjustment of the p_H to 6·0—8·0 (*e.g.*, by addition of 9·0 g. $NaHCO_3$/litre) greatly increases the stability of Donovan's solution, U.S.P. X. Both the above and the modified solution (cf. B., 1930, 585), which avoids the use of AsI_3, showed no deterioration after 7 months, whereas the U.S.P. X solution lost 20% of its activity. E. H. SHARPLES.

Quality of spearmint oil produced in Florida. B. V. CHRISTENSEN and L. D. HINER (J. Amer. Pharm. Assoc., 1932, **21**, 147—149).—The oil, produced from plants (*Mentha spicata*, L.) grown during 1929—30, had: yield 0·164—0·590% (lb./acre, 4·6—63·14), d^{25} 0·9215—0·9253, n^{20} 1·4825—1·4897, α^{25} —56·09° to —59·075°, carvone 69·5—80·2% (variations due to seasonal differences). E. H. SHARPLES.

Colloidal AgI.—See VII. **Vitamins in cod-liver oil.**—See XII. **Amylolytic preps.**—See XVIII. **Detection of lecithin.**—See XIX. **Toxicology of Hg and Pb.**—See XXIII.

PATENTS.

Manufacture of urea and thiourea derivatives [carbamides and thiocarbamides] of the aromatic, hydroaromatic, and heterocyclic series. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 365,640, 23.10.30 and 1.5.31).—An aromatic, hydroaromatic, or heterocyclic amine carrying an aminoalkyl side-chain is converted into the carbamide or thiocarbamide; or an aminoalkyl side-chain is introduced into an aromatic, hydroaromatic, or heterocyclic carbamide or thiocarbamide. The products are valuable against "abortus bang." Examples are products from *p*-aminophenyl β-diethylaminoethyl ether and PhNCO (B,HCl, m.p. 190°), PhNCS (B,HCl, m.p. 156—157°), $COCl_2$, KCNO (m.p. 101°), or allyl thiocyanate; *N*-2-pyridyl-*N'*-*p*-hydroxyphenylthiocarbamide, m.p. 218°, and β-diethylaminoethyl chloride; 3-nitro-4-aminophenyl β-diethylaminoethyl ether, reduced, and converted into the cyclic thiocarbamide with K xanthate; *N*-*p*-hydroxyphenyl-*N'*-*cyclo*hexylthiocarbamide and β-diethylaminoethyl chloride (B,HCl, decomp. 210—212°). C. HOLLINS.

Manufacture of solutions of anæsthetics. I. G. FARBENIND. A.-G. (B.P. 369,994, 19.12.30. Ger., 19.12.29).—Aq. solutions of anæsthetic salts are agitated with a free anæsthetic base, which may be the same as or different from the base of the salt. The solution separated from the excess of base has p_H about 7·3. Solutions of quinine are excluded. E. H. SHARPLES.

Preparation of [cardio-active] crystalline glucosides from digitalis. CHEM. FABR. VORM. SANDOZ (B.P. 370,344, 21.10.31. Ger., 13.4.31. Addn. to B.P. 357,926; B., 1931, 1122).—The product prepared according to the prior patent is separated into 3 cardio-active glucosides, *A* [$[\alpha]_D^{20}$ +24·5° (4% in dioxan) or +38·7° (1·88% in 95% EtOH), sol. in 225 pts. $CHCl_3$ and 16,000 pts. of H_2O], *B* [$[\alpha]_D^{20}$ +34·8° (1·91% in EtOH), sol. in 15 pts. of MeOH], and *C* [$[\alpha]_D^{20}$ +33·4° (1·93% in EtOH), sol. in 1500 pts. of $CHCl_3$], by fractionation, *i.e.*, it is dissolved in a non-miscible org. solvent containing an org. solvent miscible with H_2O and, after addition of H_2O, the layers are separated and the process is repeated with each layer until the properties of the glucosides obtained are const. Toxicity and hydrolysis experiments are given. E. H. SHARPLES.

Treatment of tobacco material. R. G. MEWBORNE, Assr. to CONSUMERS' TOBACCO CO., INC. (U.S.P. 1,823,554, 15.9.31. Appl., 26.12.25).—Previously wetted tobacco, with or without addition of alkali and in contact with a nicotine solvent, is heated and cooled intermittently so that nicotine and a portion of the H_2O are volatilised and condensed. Apparatus is specified in which the tobacco is fed continuously through a rotary heating chamber in a countercurrent direction to the solvent, from which the nicotine is continuously recovered. E. H. SHARPLES.

Obtaining a hormone. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 369,929, 22.12.30).—The urine of pregnant mares is subjected to hydrolysis before extraction by the usual methods. E. H. SHARPLES.

[Therapeutic] composition of matter containing mercury. M. PACELLA (U.S.P. 1,822,709, 8.9.31. Appl., 18.4.29).—A solution of $HgCl_2$ in EtOH is mixed with an alcoholic solution of KI and I and the ppt. is dried to a pink granular powder which is treated in aq. solution with NaI to form a colloidal suspension. E. H. SHARPLES.

Production of organic gold derivatives. BOOTS' PURE DRUG CO., LTD., and F. O. HOWITT (B.P. 365,760, 6.1.31).—Glutathione is converted into a relatively non-toxic Au derivative by treatment with a solution of a Au salt ($NaAuCl_4$), in presence of $NaHSO_3$ if desired. The product separates out at 0° or on addition of EtOH. C. HOLLINS.

[Radium-]emanation seed. A. CERVI, Assr. to RADIUM EMANATION CORP. (U.S.P. 1,823,239, 15.9.31. Appl., 16.1.26).—A metal sheath containing Ra emanation is coated with a material (*e.g.*, agar-agar) which eliminates or reduces the secondary β-radiation. E. H. SHARPLES.

Stabilisation of Et_2O.—See III. **Gnat repellant.**—See XXIII.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Rapid determination of silver in emulsions or images in photographic plates and papers. A. SEYEWETZ (Bull. Soc. Franç. Phot., 1931, **18**, 232—236).—The Ag salts are reduced to Ag by development and the emulsion is washed thoroughly and dried. The Ag is then converted into AgCl with benzoquinone and HCl.

The Ag is determined by titration of the HCl before and after the reaction. A blank determination must be made of the amount of HCl absorbed by the gelatin and paper. (Cf. Baines, J.S.C.I., 1930, **49**, 111 T.)

J. Lewkowitsch.

New use for Aniline Black.—See IV. **Cellulose films etc.**—See V. **Colloidal AgI.**—See VII.

XXII.—EXPLOSIVES; MATCHES.

Storage of nitrocellulose. M. J. Riemersma (Chem.-Ztg., 1932, **56**, 233—234).—Data are given showing that collodion wool, as prepared and stored by modern methods, cannot be regarded as dangerous in the sense of the more highly nitrated products manufactured for explosives. E. S. Hedges.

Patent.

Pyrotechnic device. H. Reihlen, Assr. to M. M. Adler (U.S.P. 1,823,376, 15.9.31. Appl., 19.3.27).—A compound of P and S, *e.g.*, P_4S_3, in cryst. form is introduced into an aq. mixture of $KClO_3$ and $KClO_4$ to which has been added a mixture of $MgCl_2$ and MgO ("Sorel cement"), the product being formed into suitable shapes and dried. W. J. Wright.

XXIII.—SANITATION; WATER PURIFICATION.

Antimosquito sprays. R. L. Holt and J. H. Kintner (Philippine J. Sci., 1932, **47**, 433—438).—Laboratory tests and large-scale experiments in hospital wards showed that a $CHCl_3$ (120 c.c.) extract of pyrethrum (60 g.) diluted with kerosene (to 1000 c.c.), sprayed near the ceiling so as to produce a mist, was highly toxic to mosquitoes and other insects and innocuous to man. E. Lewkowitsch.

Fumigation of the immature stages of clothes moths and carpet beetles with a mixture of ethylene dichloride and carbon tetrachloride. G. W. Herrick and G. H. Griswold (J. Econ. Entom., 1932, **25**, 243—248).—A 3 : 1 mixture of ethylene dichloride and CCl_4 (by vol.) used at the rate of 2 fl. oz. per 5 cu. ft. was effective against both eggs and larvæ of the clothes moth and the larvæ of carpet beetles.

A. G. Pollard.

Use of powdered hydraffin active carbon for water purification. J. C. Liddle (Chem. and Ind., 1932, 337—338).—The filtration of H_2O through beds of granular active C removes unpleasant taste and odour, reduces colour, and removes the excess of Cl_2 used in the purification treatment. Powdered active C produces the same results when 2—20 p.p.m. are agitated with pre-purified H_2O for 20 min.—2 hr. The C is removed by filtration through rapid filters, the deposit of C being periodically removed by back-flushing. D. K. Moore.

Iodometric determination of active chlorine in water containing nitrites and ferric salts. B. A. Skopintzev and F. J. Varfolomejeva (Z. anal. Chem., 1932, **88**, 97—107).—The influence of nitrites and Fe^{III} salts, the presence of which vitiates the results obtained by the usual method of determining active Cl, can be eliminated if the p_H of the liquid is adjusted to 5·0—5·5 by means of an acetate buffer. The concn. of nitrites or Fe^{III} salts must not exceed 0·5 mg. N or 5·0 mg. Fe per litre, respectively. Details are given. F. L. Usher.

Zinc in [drinking-]water supplies. E. Bartow and O. M. Weigle (Ind. Eng. Chem., 1932, **24**, 463—465).—Harmful effects ascribed to Zn in drinking H_2O were not confirmed as due to this cause by a survey of natural waters which contained up to 50 p.p.m. Zn and were regularly used without known ill-effect by men and cattle. When rats were given pure $ZnSO_4$ in their drinking H_2O in concns. up to 1000 p.p.m. all the animals survived the 40-day period of the test though the gain in wt. decreased with increasing amounts of Zn. The permissible limit of the metal in drinking H_2O (5 p.p.m.) is considered satisfactory, but pure Zn might be used with advantage for galvanising the mains.

C. Jepson.

Determination of dust in air.—See I. **Resistance of cement to sea-water.**—See IX. **Corrosion of Fe in waterworks.**—See X. **Biochemical O demand of Na soaps.**—See XII.

Patents.

Disinfectant. O. Gerngross and K. Rülke, Assrs. to Kali-Chemie A.-G. (U.S.P. 1,823,095, 15.9.31. Appl., 19.10.28. Ger., 20.10.27).—Aq. thiocyanate solutions adjusted to $p_H \nless 10$ by addition of alkaline substan[illegible] are employed. E. H. Sharples.

Preparation for repelling gnats and similar insects. A. Schmidt, Assr. to Winthrop Chem. Co. (U.S.P. 1,821,036, 1.9.31. Appl., 20.9.27. Ger., 20.9.26).—A mucilage prepared from carragheen moss, tragacanth, vaseline, etc. is mixed with at least 8% of one or more essential oils from the cedar, juniper, templin, or thuja oil group. E. H. Sharples.

Softening of water. C. P. Hoover (U.S.P. 1,823,605, 15.9.31. Appl., 24.1.30).—The H_2O is treated with 25—50 p.p.m. of $Ca(OH)_2$ in excess of the amount required to combine with the free and half-bound CO_2 and to ppt. Mg. After settling, the supernatant H_2O is recarbonated with CO_2, treated with approx. 1500 p.p.m. of $CaCO_3$, and re-settled. The $CaCO_3$ thus added is claimed to act as a stabiliser and to avoid the necessity for close supervision when re-carbonating, so that the carbonate hardness is reduced to approx. the solubility limit of $CaCO_3$ and $Mg(OH)_2$. C. Jepson.

Instruments for determining the nature and quantity of planktonic organisms present in sea-water. A. C. Hardy, and V.D., Ltd. (B.P. 369,715, 5.2.31).—An open-ended cylinder fitted with a disc of fine material is adapted to be towed behind a boat so that any plankton organisms present may be collected. Means for stabilising the instrument and keeping it at the desired depth in the water are described. A continuous record of the plankton may be secured by replacing the disc by a strip of similar material which is slowly drawn across the orifice by rollers.

C. Jepson.

Boiler-H_2O.—See I. **Tar oils.**—See II. **Cellulose waste liquors.**—See XII.