BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

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Transfusion of matter from one solid to another under the influence of heat. New factor in the process of metamorphism. F. D. ADAMS (Canad. J. Res., 1930, 2, 153-161).—A brick (A), composed of synthetic clinker made from dolomitic magnesite and mill scale (and hence rich in lime and ferric oxide), which had been fired side by side with one (B) composed of deadburned Austrian magnesite, was found to have bent over under the influence of heat and its own weight, so that one edge (which remained sharp and unflattened) touched the brick B, which remained unaltered in shape. By analysis of successive portions of brick B situated radially from the line of contact it was shown that a considerable alteration in composition had occurred, three well-defined zones (a, b, and c, the last being that immediately around the line of contact) of different composition being observed. The average percentages of SiO,, Al_2O_3 , Fe_2O_3 , and CaO in the original brick A, the zones c, b, and a, and in the original brick B were, respectively : 2.4%. Thus the silica, alumina, and lime in the altered portion of brick B increase progressively on receding from the line of contact from which the transfused elements came, whilst the amounts of ferric oxide (and magnesia) increase proportionately in the opposite direction. Furnace conditions suggest that the transfusion took place between two solid bodies, and that the period of contact was probably not greater than 20 hrs. The results are considered in the light of those of Hansen and Brownmiller (A., 1928, 480) and Greig (A., 1928, 132), and their bearing on metamorphosis of rocks is discussed. J. W. BAKER.

Pulverised fuel for the small unit-shell-type boiler, metallurgical and chemical processes. H. W. HOLLANDS and E. C. LOWNDES (J. Inst. Fuel, 1930, 3, 225-230).—The use of powdered coal in various industrial processes such as cement and macadam manufacture, and in chemical works, is described.

C. B. MARSON.

Rapid bulk-sample dryer. T. H. HOPPER (Ind. Eng. Chem. [Anal.], 1930, 2, 198).—A motor-driven blower having a capacity of about 300 cub. ft. of air per min. drives air through a baffle box which has an opening in the top on which are placed a number of screen-wire trays containing the material to be dried. For drying wet and sticky substances a special box with glass plates is used. Diced, fresh potatoes, sugar beets, and mangel beets can be dried with little, if any, oxidase reaction, and the dried, ground sample is almost white. Lean meat can be dried to an extent which permits grinding in 20 hrs. E. H. SHARPLES. Graphical rectifying-column calculations. T. BAKER and J. S. STOCKHARDT (Ind. Eng. Chem., 1930, 22, 376—377).—A method is explained by which the number of plates required in a fractionating column may be determined. The method, which is a modification of that due to McCabe and Thiele (cf. *ibid.*, 1925, 17, 605), requires experiments to be made in order to determine the efficiency of the fractionation of the plates employed. H. INGLESON.

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Large glass distillation apparatus. D. F. OTHMER (Ind. Eng. Chem., 1930, 22, 322—325).—Distillation apparatus is described in which corks and rubber stoppers are eliminated by the use of flanged glass tubes with rubber-cushion backing-rings. The largest column mentioned measures 3 in. by 72 in., and is suitable for use with 22-litre flasks. H. INGLESON.

Temperature changes in the formation of solutions. K. M. WATSON and O. L. KOWALKE (Ind. Eng. Chem., 1930, 22, 370-376).—A method is explained by which the quantities of heat associated with the adiabatic dissolution of unit mass of solute in an infinite mass of solutions at various concentrations and temperatures may be calculated from thermochemical data. Graphs are given from which the temperature attained in the adiabatic formation of solutions may be predicted. Experiments have been made in which crystals of sodium carbonate decahydrate having thermocouples in their centres were suspended in solutions of sodium carbonate of different concentrations and temperatures. Measurements of the temperature difference between the crystal and the solution were difficult to duplicate when the crystal was stationary or when it was moved through the solution at a velocity of 15 m./min.

H. INGLESON.

Determining air flow in agitation problems. H. L. KAUFFMAN (Chem. Met. Eng., 1930, 37, 178-180). -For a depth of liquid of 9 ft. moderate agitation requires 0.65 cub. ft. of air/min./sq. ft. of cross-sectional area, complete agitation $1 \cdot 3$ cub. ft., and violent agitation 3.1 cub. ft. Charts are given showing (1) the relation between linear velocity and volume in pipes of different diameters ; (2) the pressure loss due to friction per 100 ft. of pipe length of various diameters relative to volume passing, and estimates are given of lengths equivalent to elbows in respect to friction; (3) the volume of flow through orifices of various diameters under pressures up to 10 lb./in.² These data require correction by a constant varying with the form of the orifice if this is not circular. The degree of agitation in any tank depends on both the quantity of air and the velocity with which it leaves the orifices. It increases more rapidly than the rate of air flow. The same

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

quantity of air gives better agitation with deep tanks than with shallow tanks. C. IRWIN.

Is smoke responsible for property damage? R. D. MACLAURIN (Chem. Met. Eng., 1930, 37, 157—159). —Although the filtration of smoke particles at the source is a more rational procedure than the filtration of air to protect merchandise and internal decorations, the latter procedure is necessary at present. Photomicrographs show the effect of smoke particles (diam. $0 \cdot 1$ —50 μ) on silk etc., and the comparative air-cleaning efficiency of oil filters, water washers, and fabric filters. The first two are shown to remove dust, but to fail in the separation of the smaller particles from smoke. C. IRWIN.

Tentative standards (American Society for Testing Materials, 1929, 901 pp.).

Heat-balance of a boiler plant. STEIGER.—See II. Drying of pulp etc. SHERWOOD. Heat economisers for drying pulp etc. ADAMS and COOPER.—See V.

PATENTS.

Fuel-burning systems. Associated Electrical INDUSTRIES, LTD., Assees. of J. V. BREISKY and T. DRAPER (B.P. 314,757, 1.7.29. U.S., 29.6.28).-A fuelburning system, e.g., an oil-fired central-heating installation, is operated automatically by electrical controls. The fuel-ignition device consists of a transformer and spark gap, and the fuel-feeding means is controlled by an electrical discharge tube which is coupled to the spark-gap circuit in such a manner that the fuel and air are fed to the burner only when a spark capable of igniting the mixture is produced. The supply of energy to the ignition device is controlled by a thermostatic Another thermostatic switch heated by the switch. combustion gases controls a time-delay relay which, in turn, controls the fuel-feeding means, so that the supply of fuel is cut off a predetermined time after the thermostatic switch ceases to be heated. A. B. MANNING.

Heat-treating furnaces. H. M. ROBERTSON (B.P. 327,486, 23.1.29).—A tunnel kiln is constructed with a heating zone of the muffle type; the fuel is ignited at the front ends of two side chambers and the flame passes longitudinally through them then up to a common roof chamber where combustion is completed while the gases travel from back to front. The cooling zone is provided with a separate air current through a [metallic] casing forming the roof. A chain-conveyor is used to transport the goods, the return run being through a lower tunnel well insulated from the goods tunnel.

B. M. VENABLES.

Furnaces. J. A. HOPE (B.P. 327,532, 1.3.29).—A form of construction for a fire-grate and -bridge is described. Longitudinally the grate slopes upwards each end from a level centre part. Transversely it is divided into three sections each of which may be convex on the top. B. M. VENABLES.

[Composite linings for] furnaces. CARBORUNDUM Co., LTD. From CARBORUNDUM Co. (B.P. 327,390, 1.1.29). —A furnace wall or roof is composed of an inner lining or veneer of silicon carbide or similar material supported on a backing of bricks which are comparatively poor heat conductors. The veneer bricks are held in place by self extensions at the back, several methods of construction of which are given. Forms of suspended arches are also described. B. M. VENABLES.

Kilns. J. W. and S. JONES (B.P. 327,396, 2.11.28).— In a continuous, multi-compartment kiln, each compartment has a furnace each side, one, with a solid bottom, being higher than the other and having the passage for transfer of air (or gases) underneath it; this passage emerges under the firebars of the lower furnace in the next compartment. B. M. VENABLES.

Heat-exchange apparatus. SUPERHEATER Co., LTD., Assees. of COMP. DES SURCHAUFFEURS (B.P. 308,966, 26.2.29. Fr., 2.4.28).—Forms of fluid heaters, in which steam or other condensable fluid is blown through short inner tubes into larger blind tubes which are surrounded by the fluid to be heated, are described. The apparatus is wholly or partly inclined to promote discharge of condensate and to permit the outer fluid to make contact with the upper parts of the tubes first.

B. M. VENABLES.

Heat exchangers. MILLIKEN BROS. & BLAW-KNOX, LTD., Assees. of W. DYRSSEN (B.P. 304,755, 10.12.28. U.S.; 26.1.28).-An exchanger of the reversing regenerative type is provided with at least three heat-absorbing masses in separate chambers which have metal plates in or surrounding the walls to prevent leakage. Each chamber is provided with two pairs of inlet and outlet valves, which are separate for the two fluids (e.g., gas and air), and these pairs of valves are operated intermittently, slowly, and out of phase (preferably by a common cam-shaft) so that the resistance to flow of either fluid is constant but not necessarily equal for the two fluids, i.e., two pairs of valves partly open must have the same resistance as one pair fully open. To get this result the valves are arranged to move slower when they are near their seats than when they are some distance open. Since in practice it is convenient to have a strong forced draught for the air and a weak induced draught for the gases, it may be arranged that there are more chambers open to the latter than to the former; this can be done with a minimum of four chambers, typical positions in the cycle being as follows : gas-two pairs partly and one fully open ; air-one pair fully open. Later, when the cam-shaft has rotated a further 135°, the position would be : gas-two pairs fully open ; air-B. M. VENABLES. two pairs partly open.

Heat exchangers. ETABL. G. DESSON & CIE., and G. DESSON (B.P. 326,981, 5.3.29).—A form of construction of heat recuperator of the cellular type is described, in which fibro-cement sheets are used as the heat-transmitting medium. B. M. VENABLES.

Heat exchanger. ANC. ETABL. MILLE POURCEL VELUT (B.P. 304,728, 23.1.29 Fr., 25.1.28).—In an exchanger of the concentric-tube type having small tubes in the annular space which by contact with the dividing wall improve the heat transmission, the small tubes are spaced apart so that the liquid can flow easily outside as well as within them, thus rendering both their surfaces effective for transmission of heat.

B. M. VENABLES.

Heat exchanger. C. WAINWRIGHT (U.S.P. 1,743,989, 14.1.30. Appl., 30.1.28).—A multistage exchanger com-

prising a number of bundles of tubes or other units is provided with mixing chambers between each unit. B. M. VENABLES.

Ball mill. F O. WILLIAMSON (U.S.P. 1,744,089, 21.1.30. Appl., 21.5.28).—Inclined faces are provided on the ends of the mill, which are stated to make the ball movement more efficient. An intermediate head or diaphragm with inclined faces on each side and apertures for passage of partly-ground material may also be provided. B. M. VENABLES.

Attrition mills. (A) E. H. HUSSEY, (B) J. MARKLEY and E. M. BRENNAN, Assis. to BAUER BROS. Co. (U.S.P. 1,744,226 and 1,744,235, 21.1.30. Appl., [A, B] 8.3.28).-Disc grinders suitable for pulping wood or other fibrous material are constructed so that the action is one of pressing and rubbing rather than of cutting, except in the earlier stage. In (A) the discs are divided into zones which are not quite concentric, an arcuate section of any zone is saw-toothed, in the innermost zone the steep edges of the teeth meet, in the subsequent zones the longer edges of the teeth meet, and the pitch of the teeth as also the gap between the discs decrease outwardly. In (B) the discs are formed with concentric wavy grooves and with radial ribs. The space for the material is decreased outwardly by increasing the height of the crests of the waves. B. M. VENABLES.

Crushing machines. NORDBERG MANUF. Co., Assees. of E. B. SYMONS (B.P. 327,216, 16.1.29. U.S., 8.10.28).—In a gyratory cone crusher the renewable lining of the upper cone or bowl is fixed by means which are not subject to wear. The sections are formed with integral hook-like projections on the back, which extend through the permanent part of the bowl and are secured by U-bolts. B. M. VENABLES.

Grinding mill. A. J. HAZLE, JUN., ASST. to BLATCH-FORD CALF MEAL CO. (U.S.P. 1,745,330, 28.1.30. Appl., 19.3.26).—The screens of a disintegrator can be moved nearer or further from the beaters by placing their lugs in any one of several semi-circular slots, even when the mill is running. B. M. VENABLES.

Grinding bodies for tube or drum mills. HELI-PEBS, LTD., and R. McDOUGALL (B.P. 326,656, 5.3.29).— The bodies comprise helices of spring steel or similar material with smaller helices loosely confined within them. B. M. VENABLES.

Charging regulator for disintegrating and like mills or other apparatus. HARTSTOFF-METALL A.-G. (HAMETAG) (B.P. 303,032, 24.12.28. Ger., 24.12.27).-The rate of feed is regulated by the power taken by the driving motor, so that the latter is always fully loaded and the rate is never reduced to zero. A feed shaft is driven from a power shaft by two gear-trains : (a) at a low speed through a free-wheel device, this speed being sufficient to provide say 80% of the feed, and (b) at a high speed through a dog-clutch, and when this gear is in operation the free-wheel over-runs. A cam on the feed shaft moves the dog-clutch into engagement, but it will not stay in unless held by a detent. The detent is pushed out of engagement by another cam, but it is returned by a spring unless held out by an electromagnet, the strength of which is proportional

to the motor current. The result is that as long as the motor remains fully loaded the feeder operates at the lower speed. B. M. VENABLES.

Utilising waste heat for refrigerating purposes. H. KEMMER (B.P. 301,837, 6.12.28. Ger., 6.12.27).— Waste heat in the form of hot gases at 350—600° from gas works or other industries is utilised in an absorption refrigerator charged with ammonia; the cold is utilised to make ice or for cooling and purifying the gas output. B. M. VENABLES.

Bearings for the trunnions of drying cylinders. A. BUCHANAN (B.P. 327,424, 4.12.28).—The faced ends of the trunnions which form part of the steam-tight expansion joints are continuously lubricated by means of a chain encircling the trunnion and dipping into an oil-bath. B. M. VENABLES.

Emulsifiers, mixers, and the like. H. P. JONES (B.P. 327,400, 31.12,28).—Within a container for the ingredients is a cylinder with a hand-operated, doubleacting piston. The cylinder is provided with a number of holes either radially through the wall near the ends or axially through the ends themselves, which are 0.045— 0.047 in. in diam. B. M. VENABLES.

Mixing or stirring machines. E. CHRISTIANSEN and C. O. ERICSSON (B.P. 327,465, 10.1.29).—Two concentric shafts are arranged to be rotated in the same or opposite directions at will and to be fitted with a variety of interchangeable stirring tools. B. M. VENABLES.

Mixing apparatus. C. J. BLELL (U.S.P. 1,745,291, 28.1.30. Appl., 29.1.27).—An apparatus, suitable for extracting oils from seeds, sewage, etc. by means of a solvent, comprises an elongated chamber divided into sections by partitions extending alternately from the top and bottom nearly to the bottom and top, respectively. A longitudinal shaft drives propellors in each compartment and valved openings are provided in the lower baffles so that the charge may be forced either straight through or in zig-zag fashion.

B. M. VENABLES.

Emulsifiers, mixers, etc. A. C. EATON, and INTER-NAT. KREEMAKA CO., LTD. (B.P. 326,854, 21.9.28).— Details are given of a hand-operated emulsifier in which the mixture is forced by a piston through a sinuous passage between concentrically grooved plates, and then through fine perforations. B. M. VENABLES.

Electric mixer. B. GOULD, ASST. to GEM APPLIANCES, INC. (U.S.P. 1,743,271, 14.1.30. Appl., 20.9.28).— The bowl for the material and the unit comprising electric motor, gearing, and stirrer are arranged to be easily and separately detachable from the supporting stand. B. M. VENABLES.

Presses for damp, or moist, materials. F. KRUPP GRUSONWERK A.-G. (B.P. [A] 306,931, 14.12.28. Ger., 29.2.28, and [B] 326,741, 23.7.29. Ger., 4.5.29).--In a worm-press which may be used for oil-containing fruits or seeds: (A) by the use of a sleeve shaft in one or more portions locked together by a solid shaft, the conveyor-worm is made readily detachable through the inlet end of the press; in (B) the outlet for solid material is throttled by an adjustable hollow cone.

B. M. VENABLES.

Separation process and apparatus. Filtering medium. C. T. CABRERA, Assr. to ELECTRO DIALYZER CORP. (U.S.P. 1,743,524-5, 14.1.30. Appl., [A] 15.11.27, [B] 1.6.28).-(A) Suspended solids are separated from a liquid by means of a number of "filtering" elements in series arranged in tanks of increasing size so that the rate of flow decreases progressively in the direction of flow. The filtering medium may be fragmentised metal and the method of construction and operation is similar to the zinc boxes of the cyanide process. (B) Suitable filter media are more fully described, e.g., intimately mixed strands of two metals having different electric potentials and degrees of resiliency, such as zinc and lead. Application to sewage and various factory effluents is B. M. VENABLES. indicated.

Pressure regulator for mechanically pumped liquids. I. G. FARBENIND. A.-G. (B.P. 309,086, 4.4.29. Ger., 4.4.28).—In a process such as the spinning of artificial silk, the pressure may be maintained constant without the use of compressed air by means of a by-pass valve across the pump which comprises a number of small relief valves so adjusted that they lift in a close succession. To prevent ageing because of trapped liquid the valves are arranged in line in one casing, and a small permanent passage or lightly loaded valve is left at the end remote from the inlet and outlet.

B. M. VENABLES.

Mixing of liquids. E. W. BUTLER and J. C. MANN (B.P. 326,924, 19.1.29).-Two liquids, such as molten pitch and oil, which may differ largely in temperature but of which the mixture must be maintained between close temperature limits to avoid frothing on the one hand and imperfect mixing on the other, are mixed in stages in a trough-like apparatus divided into compartments, the flow being from the top of one compartment to the bottom of the next or vice versa ; additions of raw material may be made to successive compartments in proportions suitable to maintain the correct temperature, aided, if necessary, by application of heat to the transfer passages. A longitudinal shaft extends through all compartments and carries stirring arms which extend through the depth of the liquid and well above it so as to beat down any froth produced. B. M. VENABLES.

Apparatus for mixing liquid and gas. K. CHOGO, Assr. to S. KUBOTA (U.S.P. 1,740,441, 24.12.29. Appl., 7.1.28. Jap., 28.1.27).—Liquid is drawn from the upper part of a cylindrical tank by a pump, and returned through the bottom past a baffle. The gas is admitted to the pipe between the outlet of the pump and the tank, and the original liquid may be admitted rather nearer the pump. When it is desired to use the gas again, as in the case of hydrogenation of fats, the circulation is sufficiently rapid to draw the gas back through the pump. B. M. VENABLES.

Foam-producing apparatus. W. FRIEDRICH (B.P. 314,438, 26.6.29. Austr., 27.6.28).—A foam-producing liquid is caused to pass across a finely-perforated metal plate to the back of which gas is supplied under high pressure. Suitable perforated plates may be made from nickel by electrolysis. B. M. VENABLES.

Device for concentration of liquids, especially whey and skim milk. LANDWIRTSCHAFTLICHE ZENTRAL- GENOSSENSCHAFT R. GES.M.B.H. (Austr.P. 107,317, 16.6.26).—In the upper part of an open vessel which can be heated is placed a bucket-wheel consisting of a number of shovel-like ladles set on a boss at equal angular intervals. The sides of these are closed by discs of greater diameter than that of the boss. The liquid raised in the ladles flows into the vessels formed by adjacent ladles and the lateral discs, and, on further rotation of the wheel, flows back into the container over the edge of the ladle in front. W. J. BOYD.

Dividing substances in the liquid state into drops. STOCKHOLMS BENMJÖLSFABRIKS AKTIEB. (B.P. 313,566, 12.6.29. Swed., 14.6.28).—A number of plungers are reciprocated inside a vessel containing glue or other liquid in such a way that they pass, at the lower end of their stroke, right through a number of discharge nozzles in the bottom of the vessel and are lifted clear of the apertures when at the top of their stroke.

B. M. VENABLES.

Centrifugal dust arrestor. F. H. WAGNER, ASST. to BARTLETT HAYWARD Co. (U.S.P. 1,743,171, 14.1.30. Appl., 25.4.29).—The external shape of the apparatus is similar to that of a cyclone separator; internally the gas is passed through a spiral conduit, which is considerably smaller in diameter than the outer casing. The outer wall of the spiral is formed with louvre-like outlets, and beyond them is a spiral curtain wall having internal blades which form approximately a continuation of the louvres; consequently the dust cannot whirl directly from the spiral conduit to the outer wall of the apparatus, but is directed downwardly.

B. M. VENABLES.

Dust separator. R. RUEMELIN (U.S.P. 1,743,934, 14.1.30. Appl., 26.11.24).—After separation of the coarse dust by inertia the gas passes into filter bags, which are shaken by horizontally moving bars at about the middle of their length. B. M. VENABLES.

Air filter. A. JORDAHL (U.S.P. 1,743,675, 14.1.30. Appl., 10.3.23).—The filter is constructed of corrugated sheets of expanded metal arranged firstly ridge to ridge forming large pockets, then with the sheets parallel at gradually decreasing distances apart to obtain smaller pockets for the complete entrainment of the finest dust. An alternative to the latter method of assembly is to fill the pockets with metal wool, kieselguhr, or the like. B. M. VENABLES.

Gas cleaner. C. G. HAWLEY, ASST. to CENTRIFIX CORP. (U.S.P. 1,743,344, 14.1.30. Appl., 10.3.26).— The casing of the apparatus is cooled externally by water so that its temperature is maintained below the dew point of the gas, as received or after adding moisture from internal water-sprays, though the bulk of the gas may at all times be at a high temperature. The gas enters axially to the casing, and is whirled by fixed or rotating tuyères; the dust, however fine, that reaches the wall of the casing is retained there by the dew and gradually creeps down to the collecting hopper at the bottom. B. M. VENABLES.

Disintegrator for cleaning gases and the like. H. F. J. NOLZE (U.S.P. 1,743,380, 14.1.30. Appl., 19.4.27. Ger., 23.4.26).—The apparatus comprises a disintegrator with radial blades that do not extend

inwards as far as the shaft, the gas (with water also, if desired) being supplied to this central dead space. To regulate the flow, the blades are notched as deeply as possible in a direction parallel to the axis, and in these notches are inserted baffles comprising two perforated, cylindrical plates slidable on each other, so that the effective apertures of the perforations may be varied. B. M. VENABLES.

Gas-washing apparatus. A. J. BOYNTON, ASST. to H. A. BRASSERT & Co. (U.S.P. 1,744,863, 28.1.30. Appl., 4.6.27).—In a disintegrator type of washer a uniform screen of spray is produced by a device comprising a trough for the liquid, attached to the hub of the beaters, and a number of radial outlet pipes extending to the first ring of beaters. The inlets for gas are sideways among the radial pipes, thus ensuring that the streams are well distributed before coming into contact with the liquid. B. M. VENABLES.

Treatment of gases with solid substances. METALLGES. A.-G. (B.P. 304,239, 15.1.29. Ger., 17.1.28). —A solid substance which is alternately used to react with a gas and is then reactivated, *e.g.*, in the process of removing hydrogen sulphide from coal-gas, or in many catalytic reactions, is subjected to reactivation before it has lost much activity. Both operations are preferably performed with small quantities moving at considerable speed relative to the reacting and reactivating gas, respectively, and in stages, the general motion of the solid substance being countercurrent to the reacting gas. B. M. VENABLES.

Forming gases into solid blocks. F. B. DEHN. From SOLID CARBONIC CO., LTD. (B.P. 327,414, 31.12.28). —The snow (or hail) emerging from a spraying chamber where liquefied gas is expanded is forced downwards by a screw-conveyor into a compressing cylinder. The collecting chamber is provided with a jacket through which the vaporised part of the gas passes on its way to waste or re-liquefaction and in which is coiled the pipe supplying the sprays. When the piston of the snow compressor is operated, it, being long, first closes the inlet aperture and then compresses the snow and ejects a solid block of ice through the end of the cylinder, which is opened for the purpose; the feed screw is automatically stopped while the cylinder end is open.

B. M. VENABLES.

Freezing mixtures. L. A. and (MME.) B. GARCHEY (B.P. 327,038, 30.4.29. Fr., 24.10.28).—The tendency of freezing mixtures composed of powdered ammonium nitrate and sodium carbonate to cake on storage is inhibited by adding talc powder to each of the constituents before they are packed separately. [Stat. ref.] H. ROYAL-DAWSON.

[Detection of leaks during] manufacture of highvacuum vessels and apparatus. W. DÄLLENBACH (B.P. 303,512, 1.1.29. Ger., 5.1.28).—The vessel is filled with a chemically reactive gas under pressure and the outside is covered with a suitable solution, conveniently applied by soaked paper or cloth. The recommended reagents are gaseous ammonia and Nessler's solution; globules of mercury, indicating leaks, will appear at much lower pressure than is necessary with air and soapy water. B. M. VENABLES. Lubricants. R. S. and C. S. PRENDERGAST, A. SONST-HAGEN, and F. PEARSON (B.P. 327,097, 22.9.28).—For the working parts of machinery subject to friction under rapidly varying local pressure a lubricant is used containing a metal or compound, *e.g.*, powdered zinc or zinc oxide, which is anodic to the metal of the machinery, and which therefore, under the influence of any currents of electricity generated by the friction, would cause a coating of the metal to be deposited on the parts to be protected. A. B. MANNING.

[Visual] detection of suspended matter in fluids. W. KIDDE & Co., INC., Assees. of H. C. GRANT, JUN. (B.P. 306,825, 22.2.29. U.S., 25.2.28).—Smoke particles or other matter suspended in air or other fluid render a beam of light visible; in this invention both a direct and a reflected image of the luminous smoke are caused to be seen simultaneously by the observer, thus obtaining nearly double the sensitivity. B. M. VENABLES.

Industrial furnace. R. WARSITZ (U.S.P. 1,757,492, 6.5.30. Appl., 3.7.28. Ger., 15.6.27).—See B.P. 292,146; B., 1929, 701.

Method and apparatus for burning solid fuel. F. NOVELLI (U.S.P. 1,756,096, 29.4.30. Appl., 21.5.27. It., 27.5.26).—See B.P. 271,889; B., 1928, 506.

Drying plants. N. PANZIREV (B.P. 327,432, 3.10.28). —See U.S.P. 1,736,980; B., 1930, 223.

Purification system for boilers. J. OSTERTAG (Re-issue 17,658, 6.5.30, of U.S.P. 1,700,715, 29.1.29).— See B., 1929, 190.

Gyratory crusher. J. E. KENNEDY (U.S.P. 1,754,895, 15.4.30. Appl., 21.1.28).—See B.P. 322,690; B., 1930, 124.

Apparatus for separation of finely-divided solids from liquids. J. W. WICKES (U.S.P. 1,754,870, 15.4.30. Appl., 4.2.26. U.K., 19.2.25).—See B.P. 256,995; B., 1926, 857.

Separator for treatment of mixtures of mutually insoluble liquids. H. J. HOLFORD, Assr. to HARVEY HOLFORD SEPARATORS, LTD. (U.S.P. 1,756,862, 29.4.30. Appl., 30.1.29. U.K., 4.2.28).—See B.P. 310,996; B., 1929, 543.

Homogenising machine. G. C. HURRELL (U.S.P. 1,756,198, 29.4.30. Appl., 9.10.25).—See B.P. 245,929; B., 1926, 223.

Filtering or like devices. H. A. THOMPSON, ASST. to SWINNEY BROS., LTD. (U.S.P. 1,754,728 and 1,757,153, [A] 15.4.30, [B] 6.5.30. Appl., [A] 14.2.29, [B] 12.1.29. U.K., [A] 17.1.29, [B] 31.7.28).—See B.P. 318,821 and 307,267; B., 1929, 1036, 499.

Furnace walls. AMER. ENG. Co. (B.P. 327,862, 15.4.29. U.S., 22.10.28).

Construction of wagons and rails, applied in ovens for dry distillation, dryers, kilns, and similar ovens working by means of gas and vapour injections or circulations. EESTI PATENDI AKTSIASELTS, and M. KULZINSKI (B.P. 327,717, 7.11.28).

Heat-non-conducting coverings [for domestic cisterns etc.]. W. B. McCulloch (B.P. 328,472, 17.5.29).

Absorption refrigerating apparatus. (SIR) C. MARKHAM (B.P. 328,234, 22.1.29).

[Adsorption] refrigerating apparatus. G. H. HASLAM (B.P. 328,301, 25.1.29).

Refrigeration plant of the intermittent absorption or adsorption type. UNIVERSAL REFRIGERATORS, LTD. (B.P. 311,324, 26.4.29. U.S., 9.5.28).

Atomisers [for perfumes etc.]. E. GAGNAN (B.P. 313,532, 13.6.29. Fr., 13.6.28).

II.-FUEL; GAS; TAR; MINERAL OILS.

Origin of coal according to the present position of biological investigation. R. LIESKE (Brennstoff-Chem., 1930, 11, 101-105).-The formation of peat from the original plant materials is essentially a biological process, the earlier stages of which are brought about by aerobic, and the later stages by anaerobic, organisms. In this process the hydrolysable constituents are more easily and rapidly destroyed than the nonhydrolysable; the latter, of which the lignin is the most important, form the principal constituents of the original plant material from which coal has been formed. Taylor's theory (B., 1928, 509), which has received additional support from observations made in the Ruhr coalfield, has thrown light on the biological processes involved in the further transformation of peat into brown or bituminous coal. Purely physical and chemical processes, however, must also have played a part in determining the character of the final product.

A. B. MANNING.

Origin of coal according to the present position of chemical investigation. W. FUCHS (Brennstoff-Chem., 1930, 11, 106-112).-The literature dealing with the constitution of plant materials similar to those from which coal must have been derived, and with the chemical changes associated with the transformation of such material into coal, is critically discussed. It is concluded that the initial changes involve the disappearance of the cellulose with a corresponding increase in the lignin content of the material; the lignin-rich material is then slowly transformed into coal. The character of the final product, i.e., the type of coal produced, will depend to some extent on the chemical constitution of the original lignin, and this may vary considerably with the character of the plant material from which it has been derived. A. B. MANNING.

Coals and their impurities. J. W. WHITAKER (J. Inst. Fuel, 1930, 3, 175—178).—A lecture. The classification of coals, the effect of moisture, the composition of the ash, distribution of sulphur, occurrence of chlorine, and methods of coal cleaning are discussed.

C. B. MARSON.

The X-ray stereoscopic examination of coal. I. A. N. WILSON (J. Inst. Fuel, 1930, 3, 218—224).—X-Ray apparatus and the application of stereoscopic radiography to the examination of coal are described in detail.

C. B. MARSON.

Composition of coal bitumen and its influence on the coking of coal. H. Novák and J. HUBÁČEK (Paliva a Topeni, 1927, 9, 165—170, 187—196; 1928, 10, 3—9, 22—28; Chem. Zentr., 1929, ii, 3085—3086).

-Bitumen was extracted from a brown coal with tetralin and from a bituminous coal with pyridine; the compositions were compared, the former product being the lighter, and the principal constituents of the latter being asphalts. Brown-coal bitumens in contact with infusible materials give on coking a solid coke. In coke from bituminous coal the "cementing residue" forms one third of the mass. A. A. ELDRIDGE.

Phosphorus content of coal. FAERBER (Kohle u. Erz, 1929, 26, 755—756; Chem. Zentr., 1929, ii, 3263). —This varies considerably according to the origin of the coal; washing the coal does not remove the phosphorus. A. A. ELDRIDGE.

Calculation of the net calorific value of strongly bituminous brown coals. W. EISENSCHMIDT and H. Koor (Chem.-Ztg., 1930, 54, 213—214).—The authors consider that with these coals (lignites) the net calorific value should be calculated only from the value for the hydrogen content as determined by actual analysis, since the Langbein approximation $(5 \cdot 9\%)$ leads to considerable error (of the order of 100 heat units).

E. LEWKOWITSCH.

Future position of coal and carbon [in other forms] as raw materials of the chemical industry. C. MATIGNON (Chim. et Ind., 1930, 23, 543—555).— Coal and petroleum have hitherto been handled by the mechanical engineer rather than the chemist, but this position is changing. The primary by-products of coal carbonisation and petroleum cracking (hydrogen, carbon monoxide, methane, ethylene, etc.) are surveyed and their applications in ammonia synthesis, hydrogenation, and the syntheses of methyl alcohol and formaldehyde are indicated. Methane, in turn, may become a starting point for acetylene, hydrogen cyanide, and methyl chloride, etc., ethylene for ethyl alcohol, and ethylene glycol and butadiene for synthetic rubber.

C. IRWIN.

Comparative costs of fuels for domestic purposes. A. H. BARKER (Gas J., 1930, 189, 572—573, 643—646, 702—705).—A detached house having entrance hall, 4 living rooms, 7 bedrooms, etc. was equipped with the necessary appliances for heating and cooking by different methods, and tests as to cost were carried out over a period of months. The advantages and disadvantages also of the various methods of heating and cooking are discussed, and it is concluded that a suitable combination of methods is the most efficient ; rationalisation of the coke, gas, and electricity undertakings is therefore advocated. C. B. MARSON.

Agglutination of coals and its relationship to the action of solvents. M. L. CRUSSARD (Rev. de l'Ind. Min., 1929, 551; Fuel, 1930, 9, 177—191).—The work of Lierg (B., 1922, 532 A), Fischer (B., 1925, 233), and Bone (B., 1924, 584) is co-ordinated and discussed in relation to the mechanism of the agglutination of coal. Attention is directed to the part played in this process by the moderately or difficultly fusible extracts which are insoluble in light petroleum, viz., the "asphaltenes" or "solid bitumen." A. B. MANNING.

Asturian coal. I. Low-temperature distillation of cannel coal from Mieres. B. A. BUYLLA (Anal. Fis. Quim., 1929, 27, [tecn.], 195-218).—Asturian cannel coal yields concordant results when subjected to lowtemperature distillation by the Gray-King and the Fischer-Schrader methods. The rate of heating does not influence the relative yields of gas, tar, and semicoke, but the last-named becomes more porous and more friable as the rate is increased. At 600°, as compared with 520°, the primary gas becomes richer in hydrogen and carbon monoxide at the expense of the methane and other saturated aliphatic hydrocarbons.

H. F. GILLBE.

Low-temperature distillation of Asturian coal. L. R. PIRE (Anal. Fís. Quím., 1929, 27, [tecn.], 377—382). —The economic aspect of the process as carried out in Spain is discussed. H. F. GILLBE.

Phenolic solubility of humic acids in coals. F. PODBREZNIK and P. M. SOUM (Proc. II. Int. Conf. Bit. Coal, 1928, 1, 667—669).—Artificial and natural humic acids are soluble in hot phenol. Lignins are more soluble than humic acids in alcohol and in acetone. Phenol depolymerises certain humic substances which are probably derived from lignin.

CHEMICAL ABSTRACTS.

Rôle of humic acids in the transformation through heating of coal and in the production of coke. F. PODBREZNIK (Proc. II. Int. Conf. Bit. Coal, 1928, 1, 662—669).—A discussion. Young coals contain up to 15% of free humic acids, and condensed humic acids probably existing as dilactones which may undergo irreversible change into humic compounds at higher temperatures. Lignites consist of free lactonated humic acids, and disintegrate on carbonisation on account of the rapidity with which steam and carbon dioxide are evolved; humic substances afford gases which dissociate with deposition of carbon in the cavities of the coal.

CHEMICAL ABSTRACTS.

Changes in methoxyl content in the carbonisation of lignite. K. HRDLIČKA (Paliva a Topeni, 1927, 9, 185—187; Chem. Zentr., 1929, ii, 3200).—Lignite containing 6.12% OMe, when carefully distilled at $400-500^\circ$, gave only 0.25% of methyl alcohol and 0.32% of acetic acid. The coke contained no methoxyl groups; the tar contained 0.53%, calculated on the pure organic matter of the lignite. Hence in the carbonisation of lignite greater decomposition of methoxyl groups takes place than in the carbonisation of wood. A. A. ELDRIDGE.

Hydrogenation of South African coal. P. N. LATEGAN (Third Empire Min. Met. Congr., Apr., 1930, 21 pp.).—Experiments are described on the hydrogenation of coal from the Witbank Central Area, Transvaal, with reference to the use of a vehicle containing a small quantity of ferric oxide, the final temperature, and the rate of heating. The ease of hydrogenation of a coal is found to depend on the readiness with which it dissociates into its molecular complexes, and the composition and stability of these. The mechanism of the process is discussed. C. W. GIBBY.

Plasticity of coal after treatment by the Bergius process. J. M. PERTIERRA (Anal. Fis. Quim., 1929, 27, [tecn.], 191—194).—Hydrogenation by the Bergius method lowers the temperature at which the material becomes plastic and raises the temperature of solidification. H. F. GILLBE.

Combustion of solid fuels and heat-balance of a boiler plant. J. U. STEIGER (Proc. Tech. Sect. Papermakers' Assoc., 1929, 10, 165—184).—The subject is dealt with mathematically under the following headings : heating power of solid fuels, chemical reactions in combustion, heat in flue gases, and combustion formulæ. Rules for the calculation of efficiency and heat losses are given. T. T. Ports.

Disturbing effects in the determination of the decolorising power of active carbons. V. EDEL-STEIN (Z. Zuckerind. Czechoslov., 1930, 54, 257—265). —Points made are that the coloured solution (e.g., a 10% solution of beet molasses) should be prefiltered, kieselguhr being used to eliminate suspended matter, and freshly prepared; that the kind of filter-paper used should be specified; and that time and temperature of heating should be constant in all determinations.

J. P. OGILVIE.

Heat economy of coke ovens. (A) O. PEISCHER. (B) K. BAUM (Brennstoff-Chem., 1930, 11, 112-113, 113-114; cf. Baum, B., 1930, 355).-(A) The heat efficiency of an oven will vary with the size, moisture content, and caking properties of the coal carbonised. Although the heat efficiency is a maximum with uniform heating, a vertical temperature gradient is necessary to prevent undue cracking of the tar and gas in the upper part of the oven. (B) Results are quoted by Baum to show that with as uniform a heating of the oven as practicable the maximum efficiency is attained, not only from the point of view of heat economy, but also in respect of the quality of the coke produced.

A. B. MANNING.

Stamping effect in [Japanese] coke manufacture. S. ARAKAWA (J. Fuel Soc. Japan, 1930, 9, 23-27)... Comparison of cokes made from the same coal in compressed and uncompressed charges showed that compressed coke was less spongy and had a higher crushing strength than uncompressed coke, but their shatter indices were the same. The compressed coke produced less breeze, and it is concluded that the quality of certain Japanese foundry cokes can be improved by "stamping." C. B. MARSON.

Management of gas producers. L. M. WILSON (Fuel, 1930, 9, 152-164).-The choice of coal, the method of starting and maintaining the fire, the regulation of the air : steam ratio, the control of gas output, and other practical considerations in the management of modern producers gasifying raw coal are discussed. The ash in the coal may be any amount up to 20% if it is infusible; the moisture content should not exceed 3%; the volatile matter content, calculated on the ashfree basis, should be high, preferably above 35%; a small-sized non-caking coal is preferable, and the fines should be removed. The depth of ash in the producer above the apex of the blast hood should be maintained at 6-12 in., and the depth of the fuel bed at about 30 in. The gas velocity and temperature in the mains connecting the producer to the furnace, and the length of the mains, are preferably adjusted so that the tar and soot remain in suspension until the gas reaches the

furnace regenerator, wherein the tar is cracked and the soot tends to interact with the carbon dioxide in the gas according to the equation $C + CO_2 = 2CO$. It is desirable to instal a gas governor for controlling gas output.

A. B. MANNING.

[Apparatus for the] determination of the gas yield from coal. H. KOELSCH (Z. angew. Chem., 1930, 43, 310–313).—A laboratory apparatus for testing gas coal is described. S. K. TWEEDY.

Asphalt emulsions : their nature, manufacture, and practical application. GRÄFE and FLECK (Petroleum, 1930, 26, 357-361).-A general survey of modern practice. It is pointed out that whilst a certain degree of stability is essential, an extremely fine dispersion is not altogether desirable, since the total amount of emulsifier adsorbed by the particles is in this way increased, and the greater the resulting contamination of the separated asphalt surface the more is the tendency to re-emulsification by the combined action of moisture and traffic. The use of asphalt emulsions for road-surface spraying and patching, grouting, and the preparation of mixtures with suitable aggregates are briefly described and discussed. The necessity of very thorough cleansing of the road surface before treatment with emulsion is emphasised. D. G. MURDOCH.

Removal of phenols from effluents. L. M. HOROVITZ-VLASSOVA (Gas- u. Wasserfach, 1930, 73, 275—278).—Intensive aeration of dilute phenol solutions $(0\cdot1\%)$ containing soil or charcoal, or passage of such a solution through well aerated filters of the same media, fairly rapidly produces oxidation compounds which give no colour reaction with Millon's reagent and which absorb less chlorine than the original phenol, giving rise to compounds which do not possess an objectionable odour. The oxidation is shown to be independent of bacterial action, no decrease in the amount of phenol being effected by the addition of pure cultures of *B. coli*, *B. implexus*, and *B. megaterium* to a broth containing 0.1% of phenol. D. G. MURDOCH.

Determination of total cyanogen in ammoniacal liquor. A. TRAVERS and AVENET (Compt. rend., 1930, 190, 1015—1016).—Cyanogen is present both as cyanide and thiocyanate in such liquors. The thiocyanate is oxidised without loss of cyanogen to cyanide and sulphate by nascent hydrogen peroxide in an alkaline medium. This is effected by the addition in small portions at a time of sodium peroxide to a sample cooled below 0°. Oxidation is complete in about 10 min. The solution is then distilled with dilute sulphuric acid and the hydrocyanic acid determined as usual. The phenols present in such liquors have no effect. Results are accurate to 1%. C. A. SILBERRAD.

Gaseous products of shale retorting : their composition and possible utilisation. A. W. NASH (Third Empire Min. Met. Congr., Apr., 1930, 12 pp.).— The uses of the gaseous products of shale distillation, other than as fuel for the generation of heat, are discussed. The olefine content may be as high as 20%, and these gases could be advantageously used for conversion into higher hydrocarbons, alcohols, and glycols. Brief reference is made to various existing processes. C. W. GIBBY. High-pressure hydrogenation of shale oil. I. Y. TANAKA and K. FUJISAWA (J. Soc. Chem. Ind., Japan, 1930, 33, 42—43 B).—Crude shale oil produced in a retort of Japanese design was heated at 280—290° in presence of about 1% of reduced nickel and hydrogen at 140—150 atm. The content of solid paraffins was raised 8% or more, the loss on refining by sulphuric acid and the pitch and distillation loss being at the same time considerably decreased. Apparently the more highly unsaturated hydrocarbons of high b.p. are catalytically hydrogenated to less unsaturated or saturated hydrocarbons without the occurrence of any appreciable cracking. S. K. TWEEDY.

Lubricating oils : carbon residue estimation. The Ramsbottom method. C. I. KELLY (J. Inst. Petroleum Tech., 1929, 15, 495-515).-The development of the Conradson carbon residue test is reviewed, and two types of apparatus suitable for the Ramsbottom test are described, only one of which, however, is satisfactory in actual use. The satisfactory apparatus consists of (a) a gas ring burner with manometer and needle-valve control; (b) a sheet-metal container for molten-lead bath; (c) a circular lid, to the underside of which are welded the metal sheaths, holes being drilled in the lid to permit the entry of the coking bulbs into the sheaths. An additional hole is made for accommodating the pyrometer and from the underside of the lid is hung a cylindrical skirt of sheet metal lined with asbestos; (d) a circular base-plate with a circular hole and fitted with a cylinder forming an easy sliding fit into the cylindrical skirt; and (e) a vertical rod passing through the upper cylinder and resting in a ferrule. The rod is fitted with a circular eye on which the pyrometer can be rested in an inclined position. Radiation is reduced to a minimum and temperature control is fairly simple, whilst convection currents in the lead are nearly eliminated. Results of several trials with the apparatus show that the highest carbon residue is obtained when the final heating period is least, but the percentage difference is greatest with oils of low carbon residue. The carbon residue was the higher the smaller the weight of oil taken, but variations in size and thickness of bulbs had no effect. The lower the temperature the higher was the result, due probably to the varying time factors.

W. S. E. CLARKE.

Determination of the solidification point of petroleum lubricating oil. M. MIZUTA (J. Soc. Chem. Ind., Japan, 1930, 33, 44—45 в).—The oil is heated $(e.g., to 35^\circ)$ in a test-tube provided with an outer insulating tube, and is then cooled; when the oil has almost set the tube is held in a horizontal position, and that temperature observed at which the oil flows for 5—15 sec. is noted. This gives the solidification point correct to 1°, and agrees with the results obtained by the usual method. Variations in the atmospheric temperature have no effect. The variations in the flow times corresponding to successive 1° lowering of the temperature depend on the nature of the oil.

S. K. TWEEDY.

Sludge of transformer oils. II. Effect of heat on transformer oils in vacuum and in atmospheres of nitrogen, carbon dioxide, and hydrogen. T.

YAMADA (J. Soc. Chem. Ind., Japan, 1930, 33, 64 B; cf. B., 1930, 272).—Oils which readily deposit sludge on heating in air showed no deposit nor colour change when heated in a vacuum, or in a confined atmosphere of nitrogen, carbon dioxide, or hydrogen, for 100 hrs. at 140°, but they darkened when these gases were bubbled through the heated oils. The darkening under these circumstances is due to traces of oxygen in the gases. S. K. TWEEDY.

Technical xylene from distillation residues of light oils. I. E. BESPOLOV (Neft. Choz., 1929, 16, 385—386).—The separation of technical xylene in 13% yield is recorded; pure xylene could not be obtained. The separation of higher homologues is as yet impossible commercially. CHEMICAL ABSTRACTS.

American [mineral oil] refinery technology. B. T. BROOKS (J. Inst. Petroleum Tech., 1930, 16, 125-132).—Important developments during the past $1\frac{1}{2}$ years are reviewed. These include the De Florez cracking still (cf. B., 1929, 668), which produces a motor fuel of high anti-knock rating without high unsaturation and excessive gum formation, and the Gyro hightemperature low-pressure cracking process. Attention is being paid to the production of lubricating oils of very low pour-point for aviation purposes. Aluminium is finding extended use in refineries in order to overcome corrosion trouble, especially in those treating highsulphur crudes. H. S. GARLICK.

The Edeleanu process for refining petroleum. R. L. BRANDT (Ind. Eng. Chem., 1930, 22, 218-223).— Flow sheets and a description of a commercial plant for operating this process, using liquid sulphur dioxide as the treating reagent, are given. The process is shown to give excellent results, especially in the removal of sulphur and nitrogenous compounds, and to have overcome many of the disadvantages inherent in the sulphuric acid method of refining. Analyses of the products show them to be superior to those obtained by the usual methods. Pressure distillate can be treated by this process, so that the anti-knock properties of the finished gasoline are greatly improved. Cost data are given for a plant treating kerosene and light oils and also for a plant treating lubricating oil.

H. S. GARLICK.

Cracking. G. EGLOFF, C. D. LOWRY, JUN., and R. E. SCHAAD (J. Inst. Petroleum Tech., 1930, 16, 133-246).—A comprehensive review of papers and patents published during 1928 and 1929 dealing with the application and technology of cracking.

H. S. GARLICK.

Catalytic oxidation of paraffin and mineral oil. E. ZERNER (Chem.-Ztg., 1930, 54, 257—259, 279—281).— Treatment of paraffin by air or oxygen at 110—150° in the presence of catalysts, such as manganese or zinc stearate, results in considerable absorption of oxidation and the formation of a white pasty product with a coccoa-like odour, a small quantity of an oily distillate having a strongly acid odour, and a strongly acid aqueous distillate. The pasty product contains a large proportion of fatty acids, chiefly hydroxy-acids, as well as much unsaponifiable matter the nature of which has not yet been elucidated. The fatty acids yield hard

soaps which give a good lather, but have a most unpleasant odour and cannot be salted out from solution. The oily distillate contains about 30% of oily fatty. acids which also yield unpleasant soaps, and 60-70% of hydrocarbons, alcohols, and carbonyl compounds; those of the last-named compounds which have a low b.p. have a fruity odour, and those of high m.p. crystallise well. The aqueous distillate contains formic, acetic, and other volatile fatty acids. Similar results are obtained by the catalytic oxidation of mineral oil; this oil after purification with liquid sulphur dioxide can also be catalytically oxidised with air in the presence of 1% of slaked lime and a manganese or zinc catalyst, but the products obtained all have an unpleasant odour. and so far it has not been found possible to remove the cause of this odour, consequently the oxidation products of these oils are unsuitable for the manufacture of soap. A. R. POWELL.

Distillation of naphthas containing mercaptans by steam, with and without reagents. P. Borg-STROM, R. ROSEMAN, and E. E. REID (Ind. Eng. Chem., 1930, 22, 248—249).—The mercaptans studied were all volatile in steam, and the mercaptan content of all naphthas but one remained constant after distillation from water or from alkali. On steam-distillation from copper sulphate or copper acetate solutions the mercaptan content in the distillate decreased with increasing amounts of copper salts. Caustic soda did not aid in removing the mercaptan in these solutions.

H. S. GARLICK.

Loss of mercaptan-sulphur in naphtha by use of inorganic salts and caustic soda. P. BORGSTROM, V. DIETZ, and E. E. REID (Ind. Eng. Chem., 1930, 22, 245-247).-The efficiency of removal of low-boiling mercaptans from various naphthas by a number of inorganic salts and sodium hydroxide has been studied. Copper acetate, mercuric acetate, and ammoniacal copper sulphate gave a sweet naphtha, although with the last-named there was oxidation to disulphide instead of removal as with the other two salts. With reagents such as mercuric oxide, copper oxide, and copper sulphate, where a precipitate could be formed, variable results were obtained. Acetates of sodium, calcium, barium, cobalt, zinc, and iron show only slight removal of the lower mercaptans and practically none of the sec.-amyl compound. Bismuth nitrate has a greater effect, but ferrous and ferric salts are not so efficient. Cadmium chloride, neutral and acidified, give a slight decrease which appears dependent on the solvent for the mercaptans. A naphtha solution treated with a solution of sodium zincate made up similarly to that of sodium plumbite shows that more of the higher mercaptans remained than of the lower. N-Caustic soda removes more of the lower mercaptans than of the higher. With variations in the naphtha used, mercaptan content, and concentration of alkali it was found that solutions of ethyl mercaptan are "doctor-sweet" after treatment with all concentrations of alkali used. N-Propyl and isopropyl mercaptans show only a trace of mercaptan remaining after treatment with all except the lowest concentrations of alkali. With increasing mol. wt. of the same type of mercaptan there is increase in the percentage remaining in the naphtha, the secondary

straight-chain mercaptan being less removed than the corresponding primary compound, independent of the naphtha used. Increase in concentration of alkali shows no corresponding decrease in mercaptan remaining in the naphtha, whilst there appears to be a minimum with $2 \cdot 18N$ -sodium hydroxide. H. S. GARLICK.

Petrol-water emulsions. C. VARADHAN and H. E. WATSON (J. Indian Inst. Sci., 1930, 13A, 21-30).-The emulsions were prepared by dissolving or suspending a stabiliser in a definite volume of water and mixing this with a known volume of petrol, then passing the mixture many times through a Premier colloid mill. Consistent emulsions were difficult to obtain, and varied from a thin fluid, which separated into its constituents in a few seconds, to a butter-like mass apparently indefinitely stable. Emulsions of two types were obtained with every stabiliser used, depending on the relative quantities of the two constituents. Each stabiliser gave a fairly definite inversion point, in the neighbourhood of which emulsions of both types having the same concentration could be obtained. Ammonium soaps gave an inversion point around 30% of petrol, sodium and potassium soaps of unsaturated acids about 65%, potassium stearate 50%, and potassium palmitate 30%, although with the last-named petrol-in-water emulsions were obtained with 52% of petrol, and one emulsion prepared with 0.5% of potassium stearate was of the water-in-petrol type, although containing only 33% of petrol. The inversion point did not appear to depend on the concentration of the stabiliser. Ammonium soaps generally gave the more stable emulsions, particularly as regards the water-in-petrol type. Emulsions using potassium palmitate or stearate tended to set to a jelly and were more stable than those containing salts of the unsaturated acids, although except for these two cases the degree of unsaturation of the scid appeared to have little effect. Comparison of the atability of emulsions with the drop numbers for the different stabilisers shows that the most stable emulsions are obtained with stabilisers having the lowest drop numbers, *i.e.*, ammonium oleate and ammonium soaps from olive oil fatty acids. Measurements were made of the viscosity of the emulsions after varying periods of time. H. S. GARLICK.

Benzol. W. H. COLEMAN (J. Inst. Petroleum Tech., 1930, 16, 252—254).—Work published during 1928 and 1929 chiefly concerns methods of treating benzol so that easily polymerisable substances may be removed without destroying the valuable unsaturated hydrocarbons which will not polymerise, thus avoiding the loss of a large proportion of aromatic hydrocarbons following treatment with drastic refining agents. Methods of determining the content of aromatic compounds in mixtures have received attention, but up to the present these still fall short of what might be desired. H. S. GARLICK.

Production of benzine by cracking. F. KOUDELÁK (Paliva a Topeni, 1928, 10, 36–37, 51–56, 67–75, 89–95, 109–113, 119–126; Chem. Zentr., 1929, ii, 3265).—Descriptive. A. A. ELDRIDGE.

Raoult's law and the equilibrium vaporisation of hydrocarbon mixtures. M. C. ROGERS and G. G. BROWN (Ind. Eng. Chem., 1930, 22, 258-264).-Mixtures of three natural gasolines, a synthetic mixture, three mixtures of natural gasoline with a mid-Continent absorption oil, a mixture of a naphtha with a natural gasoline, and a mixture of tetralin with natural gasoline were studied in order to determine the extent to which Raoult's law holds in calculations involving the vaporisation of hydrocarbon mixtures. After analysis of the mixtures by a special fractional-distillation procedure and mol. wt. determinations on the various residues, vaporisations were made on these mixtures and the results compared with the curves calculated by Raoult's law. The results show that deviations from Raoult's law when applied to complex mixtures are dependent on the relative composition of the mixtures, and that the vapour pressure of natural gasolines and similar mixtures cannot be calculated by this law when a precision greater than 5-15% is desired.

H. S. GARLICK.

Motor-fuel volatility. I. Equilibrium volatility. G. G. BROWN and E. M. SKINNER (Ind. Eng. Chem., 1930, 22, 278-288).-Methods previously proposed for estimating the equilibrium volatility, which is defined as the percentage by wt. vaporised under equlibrium conditions at specified temperature, pressure, and air-fuel ratio, from the A.S.T.M. distillation are shown to be inaccurate, although convenient, and it has been found impossible to determine accurately the partial equilibrium volatility of motor fuels in the presence of air in any form of apparatus that has been described. Equilibrium volatility can be computed accurately from the continuous equilibrium vaporisation or "flash distillation " data by making proper allowance for the mol. wt. of the vaporised part of the fuel. This relationship is incorporated in a chart which is applicable to all types and sources of motor fuel. H. S. GARLICK.

Natural gas. S. C. CARNEY (J. Inst. Petroleum Tech., 1930, 16, 118-124).-Progress in the utilisation and distribution of natural gas in the U.S.A. is reviewed. Natural-gas gasoline is the chief by-product, with carbon black second in importance, most of the production of this latter product being still by the old method of burning gas jets against slowly moving steel Various chemical products derived from surfaces. natural gas are rapidly increasing in importance, but they use relatively small amounts of natural gas, gas from cracking installations being preferred. Of liquefied gas fuels, propane is sold chiefly for domestic use and butane for industrial purposes, e.g., gas enrichment and as a high-grade fuel for ceramic and metallurgical operations. Helium is being separated in increasing quantities in certain localities. H. S. GARLICK.

Solubility of gas benzines and gases in paraffin oil. F. FISCHER and P. DILTHEY (Ges. Abh. Kennt. Kohle, 1928, 8, 305—306; Chem. Zentr., 1929, ii, 3265) —Methane, pentane, and carbon dioxide, but not hydrogen, carbon monoxide, air, or water-gas, are distinctly soluble in paraffin oil. Similar experiments with gas produced with the aid of a benzine catalyst indicated no correlation with the contraction of the catalyst or the composition of the gas.

A. A. ELDRIDGE.

Anti-detonators. W. H. COLEMAN (J. Inst. Petroleum Tech., 1930, 16, 247-251).—A summary of papers and patents published during 1928 and 1929 dealing with the action of anti-detonators and causes of detonation. H. S. GARLICK.

Interpretation of results of chemical analyses for gas works. W. Scott (Gas J., 1930, 190, 198).

Pulverised-fuel-fired furnaces. Hollands and Lowndes.—See I. Separation of phenols from tar. Schulz and Mengele.—See III. Road tar. Nicholson. Tar roads. Müller.—See IX. Alcohol for motor fuel. GUINOT.—See XVIII.

See also A., May, 546, Inflammability of hydrogen (TANAKA and NAGAI). 551, Catalytic reduction of carbon monoxide at ordinary pressure (KODAMA). 561, Determination of water [in tars and oils] (NOTEVARP). 570 and 571, Lignin theory of origin of coal (BODE ; LIESKE). 571, Origin of bituminous coal (STADNIKOV). 589, Separation of xylenes (NAKATSUCHI).

PATENTS.

Separation of coal from dirt and like foreign substances. W. H. BERRISFORD (B.P. 326,961, 19.2.29). —The material is passed through several stages each comprising a declining plate and a gap, the apparatus being so adjusted that in at least one stage substantially clean coal is separated, and in at least one other stage coal-free dirt is separated ; the middlings from the last stage are returned to the first for re-treatment.

A. B. MANNING.

Coal-washing apparatus. F. H. BLATCH, H. L. McLEAN, and W. C. MENZIES (B.P. 327,042, 3.5.29).-The coal is separated from its impurities by means of a current of water which passes up through a perforated plate forming the bottom of the compartment wherein the washing is effected; the coal is carried over the upper edge of a breast-plate into a chute and is thence discharged from the apparatus. The impure coal is delivered into the compartment through a pivoted control gate, which is connected to the gate controlling the opening through which the impurities are discharged, the two gates co-operating to maintain the required relation between the rate of delivery of impure coal and the rate of discharge of the impurities. Means are provided for agitating the material in the washing compartment and for preventing clogging of the passage through which the impurities are discharged.

A. B. MANNING.

Heat-treatment of carbonaceous material. TRENT PROCESS CORP., Assees. of W. E. TRENT (B.P. 307,918, 26.2.29. U.S., 17.3.28).—The finely-divided material is fed continuously into a vertical retort, through which it passes by gravity, and wherein it is subjected to progressively higher temperatures in such a manner that the volatile products are first removed, and the residue is then carbonised, without substantial agglomeration of the material. Heating is effected by the circulation of the hot gases from suitably placed combustion chambers through tubes extending across the retort. The hot residue is withdrawn through a water-seal at the bottom of the retort. The steam thereby evolved reacts with the hot carbonised particles to produce water-gas. The latter may be withdrawn from the retort mixed with the distillation gases, or, by the provision of separate sets of eduction tubes, the two gases may be withdrawn separately. Provision is made for the complete gasification of the material in the lower part of the retort, if desired, by the introduction of a controlled amount of air.

A. B. MANNING.

Low-temperature carbonisation of coal and other suitable fuels. J. E. HACKFORD (B.P. 326,813, 19.9. and 10.11.28).—Adhesion of the fuel to the container, conveyor, or other surfaces with which it is brought into contact during the heat treatment, is prevented by interposing a thin layer of paper, pulped paper, sawdust pulp, etc. between the fuel and the surfaces in question. The interposed material must be one which does not pass through an intermediate plastic or liquid phase during carbonisation. The coal may be carbonised in cylindrical metal containers, the interior surfaces of which have been coated with a thin layer of the material, in a liquid or semi-liquid form, by a spraying operation. A. B. MANNING.

Production of carbon black. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 326,913, 9.1.29).— A particularly finely-divided carbon black is obtained by subjecting suitable carbon compounds, *e.g.*, olefines, diolefines, acetylenes, carbon monoxide, to heat treatment in the presence of catalysts, the treatment being carried out in a non-sparking electric field in which no substantial discharge takes place. A. B. MANNING.

Manufacture of carbon black. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 327,374, 19.12.28. Cf. B.P. 324,959; B., 1930, 405).—Unsaturated hydrocarbons are treated in the gaseous phase with a dehydrogenating catalyst, at temperatures between 100° and 600°, either under reduced pressure in the absence or presence of other gases, or under atmospheric pressure in the presence of other gases. The catalyst comprises a metal or compound of a metal of the iron group.

A. B. MANNING.

Operation of retort [coal-]gas plants, and particularly the stand-pipes therefor. BARRETT Co., Assees. of S. P. MILLER (B.P. 303,166, 27.12.28. U.S., 29.12.27).—In a horizontal retort setting the vertical stand-pipes leading from the retorts to the main are insulated so that the temperature of the gases therein is maintained sufficiently high to prevent any condensation of tar or pitch in the pipes. The sensible heat of the gases is utilised in the distillation of tar which is supplied to a section of the main or to a special distillation box. The tar is brought into intimate contact with the gas by spraying or other means. The pitch residue is withdrawn and the enriched gases are passed to a condensing system. A. B. MANNING.

Water-gas plants. T. SCHLATTER (B.P. 326,998, 16.3.29).—A water-gas plant is provided with a steam superheater, the tubes of which are built into the outer walls of the igniting chamber, which is interposed between the producer and the waste-heat boiler.

A. B. MANNING.

b

Removal of ammonia and hydrogen sulphide from coal-distillation and like gases. C. J. HANSEN, Assee. of H. KOPPERS A.-G. (B.P. 307,903 and 309,116, [A] 15.11.28, [B] 24.9.28. Ger., [A] 17.3.28, [B] 5.4.28. Cf. B.P. 299,765 and 301,061; B., 1930, 449).-(A) The gases are scrubbed with solutions containing thiosulphates, polythionates, or other suitable oxy-sulphur compounds, and the spent liquors are regenerated with sulphurous acid obtained by the oxidation of some or all of the hydrogen sulphide in the gas. The oxidation is carried out by passing a part or the whole of the gas, together with air or oxygen, over a catalyst, e.g., finelydivided iron oxide, the treated gases being subsequently worked up by a wet process. (B) The gases are scrubbed with a single liquor containing iron or manganese thiosulphates or polythionates in solution, and the corresponding hydroxide in suspension, the proportion of hydroxide being sufficient to eliminate all hydrogen sulphide in excess of the ratio 2NH₃:1H₂S. The spent liquor is divided into two parts, one of which is regenerated by oxidation with air and the other by treatment with sulphurous acid, in such a manner as to produce hydroxide and thiosulphate, respectively, in the required ratio. A. B. MANNING.

Destructive hydrogenation. W. R. TATE, H. P. STEPHENSON, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 326,896, 31.12.28).—Tars, oils, suspensions of coal in oil, etc. are passed together with hydrogen through an externally heated spiral coil arranged within a high-pressure vessel. The coil may be heated by means of a gas under pressure, *e.g.*, hydrogen, which is itself used subsequently in the reaction, or nitrogen, which may also flow in a spiral coil enveloping the first coil. The coils are preferably arranged vertically and the space within them is occupied by a vessel wherein the liquid and gaseous products are separated.

A. B. MANNING.

Carrying out catalytic hydrogenation [of hydrocarbons]. GES. F. TEERVERWERTUNG M.B.H., and H. KAFFER (B.P. 302,912, 18.12.28. Ger., 23.12.27).— Naphthalene, low-temperature tar benzines, etc. are hydrogenated, without cracking, by the action of hydrogen under pressure and at elevated temperatures, using as catalyst the residual coal which remains as the insoluble and undistillable portion of the original coal after hydrogenation according to the Bergius process.

A. B. MANNING.

Destructive hydrogenation of carbonaceous materials, especially for the production of motor fuels. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 327,194, 3.12.28).—The desulphurisation of crude benzol by treatment with hydrogen under pressure and at elevated temperatures is combined in one operation with the destructive hydrogenation of other carbonaceous materials, *e.g.*, coal, oil, etc. A. B. MANNING.

Distillation of tar. BARRETT Co., Assees. of S. P. MILLER (B.P. 306,093, 14.2.29. U.S., 15.2.28).—The hot gases from a number of coking chambers or retorts are passed through a common collecting main through which also a stream of thinly fluid tar is circulated and is thereby distilled by surface contact with the hot gases. The gases which leave the main are scrubbed

while hot to remove suspended particles of pitch, and are then passed to a condensing system wherein relatively clean oils are separated. A. B. MANNING.

Production of (A) high-, (B) low-carbon pitches and pitch compositions. (c) Production of highand low-carbon pitches. BARRETT Co., Assees. of S. P. MILLER (B.P. 303,163-5, 27,12.28. U.S., 29.12.27).-(A) The gases and vapours evolved during the later stages of coal distillation in coke ovens, horizontal retorts, etc. are withdrawn separately and cooled, in stages if desired, and the tars obtained are subsequently distilled to give pitches of high free-carbon content. The distillation may be effected by bringing the tar into intimate contact with hot coal-distillation gases (cf. B.P. 282,826; B., 1929, 633). By suitably blending the pitches and tars produced, pitches of any desired m.p. and of high free-carbon content are obtained. (B) By separately withdrawing and cooling the gases evolved during the earlier stages of coal distillation, and subsequently distilling the tars thus recovered, pitches containing a relatively low proportion of free carbon are obtained. The distillation may be carried sufficiently far to give pitches of high m.p., which may then be blended with tars or softer pitches to form products of any desired characteristics. (c) The coke ovens or retorts are provided with three collector mains in which the tars evolved during the initial, intermediate, and final stages of carbonisation, respectively, are separately collected. The duration of the initial and final stages, during which low-carbon and high-carbon tars, respectively, are collected, can thus be independently regulated. The tars are subsequently distilled to produce pitches of different free-carbon content. A. B. MANNING.

Fractional distillation [of lubricating oil distillate]. M. B. COOKE, ASST. to ATLANTIC REFINING Co. (U.S.P. 1,744,261, 21.1.30. Appl., 27.8.26).—A lubricating oil distillate having a narrow b.p. range and from which wax is readily removable is produced by passing the appropriate petroleum oil vapours through a series of fractionating zones one above another in countercurrent to and in actual contact with a continuous stream of reflux liquid, while withdrawing and cooling liquid from a zone intermediate the uppermost and lowermost zones and returning the cooled liquid to the zone from which it was withdrawn. H. S. GARLICK.

Recovery of gasoline. H. B. BERNARD, Assr. to SINCLAIR OIL & GAS CO. (U.S.P. 1,743,185, 14.1.30. Appl., 17.4.25).—A liquid absorbing medium used for extracting condensible hydrocarbons from gas mixtures is heated by heat exchange with an external heating medium and the volatile products are dephlegmated by heat exchange with the separated absorbing medium after cooling. The absorbing medium from the dephlegmator is cooled and part returned for treating fresh gas mixtures, the remainder being re-cycled and mixed with the absorbing medium circulating to the dephlegmator. H. S. GARLICK.

Production of stabilised dispersions. N.V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ (B.P. 301,805, 3.12.28. Holl., 5.12.27).—Aqueous dispersions of asphalt, pitch, tar, mineral oils, rubber, etc. are stabilised by reversing the charge of the particles from

negative to positive by the addition of suitable agents, e.g., aluminium chloride, the reversal being effected in the presence of added protective substances (e.g., casein, gelatin), and of finely-divided solid substances preferably colloidal in character, e.g., iron or aluminium hydroxide, clay, barium sulphate. A. B. MANNING.

Bone-black of great decolorising power. E. UR-BAIN, Assr. to URBAIN CORP. (U.S.P. 1,755,156, 15.4.30. Appl., 3.7.26. Fr., 22.7.25).—See B.P. 255,816; B., 1926, 1003.

Products [acetylene] from coal, tars, mineral oils, and the like. O. EISENHUT, ASST. to I. G. FARB-ENIND. A.-G. (U.S.P. 1,757,454, 6.5.30. Appl., 18.1.27. Ger., 19.1.26).—See B.P. 286,825; B., 1928, 356.

Recovery of gas tars from their emulsions with water. R. R. RIPLEY and S. C. SCHWARZ (B.P. 328,516, 29.7.29).—See U.S.P. 1,724,222 ; B., 1929, 842.

Manufacture of oil-gas mixtures. C. CHILOWSKY (U.S.P. 1,757,855, 6.5.30. Appl., 18.7.22. Fr., 27.7.21). —See B.P. 183,828; B., 1924, 46.

Production of products from montan wax. W. PUNGS and M. JAHRSTORFER, ASSTS. to I. G. FARBENIND. A.-G. (U.S.P. 1,755,189, 22.4.30. Appl., 10.9.27. Ger., 13.9.26).—See B.P. 292,298; B., 1928, 633.

Automatic means for regulating the calorific value of coal gas. C. M. CROFT, R. H. BUXTON, and WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT GAS Co. (B.P. 328,007, 15.1.29).

Oil-cleaning apparatus [for waste lubricating oil etc.]. A. R. BELLAMY, and RUSTON & HORNSBY, LTD. (B.P. 327,386, 1.1.29).

Fuel-burning system (B.P. 314,757). Utilising waste heat (B.P. 301,837). Treatment of gases with solids (B.P. 304,239).—See I. Fibres from peat (B.P. 325,904).—See V. Asphalt- and bituminous-masses (B.P. 307,465).—See IX.

III.—ORGANIC INTERMEDIATES.

Formation of butadiene by cracking of hydrocarbons. P. K. FROLICH, R. SIMARD, and A. WHITE (Ind. Eng. Chem., 1930, 22, 240-241).-Experiments were made on the production of butadiene by simultaneous cracking and polymerisation of propane, butane, ethylene, propylene, and cyclohexane by passing the gases or vapours through a cracking chamber consisting of a 2-ft. length of 1-in. quartz tubing wound with resistance wire, and leading the exit gases first through an icecooled and then through a carbon dioxide-cooled condenser. The former condensed most of the highboiling products, e.g., tar, benzene, and naphthalene, whilst the butadiene condensed along with the lowerboiling materials in the carbon dioxide snow cooler. This product was collected and distilled, the fraction boiling above -30° being passed through a train of absorbers containing a concentrated solution of bromine in carbon tetrachloride. Brominated olefines and diolefines remained in solution, which on evaporation to dryness left a solid which was almost pure butadiene tetrabromide. In the case of propane the highest yield obtained corresponds to about 1 mol. of butadiene per

100 mols. of propane, and it appears that this is close to the maximum conversion obtainable by simple cracking. With propylene and butane the highest yields were observed when slightly more than 3 mols. of the diolefine per 100 mols. of hydrocarbon were employed, but in view of the incomplete survey of the experimental conditions a possibility exists of increasing these conversion figures. A single experiment on the cracking of cyclohexane gave 20.6 mols. of butadiene per 100 mols. of cyclohexane reacting. In all experiments with propane, butane, ethylene, and propylene some high-boiling material was formed consisting largely of benzene with smaller amounts of naphthalene and unidentified tarry compounds. The results throw some light on the mechanism of production of aromatic compounds from paraffins, in that they point to the formation of diolefines as intermediates in the process. H. S. GARLICK.

Triethanolamine [tri- β -hydroxyethylamine] emulsions. A. L. WILSON (Ind. Eng. Chem., 1930, 22, 143—146).—The properties and many uses of tri- β hydroxyethylamine and its fatty acid soaps for emulsification are discussed. The oleate is completely miscible with practically all organic liquids, including hydrocarbons, and like the linoleate is valuable for the emulsification of vegetable (and boiled) oils, animal and mineral oils for all purposes. In general, emulsions may be formed by adding an oil solution of a fatty acid (6—20%) to an aqueous solution (2—8%) of tri- β -hydroxyethylamine. The stearate is a hard soap of special value for the emulsification of waxes, and for polishes, cosmetics, etc. E. LEWKOWITSCH.

Separation of phenol mixtures, especially those obtained from brown-coal tar. G. SCHULZ and H. MENGELE (Z. angew. Chem., 1930, 43, 277-279).-The phenol mixture is fractionally distilled, the fractions being collected separately over every 5° range from 185° to 225°. Every fraction is then converted by means of dimethyl sulphate into a mixture of ethers; the b.p. of these from every 5° fraction are 30-35° below those of the original phenols and extend over a range of 17-30°. The ethers are fractionated four times, the receiver being changed at every 5° rise in temperature, and finally the ethers are converted into tribromoderivatives for identification. In this way the following phenols have been detected in the phenol mixture obtained from brown-coal tar: phenol, *m*-cresol, *o*- and *m*-ethylphenol, *o*-4-, *m*-2- and -4-, and *p*-2-xylenols, o-isopropylphenol, and pyrocatechol. A. R. POWELL.

Adsorption of cresol by active carbon. L. PIATTI and O. SPRECKELSEN (Z. angew. Chem., 1930, 43, 308— 310).—Cresol cannot be quantitatively removed from active carbon in which it is absorbed by steam-blowing or by thermal distillation, although such treatment does not affect the adsorptive powers of the carbon. It may be completely withdrawn, however, by thoroughly extracting the carbon with organic solvents, *e.g.*, ethyl alcohol, in a Soxhlet extractor. S. K. TWEEDY.

Coal and carbon as raw materials. MATIGNON. Products from shale retorting. NASH.—See II. Sulphonated oils. RIESS; NISHIZAWA and WINOKUTI. —See XII. Guaiacol and phenacetin. Schwyzer.— See XX.

See also A., May, 551, Catalytic reduction of carbon monoxide at ordinary pressure (KODAMA). 552. Hydrogenation over metallic cæsium (HILL and KISTIAKOWSKY). Copper-zinc oxide catalysts (Aborn and DAVIDSON). 552, Catalysts for synthesis of methyl alcohol (NATTA). 553, Preparation of salicylaldehyde electrolytically (KAWADA and YOSIDA). 580, Electrolytic reduction of crotonaldehyde (SHIMA). 588, Preparation and application of higher esters of p-toluenesulphonic acid (SLOTTA and FRANKE). 593, 1-Methylnaphthalene and derivatives (STEIGER; VESELY and others). 607, Derivatives of hydroxyaminomethylanthraquinones and dihydroxydianthraquinonylethylenes (DE DIESBACH and others). Reduction products of hydroxyanthraquinones (CROSS and PERKIN). 608, Perylene and its derivatives (ZINKE and WENGER). 616, Preparation of quinoline (DARZENS and others).

PATENTS.

Manufacture of butyl alcohol. E. NEUMANN (B.P. 326,812, 18.9. and 9.11.28).—Alcohol vapour, or a mixture of alcohol vapours, is led over a mixed catalyst consisting of a metal (for hydrogenation and dehydrogenation) and a metal oxide (for dehydration), e.g., copper and alumina at 250° ; copper and thoria at 200° ; silver and alumina at 250° ; copper, nickel, and thoria at 200° ; copper and kaolin at 250° . Ethyl alcohol gives acetaldehyde, butyraldehyde, and butyl alcohol; propyl, isopropyl, or a mixture of ethyl and isopropyl alcohols similarly yield alcohols etc. containing C₅ and C₆. C. HOLLINS.

Manufacture of condensation products containing nitrogen and sulphur [from acetylene, ammonia, and inorganic sulphides]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 326,795, 17.12.28). —Acetylene and ammonia are passed over iron pyrites at 350—450°. The products consist of nitriles, thiophen, pyridine bases, ethyl mercaptan, carbon disulphide, etc. and are useful as denaturants, flotation agents, etc.

C. HOLLINS.

Manufacture of nuclear iodination products of oxindole-3-propionic acid. SCHERING-KAHLBAUM A.-G., Assees. of W. SCHOELLER and K. SCHMIDT (G.P. 459,361, 7.2.26. Addn. to G.P. 436,518; B., 1927, 378). —Iodinated oxindole-3-aldehydes are melted with malonic acid and the resulting acrylic acids are reduced. 5-Iodo-oxindole-3-aldehyde, decomp. above 250°, and the 5:7-di-iodo-compound, decomp. 204°, are thus converted into acrylic acids, which are reduced with sodium amalgam. C. HOLLINS.

Preparation of fatty sulphonic acids and wetting, cleaning, and emulsifying agents therefrom. Н. Т. Вöнме А.-G. (В.Р. 298,559, 21.9.28. Ger., 11.10.27. Addn. to B.P. 261,385; B., 1928, 418).—Oleic acid, or other unsaturated, non-hydroxylated, fatty acid, is sulphonated with sulphuric acid in presence of 1 mol. of acetic anhydride (or other organic acid anhydride or chloride). C. Hollins.

Manufacture of sulphonic acids derived from non-aromatic carboxylic acids [wetting and emulsifying agents]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 326,815, 12.12.28).—A non-aromatic acid or fat over C_8 (e.g., stearic acid, oleic acid, coconut oil) is treated below 35° with not more than 3 mols. of a strong sulphonating agent (sulphur trioxide) in carbon tetrachloride, nitrobenzene, or other inert organic diluent to give wetting or emulsifying agents. C. HOLLINS.

Manufacture of sulphonic derivatives of hydrogenated aromatic hydrocarbons [wetting agents etc.]. I. G. FARBENIND. A.-G., Assees. of K. DAIMLER and G. BALLE (G.P. 459,045, 23.7.24. Addn. to G.P. 449,113; B., 1928, 846).—In the process of the prior patent the benzylated naphthalene is replaced by hydrogenated or partly hydrogenated aromatic hydrocarbons. *E.g.*, tetrahydronaphthalene and *n*-butyl alcohol are treated with chlorosulphonic acid at 30—50°. The products may subsequently be benzylated. C. HOLLINS.

Propylation of o- and p-cresols. RHEINISCHE KAMPFER-FABR. G.M.B.H. (B.P. 325,855, 30.8.28. Ger. 12.10.27. Cf. B.P. 298,600; B., 1930, 352).—Cresol vapour is passed with excess of propylene over a dehydrating catalyst (alumina, thoria, aluminium phosphate, kaolin, etc.) at 250—350°. o-Cresol yields mainly 3- and 5-isopropyl-o-cresols and a little carvacrol; p-cresol gives as main product 4-hydroxy-m-cymene, m.p. 36°, b.p. 228—229°, and a little 4-hydroxy-ocymene, m.p. 37°, b.p. 248°. C. HOLLINS.

Manufacture of arylcarboxyamido-o-thioglycolacids [o-carbamylarylthioglycollic acids]. lic I. G. FARBENIND. A.-G. (B.P. 305,140, 30.1.29. Ger., 31.1.28).—The o-thiocyano-nitriles of B.P. 306,575 (B., 1929, 316) are hydrolysed, sometimes by way of the carbamylaryl thiolcarbamates, $NH_2 \cdot CO \cdot Ar \cdot S \cdot CO \cdot NH_2$, to o-thiolarylcarboxylamides by sulphuric acid followed by alkali and hyposulphite. 5-Chloro-3thiocyano-o-tolunitrile is converted by 90% sulphuric acid at 20-25° into 5-chloro-2-carbamyl-m-tolyl thiolcarbamate, m.p. 182-183°, from which by action of alkali and hyposulphite, followed by condensation with chloroacetic acid the 5-chloro-2-carbamyl-mtolylthioglycollic acid is obtained. 4-Chloro-2-thiocyanobenzonitrile gives with sulphuric acid at 20-25° 5-chloro-2-thiolbenzamide, m.p. 305°, which is condensed with chloroacetic acid to form 5-chloro-2-carbamylphenylthioglycollic acid, m.p. 206°. From 4-ethoxy-2thiocyanobenzonitrile are obtained 4-ethoxy-2-thiolbenzamide, m.p. 285°, and a thioglycollic acid of m.p. 208-210°. C. HOLLINS.

Manufacture of 2-mercaptoarylenethiazole compounds [vulcanisation accelerators.] I. G. FARB-ENIND. A.-G. (B.P. 306,558 and 306,842, [A] 23.2.29. Ger., 23.2.28; [B] 25.2.29. Ger., 24.2.28).—(A) A benz- or naphtha-thiazthionium chloride or hydroxide, such as is obtainable by action of sulphur chloride on arylamine, is treated with carbon disulphide and aqueous sodium sulphide, or with a di- or tri-thiocarbonate; the o-aminothiophenol presumably first formed is converted at once into the mercaptobenzthiazole. The thiazthionium chloride from p-phenetidine gives 6-ethoxy-2-thiolbenzthiazole, m.p. 198°. The 6-chloro-4-methyl-(m.p. 252°, from o-toluidine), 6-chloro-4-methoxy-(m.p. 233°, from o-anisidine), and 6-phenylamino-4carboxy- [m.p. 300—305° (decomp.), from anthranilic

acid after an aniline treatment] derivatives are described. 2-Thiol- α -naphthathiazole, m.p. 235°, and 5-chloro-2thiol- β -naphthathiazole, m.p. 304°, are obtained respectively from β - and α -naphthylamines. Benzidine gives 2:2'-dithiol-5:5'-dibenzthiazolyl. (B) 2-Thiolbenzthiazoles are similarly obtained by refluxing an o-thiocyanoarylamine with aqueous sodium sulphide and carbon disulphide (etc.). The preparation of 6-chloro-2-thiol-4methylbenzthiazole, m.p. 252°, 2-thiol-4:6-dimethylbenzthiazole, m.p. 263—265°, 2:6-dithiolbenzthiazole, m.p. 275°, and 2-thiol- α -naphthathiazole is described.

C. HOLLINS.

Manufacture of condensation products from aldehydes and amines and the application thereof in the manufacture of vulcanised rubber. CLAYTON ANILINE Co., LTD., and H. FRITZSCHE (B.P. 326,525, 12.11.28).—Vulcanisation accelerators are made by condensing an aldehyde (more than 1 mol.) with the product from an amine and an aldehyde-bisulphite compound; *e.g.*, formaldehyde is condensed with sodium anilimomethanesulphonate, acetaldehyde or crotonaldehyde with sodium α -anilinoethanesulphonate.

C. HOLLINS.

Manufacture of compounds having hydrogenated ring-systems. I. G. FARBENIND. A.-G., Assees. of O. DIELS and K. ALDER (B.P. 300,130, 5.11.28. Ger., 5.11.27).-Maleic, itaconic, and citraconic anhydrides, acrylic acid, acraldehyde, and other non-quinonoid compounds containing the grouping $C: C \cdot C: O$ react exothermically in absence of a condensing agent with butadiene, cyclopentadiene, phellandrene, myrcene, and other not purely aromatic compounds containing conjugated carbon double linkings, with the production of hydrogenated cyclic or polycylic compounds. From maleic anhydride and cyclopentadiene in cooled benzene solution there is obtained 3: 6-endomethylene- Δ^4 -tetrahydrophthalic anhydride, m.p. 164-165° (acid, m.p. 177-179°; reducible to the hexahydro-acid, m.p. 160—161°). Butadiene gives $cis-\Delta^4$ -tetrahydrophthalic acid, m.p. 166° (anhydride, m.p. 103-104°), and dihydrobenzene yields 3:6-endoethylene- Δ^4 -tetrahydro-phthalic anhydride, m.p. 147°. 3:6-endo $Methylene-\Delta^4$ tetrahydrobenzaldehyde, b.p. 70-72°/20 mm. (bisulphite compound; semicarbazone, m.p. 160°; cyclohexanone compound, m.p. 104-105°), and the corresponding benzoic acid, b.p. 128-130°/15 mm., are obtained from cyclopentadiene and acraldehyde and acrylic acid, respectively. C. HOLLINS.

Manufacture of compounds of the general formula $\mathbf{R}_{\mathbf{C}}$

 $R \cdot CH < C > Ar$, especially derivatives of 1:3-

diketohydrindene [indan-1:3-dione]. T. K. and L. M. WALKER, H. SHAW, and R. BLACK (B.P. 326,467, 12.11.28).—A monoalkylmalonyl halide is condensed with a phenol, or a phenol ether or ester, in presence or absence of a solvent (nitrobenzene, carbon tetrachloride, etc.) and in presence of aluminium chloride or similar condensing agent. *n*-Butylmalonyl chloride and *p*-cresol (or its methyl ether or acetate) give 7-hydroxy-4-methyl-2n-butylindan-1: 3-dione, m.p. 165°; the 2-n-propyl compound has m.p. 187°. Ethylmalonyl chloride and resorcinol dimethyl ether yield, with loss of a methyl group, 5:7- or 7:5-hydroxymethoxy-2-ethylindan-1:3dione, m.p. 192.5°. β -Naphthyl methyl ether condenses with *n*-butylmalonyl chloride in the 1:8-position to give a product, m.p. 182°. The indandiones may be reduced to indanes, e.g., 7-hydroxy-4-methyl-2-n-butyl- and 2-npropyl-indanes, b.p. 207—210°/21 mm. and 190°/18 mm., respectively. C. HOLLINS.

Manufacture of ar-tetrahydronaphthols and their esters and ethers. A. CARPMAEL. From I. G. FARB-ENIND. A.-G. (B.P. 326,762, 16.11. and 10.12.28) .- A naphthol ester or ether is hydrogenated in a solvent in presence of nickel, nickel-cerium, etc. The following compounds are described; ar-tetrahydro-a-naphthol, m.p. 68° (acetate, m.p. 73-75°, b.p. 142-144°/10 mm.; benzoate, m.p. 46°; carbonate, m.p. 114°; methyl ether, b.p. 113°/7 mm.; ethyl ether, b.p. 122°/9 mm.); artetrahydro- β -naphthol (acetate; carbonate, m.p. 106°; methyl ether, b.p. 118°/9 mm.; ethyl ether, b.p. 123°/8 mm.; n-propyl ether, b.p. 140°/10 mm.; isopropyl ether, b.p. 135-136°/9 mm.; isobutyl ether, b.p. 146-148°/12 2-hydroxy-5:6:7:8-tetrahydro-3-naphthoic mm.); acid, m.p. 176° (methyl ester O-acetate, m.p. 94°, b.p. 193°/5 mm.; ethyl ester O-acetate); 2-hydroxy-1-methyl-5:6:7:8-tetrahydronaphthalene acetate, b.p. 156°/9 mm.; 1: 4-dimethoxy-5: 6: 7: 8-tetrahydronaphthalene, b.p. 138—140°/5 mm. C. HOLLINS.

Manufacture of halogen-naphthalene ketones. I. G. FARBENIND. A.-G. (B.P. 301,311, 23.11.28. Ger., 26.11.27).—Aromatic acid halides or anhydrides react with di- and poly-halogenated naphthalenes in presence of aluminium chloride etc. to give naphthyl ketones. The preparation of phenyl 5:8-dichloro- α -naphthyl ketone, m.p. 104—105°; phenyl 4:8-dichloro- α -naphthyl ketone, m.p. 112°, b.p. 270—275°; o- and p-chlorophenyl 5:8-dichloro- α -naphthyl ketones, m.p. 122— 123° and 118°, respectively; 5:8-dichloro- α -naphthyl ketone, m.p. 163—164°; 5:8-dichloro- α -naphthyl methyl ketone, b.p. 250°/13 mm.; and of a ketone from 1:4-dichloronaphthalene and phthalic anhydride is described. C. HOLLINS.

Manufacture of arylated quinones and hydroxyarylquinones. R. PUMMERER (G.P. 459,739, 22.3.22; cf. Pummerer and Prell, A., 1922, i, 1164).—Benzoand naphtha-quinones are condensed in presence of hydrogen chloride and aluminium chloride or zinc chloride with aromatic hydrocarbons, or aromatic compounds containing no free hydroxy-, thiol, or primary or secondary amino-groups; or with monohydric phenols in a diluent. C. HOLLINS.

Manufacture of reduction products of indoxyl, naphthindoxyl, their homologues and acyl derivatives. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 326,523, 6.11.28).—Indoxyls are reduced by hydrogen at suitable pressure and temperature in presence of a catalyst (nickel-copper, copper-cobalt or -nickel, on kieselguhr) to dihydroindoxyls and dihydroindoles; the former may be dehydrated to form indoles. The preparation of 2:3-dihydroindoxyl, m.p. 92—93° (N-acetyl derivative, m.p. 158°), indole, 7-methylindoxyl (ON-diacetyl derivative, m.p. 118—120°), 7-methyldihydroindoxyl, 7-methylindole, m.p. 84—85°, N-acetylββ-naphthindoxyl, m.p. 182° (dihydro-compound, m.p. 175—180°), N-acetyldihydro- $\beta\beta$ -naphthindole, m.p. 118— 120°, and $\beta\beta$ -naphthindole, m.p. 62—63°, is described. C. HOLLINS.

Manufacture of [olefine – polynuclear hydrocarbon] condensation products. R. MICHEL, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,741,473, 31.12.29. Appl., 3.12.28. Ger., 8.12.27).—See B.P. 323,100; B., 1930, 363.

Preparation of condensation products of ethyl alcohol. W. O. HERRMANN and E. BAUM, Assrs. to CONSORT. F. ELEKTROCHEM. IND. (U.S.P. 1,755,692, 22.4.30. Appl., 2.12.27. Ger., 18.12.26).—See B.P. 282,448; B., 1929, 426.

Production of acetone. L. SCHLECHT, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,755,193, 22.4.30. Appl., 23.11.28. Ger., 16.12.27).—See B.P. 313,897; B., 1929, 708.

Preparation of dihydroxyacetone. W. LENZ, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,755,656, 22.4.30. Appl., 20.4.27. Ger., 26.4.26).—See B.P. 269,950; B., 1928, 313.

Manufacture of esters of the borneols. K. STEPHAN and F. ULFFERS, ASSIS. to SCHERING-KAHL-BAUM A.-G. (U.S.P. 1,755,750 and 1,755,752, 22.4.30. Appl., 30.3.26. Ger., 11.4.25).—See B.P. 250,555; B., 1926, 995.

Manufacture of the dehydration product of sorbitol. J. MÜLLER and U. HOFFMANN, Assrs. to I. G. FARBENIND. A.-G. (U.S.P. 1,757,468, 7.1.28. Ger., 7.6.27).—See B.P. 301,655; B., 1929, 123.

Sulphurised compounds of phenols. A. THAUSS, Assr. to GEN. ANILINE WORKS, INC. (U.S.P. 1,757,400, 6.5.30. Appl., 7.7.27. Ger., 15.7.26).—See B.P. 298,280; B., 1928, 886.

Substitution of alkyl groups in the aromatic nucleus. A. VERLEY (U.S.P. 1,756,575, 29.4.30. Appl., 7.7.27. Fr., 31.3.27).—See B.P. 288,122; B., 1929, 47.

[Production of] 6-chloro-2-amino-1-methylbenzene-4-sulphonic acid. F. HENLE and B. VOSSEN, Assrs. to GEN. ANILINE WORKS, INC. (U.S.P. 1,755,648, 22.4.30. Appl., 6.6.28. Ger., 1.9.24).—See G.P. 434,402; B., 1927, 276.

Manufacture of a compound of isonaphthyridin. C. Räth (U.S.P. 1,755,515, 22.4.30. Appl., 10.11.26. Austr., 17.10.25).—See B.P. 259,973; B., 1928, 244.

Manufacture of cyclic ketones of the aromatic series [indanones]. F. MAYER, K. BILLIG, K. HORST, and K. SCHIRMACHER, ASSTS. to I. G. FARBENIND. A.-G. (U.S.P. 1,754,031, 8.4.30. Appl., 15.3.27. Ger., 16.3.26). —See B.P. 288,441; B., 1928, 441.

Hydrogenation of hydrocarbons (B.P. 302,912).— See II.

IV.—DYESTUFFS.

See also A., May, 595, Azomethine azo dyes (SEN and SEN). 605, Sulphur-containing dyes (BETRABET and CHAKRAVATI). 606, Colouring matters of fungi (Kögl and ERXLEBEN). 614, Reactions of magnesium pyrryl and indolyl compounds (NENITZESCU). 616, Action of amines on benzylquinoline chloride (MICHAILENKO and MINOFIEV).

PATENTS.

Manufacture of derivatives of anthanthrone [vat dyes]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 326,874, 22.12.28).—Alkoxyanthanthrones are halogenated, preferably in a diluent (chlorosulphonic acid or nitrobenzene) in presence of iodine etc. to give vat dyes. Methoxyanthanthrone gives on bromination a red, on chlorination a yellowish-red ; a bluish-red is obtained by brominating ethoxyanthanthrone.

C. HOLLINS.

Manufacture of azo dyes [ice colours and pigments]. I. G. FARBENIND. A.-G. (B.P. 302,173, 10.12.28. Ger., 10.12.27).—Imides of 4-amino-1:8-naphthalic acid are diazotised and coupled in substance or on the fibre with 2:3-hydroxynaphthoic arylamides. The methylimide, *e.g.*, gives with the 2:5-dimethoxyanilide a bluish-claret, with the α -naphthylamide a bluish-bordeaux, with the dianisidide violet-brown ; the imide is coupled with the 2:5-dimethoxyanilide (claret-red), anilide (violet), α -naphthylamide (violet), *p*-anisidide (violet), or dianisidide (chocolate-brown).

C. HOLLINS.

Production of monoazo dyes from aminobenzylω-sulphonic acid. W. DUISBERG, W. HENTRICH, and L. ZEH, ASSTS. to GEN. ANILINE WORKS, INC. (U.S.P. 1,755,871 and 1,757,419, [A] 22.4.30, [B] 6.5.30. Appl., [A, B] 12.2.26. Ger., [A] 19.2.25, [B] 13.2.25).—See (A) B.P. 265,767, (B) F.P. 611,004 ; B., 1927, 325, 404.

Production of azo dyes [pigments and ice colours]. O. SOHST, ASST. to GEN. ANILINE WORKS, INC. (U.S.P. 1,754,652, 15.4.30. Appl., 26.6.26. Ger., 7.7.25).—See B.P. 255.072; B., 1927, 743.

Manufacture of (A) azo, (B—D) secondary disazo, dyes. BRIT. DYESTUFFS CORP., LTD., Assees. of (A, B) J. BADDILEY, P. CHORLEY, and R. BRIGHTMAN, and (C, D) J. BADDILEY (U.S.P. 1,757,496, 1,757,499, 1,757,500, and 1,757,506. Appl., [A] 2.3.27, [B, C] 21.5.27, [D] 3.5.29. U.K., [A] 25.6.26, [B] 8.9.26, [C] 10.12.26, [D] 13.12.26).—See B.P. 277,756, 281,767, 287,609, 287,214; B., 1927, 869; 1928, 118, 402, 402.

Preparation of dyes derived from indoline bases. O. WAHL, ASST. to GEN. ANILINE WORKS, INC. (U.S.P. 1,755,678, 22.4.30. Appl., 26.4.27. Ger., 3.5.26).— See B.P. 291,888 : B., 1928, 599.

Manufacture of indigoid dyes. R. STOCKER, ASSI. to Soc. CHEM. IND. IN BASLE (U.S.P. 1,755,972, 22.4.30. Appl., 7.7.26. Switz., 29.7.25).—See B.P. 236,332; B., 1925, 703.

Colloidally dispersed pigments (B.P. 326,516).— See XIII.

V.-FIBRES; TEXTILES; CELLULOSE; PAPER.

Determination of fat in washed wool. P. KRAIS and K. BILTZ (Chem. Umschau, 1930, 37, 81-82).— If washed wool be boiled with very dilute sulphuric acid after the usual extractions of fatty matter etc., further small ether and alcohol extracts (substances in the wool unconnected with the washing process ?) can be obtained. Further, the ordinary alcohol extract contains substances other than soaps or fat, and for an accurate knowledge of the state of the washed wool the alcohol extract should be diluted with water, acidified, and extracted with ether, the fatty matter obtained titrated with alkali, and the result calculated to oleic acid. This figure added to that for the ether extract of the wool (" wool fat ") gives total fatty matter, or multiplied by 1.08 expresses the anhydrous soap content. E. LEWKOWITSCH.

Wood-pulp viscose. II. A. LOTTERMOSER and H. RADESTOCK (Z. angew. Chem., 1929, 42, 1151-1154; cf. B., 1928, 189) .- The influence of pulp origin, concentration of caustic soda, duration of mercerising, maturing of alkali crumbs, and ripening of viscose has been investigated. Great variations of initial viscosity are in part dependent on pulping and more so on bleaching ; excessive bleaching greatly diminishes viscosity. Mercerising with $17\frac{1}{2}$ % caustic soda for 2 hrs. gives good dispersions for all pulps; below $17\frac{1}{2}$ % good dispersion is not obtainable with certainty, but a 30% solution behaves as does a $17\frac{1}{2}$ % solution. Insufficient mercerising cannot be rectified by modifying sulphiding. Increasing the mercerising period diminishes viscosity up to a period of 24 hrs., after which it increases until 90 hrs.' mercerising gives the same viscosity as 2 hrs. More viscous pulps suffer higher percentage diminution of viscosity than do pulps of lower viscosity when over-mercerised. Atmospheric oxygen has a lowering influence on viscosity. Maturing the crumbs also diminishes the viscosity, the effect being most marked during the first 24 hrs. and depending on the concentration of caustic soda used. All viscosities were measured on dispersions of 1 g. of pulp per 200 c.c. of viscose. C. J. J. Fox.

Viscose. III. Influence of oxygen on the ripening of viscose. A. LOTTERMOSER and F. SCHWARZ (Z. angew. Chem., 1930, 43, 16-19; cf. preceding abstract) .- During the preliminary ripening of alkalicellulose in air a reaction takes place with the oxygen of the air which causes the resulting viscose solution to become more fluid. Alkali-cellulose, removed from the sodium hydroxide solution in which it is prepared and allowed to ripen in nitrogen or hydrogen, yields, on xanthation, a viscose solution of higher initial viscosity than that yielded by similar material ripened in oxygen. Subsequent ripening of the viscose solution in nitrogen results in a rapid decrease of viscosity for 24-30 hrs., followed by a steady increase until gelatinisation ensues; at the same time the liquid becomes gradually darker in colour owing to the formation of sodium trithiocarbonate. Viscose solutions made from alkali-cellulose pre-ripened in air or oxygen have, when ripened in oxygen, a low viscosity which rapidly decreases nearly to that of sodium hydroxide solution, and remains constant until gelatinisation occurs; in this case the solution gradually becomes almost colourless and, on acidification, yields sulphur dioxide and carbon dioxide but no hydrogen sulphide. Ripening in air follows an intermediate course between these two extremes. These results indicate that oxygen causes considerable oxidation of cellulose in both ripening stages in the manufacture of viscose silk, and is thus probably the cause of the lower

tensile strength of this type of silk as compared with that of cuprammonium silk, the preparation of which is carried out in the absence of air. A. R. POWELL.

Viscose. IV. Reason for the dependence of the cross-section of viscose filaments on the composition of the coagulating bath. A LOTTERMOSER and C. SCHIEL (Z. angew. Chem., 1930, 43, 80-81; cf. preceding abstract) .- Investigation of osmotic pressure differences between viscose solutions and coagulating-bath liquids shows that when a viscose solution is spun into a coagulating bath a skin of regenerated cellulose is first formed which surrounds the viscose solution. This skin acts as a semi-permeable membrane, and since the osmotic pressure of the coagulating liquid is much higher than that of the viscose solution, water passes from the latter to the former. This causes a partial collapse of the skin and produces a filament of irregular cross-section when coagulation is complete. The more concentrated in sodium bisulphate is the bath, the higher is its osmotic pressure and the more pronounced the collapse of the skin, and hence the more irregular is the shape of the cross-section. This effect is further promoted by reason of the fact that the porosity of the skin increases with increasing salt concentration of the bath.

B. P. RIDGE.

Ripening of alkali-cellulose and the viscosity of the viscose. Y. KAMI, K. KITAZAWA, and T. YAMA-SHITA (J. Cellulose Inst., Tokyo, 1930, 6, 55-66).-At normal temperature the curve expressing the relation between time of ripening and the viscosity of the viscose is hyperbolic in shape, but the lower the temperature the less is its curvature, so that with decreasing temperature the curves approach nearer and nearer to a straight line parallel with the time axis. The viscosity shows a minimum at about 9% soda content of the viscose, and the clearness of the liquid increases with soda content, whilst its colour changes from dark to reddish-brown. In the case of viscoses of about 9% soda content, the influence of the soda content of the alkali-cellulose (degree of pressing) is very small, but for higher or lower contents it is very marked, because homogeneous viscose is then obtained only with difficulty. Optimum conditions for homogeneity of the alkali-cellulose are obtained by pressing the latter to about 3.2 times the weight of cellulose used. If the viscosity-time of ripening curves are drawn for different temperatures of ripening, and if the angle of inclination of the tangents to these curves is Σ , the points of contact of the tangents satisfied by the equation tan $\Sigma = \frac{1}{2}$ lie on a straight line. This line makes an angle φ with the time axis which is characteristic of the cellulose concerned, and the determination of this line furnishes a good method of testing the B. P. RIDGE. cellulose.

Treatment of alkaline drain from [a Japanese] viscose factory. K. TANEMURA and T. KOHNO (J. Cellulose Inst., Tokyo, 1930, 6, 67–75).—The sulphide wash, drain from the viscose cellar, and the alkaline drain liquors have been analysed and conditions of treatment of the effluents under which viscose and sulphides may be removed without neutralisation or acidification have been studied. Satisfactory results are obtained by the

addition of zinc and/or ferrous sulphate, provided that the $p_{\rm H}$ of the liquor is controlled on the alkaline side during precipitation. After settling, the supernatant liquid is colourless and contains neither sulphide and viscose nor the precipitant. When zinc sulphate is used as an ingredient of the spinning bath, the excess liquid from these baths may be used for this treatment. B. P. RIDGE.

Preparation of acetate artificial silk. F. Ohl (Chem.-Ztg., 1930, 54, 202).—A brief review of the above industry. H. F. HARWOOD.

Beating of [paper] pulp. VII. Beating degree and copper number. M. NAKANO (J. Cellulose Inst., Tokyo, 1930, 6, 75-76; cf. B., 1930, 412). As a result of an investigation of the relation between copper number and degree of beating it is shown that (1) the copper number of the beaten stuff is generally higher than that of the original pulp, (2) the rate of increase of the degree of beating of the stuff does not depend on the initial copper number of the unbeaten pulp, and (3) there is no relation between the degree of beating and the copper number of the beaten stuff.

B. P. RIDGE. Swelling of cellulose esters. A. EICHENGRÜN (Z. angew Chem., 1930, 43, 236—237).—By treatment with suitable swelling media, cellulose esters undergo a considerable increase of volume, without essential change of structure, and are easily worked in this state. The author's results differ from those of Hess (B., 1930, 412). J. A. V. BUTLER.

Interim report of the Pulp Evaluation Committee (Proc. Tech. Sect. Papermakers' Assoc., 1929, 10, 4-42).-An apparatus has been designed, and is described, for the purpose of making standard sheets for testing the initial (unbeaten) strength of pulps. The apparatus consists essentially of a disintegrator, a sheet-making machine comprising a cylindrical decklebox, 64 in. in diam. with a 150-mesh wire, and constanthead drainage system, a couch-roll, a sheet press, stainless-steel drying plates, and a device for clamping the sheets at the edges during drying. A sample of pulp equivalent to 24 g. of bone-dry fibre is thoroughly wetted out, made up to 2000 c.c., and disintegrated for 75,000 revolutions at 3000 r.p.m. Mechanical pulps are diluted to 8 litres; chemical pulps to 16 litres. 800 C.c. of chemical pulp stock, or 420 c.c. of mechanical, are poured into the container of the sheet-machine, water being run in to a height of 35 cm. above the wire. After gentle agitation to distribute the fibres, the drain-cock is opened, the sheet allowed to drain for 1 min. after the bulk of water has disappeared, and the container removed. The sheet is couched off the wire by means of blotters, and is transferred to a stainlesssteel plate. Seven sheets are made in this way, the drying plates being alternated with blotters and the stack pressed at 50 lb./in.2 for 5 min. The order of the sheets is then reversed and the pressing repeated. The sheets are air-dried, being clamped at the edges to prevent shrinkage. An "M.G." finish is imparted to the sheets. After conditioning at 65% R.H. and 70° F., tests are made for thickness, basis weight, tensile strength, tearing strength, and bursting strength.

The strengths are reported as factors independent of the basis weight. In dealing with mechanical pulps, the Canadian freeness tester is recommended for checking the fineness. The method has been adopted as standard by the Papermakers' Association. The experimental work carried out by the Committee is described in a separate publication. A full bibliography is appended. T. T. Ports.

Drying of solids. III. Mechanism of the drying of pulp and paper. T. K. SHERWOOD (Ind. Eng. Chem., 1930, 22, 132-136; cf. B., 1929, 1035).-The drying operation is divisible, in general, into two periodsa constant-rate period and a falling-rate period. During the former the surface of the solid is uniformly wetted and the rate of drying is independent of the water content and the thickness of the slab. The falling-rate period is usually further divisible into two phases, either or both of which in turn may control during this period. In the first phase the reduced rate of drying is due to a decrease in the area of wetted surface (unsaturated surface drying), and is independent of the thickness of the material being dried. In the second the rate of drying is controlled by the rate of internal liquid diffusion, and is then a function of the thickness of the slab. Experiments are cited which show that for thick pulp slabs internal liquid diffusion is the controlling factor during the falling-rate period of drying, whilst for thin pulp sheets and paper the mechanism during the falling-rate period is that of unsaturated surface-drying. An empirical equation is given showing the relationship between water content and time for the drying of pulp and fibre boards. D. J. NORMAN.

Performance of [heat] economisers in the drying of pulp and paper. F. W. ADAMS and C. M. COOPER (Ind. Eng. Chem., 1930, 22, 127—129).—The results of a series of tests on a Briner-type economiser indicate that when heat is recovered solely for preheating air for the dryer, the maximum heat recoverable is less than one third of the total heat available in the outgoing air, and of this amount an actual recovery of 50—60% may be expected. When, however, there is a demand outside the dryer system for large quantities of warm air for ventilating purposes, the efficiency of heat recovery is greatly improved. A hypothetical case is worked out to show the financial advantages of using economisers.

D. J. NORMAN.

Cooking process. I. Rôle of water in the cooking of wood. S. I. ARONOVSKY and R. A. GORTNER (Ind. Eng. Chem., 1930, 22, 264-274).—The effect of digestion under varying conditions of a number of wood dusts is examined. Changes in the amounts of sugars, pentoses, pentosans, lignin, furfuraldehyde, and volatile acids obtained in the cooking liquor at different temperatures are recorded, together with the corresponding proportions of cellulose, α -cellulose, pentosans, and lignin in the wood residue. During digestion for 2 hrs. at temperatures up to 186°, changes occurring in the wood result from the direct action of water, and are not secondary effects of acids formed in the process. A. G. POLLARD.

Carbonyl groups of lignin and its sulphonates and sulphate pulp digestion. E. Hägglund, T.

JOHNSON, and L. H. TRYGG (Cellulosechem., 1930, 11, 30-38).-Investigations have been made to establish the presence of active carbonyl groups in lignin hydrochloride prepared by the authors' method (B., 1929, 241). The presence of these groups is masked, but treatment with acid in presence of phenols and aromatic amines discloses their presence. Phenol-lignin does not behave thus, and appears to be a condensed ring product formed by interaction of phenolic hydroxyl and ligninaldehyde to form an acetal compound. Sulphonation of lignin in the pulping process proceeds directly and carbonyl groups are masked in consequence; if lignin is not fully sulphonated before the buffer action of sulphite ceases, owing to its interaction, "black cook" is unavoidable. The acidity of the cooking solution remains constant until the buffer action fails; until then the cooking solution and pulp are almost colourless. Bisulphited carbonyl groups act protectively, but later diminution of bisulphite concentration and intramolecular changes lead to decomposition of bisulphited carbonyl groups, darkening of liquor, and corresponding changes in pulp colour. These facts are confirmed by colour changes obtained with fuchsin reagent. C. J. J. Fox.

Corrosion problems in the rayon industry. P. C. KINGSBURY (Ind. Eng. Chem., 1930, 22, 130—132). —The advantages of stoneware plant for the storage of corrosive liquids are outlined. Vessels of 2000-litre capacity are the largest that can be satisfactorily manufactured in quantity, but a number of these may be connected up by a siphoning system to resemble in operation one large storage tank. D. J. NORMAN.

Action of liquids on paper. J. STRACHAN (Proc. Tech. Sect. Papermakers' Assoc., 1930, 10, 59-70).— A discussion of a paper already abstracted (B., 1930, 97).

China clay. AITKEN.—See VIII. Air-conditioning in the press room. GRAHAM.—See XXIII.

See also A., May, 538, Adsorption of salts by artificial silk (Hellar).

PATENTS.

Manufacture of textile fibres from peat. I. WEG-MAN (B.P. 325,904, 8.12.28).—The tensile strength, appearance, and spinning properties of peat fibre as ordinarily prepared are improved by a treatment for 20—30 days in wooden vats with dilute solutions of plant extracts and/or resin emulsions with addition of small quantities of metal salts or mixtures thereof. After rinsing, the fibres are finally treated with oxygen or solutions of oxidising agents. The plant extract is preferably prepared from plants of the *Labiatæ*, *Aristolochiaceæ*, or like family. D. J. NORMAN.

Production of artificial (A) filaments and threads, (B) textile yarns or threads. BRIT. CELANESE, LTD., and W. I. TAYLOR (B.P. 326,462 and 325,823, [A] 28.9.28, [B] 21.11.28).—(A) A "unitary" filament of relatively large cross-section is obtained from twisted or untwisted bundles of filaments by moistening them with a swelling agent so that the individual filaments stick together. The "unitary" filament may contain different types of artificial filaments or yarns or even metallic wires. Any tackiness remaining after adhesion of the filaments is removed by the application of lubricants. Suitable apparatus is described. (B) The bundles of filaments are treated at intervals with a swelling agent instead of continuously. D. J. NORMAN.

Extraction of cellulose. A. THIRET (B.P. 325,570, 20.11.28).—Cellulosic material is subjected to successive treatments under atmospheric pressure with hot caustic alkali solution of gradually increasing concentration, the caustic alkali solution circulating in a more or less continuous flow through a series of vats so that the final purification of the cellulose is effected with soda solutions that are free from organic matter. Suitable apparatus is described. D. J. NORMAN.

Production of pulp. EUROMERICAN CELLULOSE PRODUCTS CORP., Assees. of E. R. DARLING (B.P. 314,061, 6.6.29. U.S., 22.6.28).—Cellulose pulp is prepared from straw, oat hulls, and similar material containing pentosans, by digesting the shredded and washed material first with water, then with dilute acid, e.g., 1% sulphuric acid to hydrolyse the pentosans, and finally with dilute alkali solution. Each or all of these operations may be conducted under pressure.

D. J. NORMAN. Machine for dissolving [cellulose] xanthate. R. THURM and E. SCHMIERER, Assrs. to BAKER PERKINS Co., INC. (U.S.P. 1,742,226, 7.1.30. Appl., 10.9.27).-A receptacle contains an open-ended drum fixed therein above a series of radially-disposed bars; this, in turn, is mounted above a co-axial, rotatable, bladed impeller. The material being dissolved passes through the impeller and bars and thence through the drum, and is impeded from flowing away laterally from the impeller by means of a grille arranged as a circular wall outside, and close to, the tips of the impeller blades, which tips may be constructed as shear edges for better disintegration of the material. A second, finer-meshed, removable grille may also be provided. S. K. TWEEDY.

Preparation of plastic composition articles and method of preparing the same. BRIT. CELANESE, LTD. (B.P. 303,516, 4.1.29. U.S., 6.1.28. Addn. to B.P. 282,723; B., 1928, 853).—The mixtures of finelypowdered cellulose esters and plasticisers prepared according to the prior process are moulded under heat and pressure. Temperatures of 50—80°, preferably 70°, and pressures of 300—500 lb./in.² are suitable for a period of 2—3 hrs. D. J. NORMAN.

Production of paper. L. MELLERSH-JACKSON. From MATHIESON ALKALI WORKS (B.P. 326,956--8, 15.2.29).-(B) Chlorine is used for the sterilisation of the stock and for this purpose is conveniently introduced continuously into the mixing boxes ahead of the paper machine in sufficient quantity to leave 0.5-1 p.p.m. of free chlorine. (A) A coagulating agent, e.g., alum, may be added at the same time to effect coagulation of the colloidal material. This chlorination treatment prevents slime and pitch formation, increases the hydration of the stock, and at the same time causes it to run freer on the machine. (c) Chlorine is added at or near the beginning of the beating operation to sterilise the stock and thereby prevent the formation of pitch

and beater gum during the beating operation (cf. B.P. 324,547; B., 1930, 368). D. J. NORMAN.

Production of paper-, artificial leather-material, and the like from leather waste. M. M. SEREBRIANY (B.P. 326,936, 30.1.29).—Leather waste is swollen and degreased in hot water containing about 5% of salt or turpentine, and is then moulded in hot or cold presses. Alternatively, the swollen mass may be pressed into log-shaped pieces, which are then converted into fibrous material and run on a paper or board machine optionally after the addition of vegetable or animal fibrous material or fillers. D. J. NORMAN.

Manufacture of composite sheet material. WOLFF & Co. KOMM.-GES. AUF AKT., and R. WEINGAND (B.P. 309,019, 9.1.29. Ger., 3.4.28. Addn. to B.P. 304,722; B., 1930, 368).—Improved results are obtained by using as the agglutinant a protein, *e.g.*, gelatin, dissolved in a solvent such as glacial acetic acid which is also a solvent for the cellulose derivative which does not swell in water. If desired, cellulose derivatives which swell in water may be used instead of the regenerated cellulose specified in the prior patent. D. J. NORMAN.

Manufacture of artificial threads of cellulose derivatives. K. HOFFMANN (U.S.P. 1,754,427, 15.4.30. Appl., 11.3.26. Ger., 12.3.25).—See B.P. 249,141; B., 1927, 184.

Production of porous paper. G. L. SCHWARTZ, Assr. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,757,757, 6.5.30. Appl., 6.6.28).—See B.P. 313,085; B., 1930, 414.

[Apparatus for] conversion of vegetable fibres into fibres resembling wool. TEXTILES (NEW PRO-CESS), LTD., Assees. of J. VIALLET (B.P. 309,020, 15.1.29. Fr., 3.4.28).

Composite [cotton-jute heat-]insulating material. UPSON Co., Assees. of C. A. UPSON and H. MCC. SPENCER (B.P. 317,363, 23.2.29. U.S., 14.8.28).

Production of artificial [silk] ribbons, tapes, straws, etc. BRIT. CELANESE, LTD., and W. I. TAYLOR (B.P. 328,312, 21.11.28).

Devices for winding artificial silk threads. O. (FRH.) VON KOHORN (O. KOHORN & Co.), and A. PERL (B.P. 316,252, 17.5.29. Austr., 26.7.28).

[Apparatus for] washing of pulp [for use as filtering-medium]. BLAIR, CAMPBELL, & MCLEAN, LTD., and S. HUTCHIN (B.P. 328,090, 20.3.29).

Making paper of definite thickness. A. E. O'Dell. From Freiberger Papierfabr. zu Weissen-BORN (B.P. 327,655, 25.7.29).

Protection against textile pests (B.P. 326,451 and 326,567).—See VI. Waste alkali liquors (B.P. 314,812).—See VII. Impregnating insulating material (B.P. 297,035).—See XI.

VI.—BLEACHING; DYEING; PRINTING; FINISHING. PATENTS,

Protection of fibres. ORANIENBURGER CHEM. FABR. A.-G., Assees. of CHEM. FABR. MILCH A.-G. (B.P. 289,898, 5.5.28. Ger., 6.5.27).—Textile fibres are protected during treatment with acids or alkalis as in bleaching, scouring, carbonisation, degumming, and tanning, by addition to the treatment liquors of water-soluble, halogen-substituted sulphonic acids or their salts prepared from aliphatic or hydroaromatic substances of high mol. wt. containing at least 10 carbon atoms in the molecule. [Stat. ref.] A. J. HALL.

Dyeing of animal fibres with vat dyes. I. G. FARBENIND. A.-G., Assees. of F. JUST, K. DAIMLER, and G. BALLE (G.P. 457,802, 20.12.23).—Wool is dyed from a weakly alkaline, neutral, or weakly acid bath with a leuco-vat dye maintained in solution by means of benzylnaphthalenesulphonic acid resins etc.

C. HOLLINS.

Dyeing with the aid of diazo compounds [ice colours]. O. Y. IMRAY. From I. G. FARBENIND. A.-G. (B.P. 326,866, 19.12.28).—The stability of diazo solutions in presence of metallic iron is improved by addition of nitrous acid (sodium nitrite) so that ferrous ions are oxidised to ferric. C. HOLLINS.

Dyeing of cellulose esters. I. G. FARBENIND. A.-G., Assees. of R. METZGER (G.P. 457,957, 23.4.22).— Acetate silk etc. is dyed with carboxylated azo dyes (other than derivatives of salicylic acids). Examples are: *p*-aminophenoxyacetic acid $\rightarrow \beta$ -naphthol (redorange); *p*-aminobenzoic acid $\rightarrow m$ -phenylenediamine (orange); α -naphthylamine $\rightarrow p$ -hydroxybenzoic acid (gold-yellow); *p*-nitroaniline $\rightarrow 4$ -hydroxy- α -naphthoic acid (brown-red). C. HOLLINS.

Decorative treatment of textile fabrics. CALICO PRINTERS' ASSOC., LTD., and J. D. WEBSTER (B.P. 326,823, 20.12.28).—The fabric is prepared on one side by means of an engraved padding or printing roller with a coupling component, dried, and prepared on the other side with a different coupling component, and, after drying, a single application of a diazo compound is made, which penetrates the fabric and produces the same pattern on both sides in different shades. An example is Naphthol AS and AS/G with three-colour pattern of Fast black salt K, 5-nitro-o-anisidine, and *m*-nitroaniline. A printing roller of exceptional depth ("bang-through" engraving) is used. C. HOLLINS.

Protection of materials from the attack of moth and other pests. Protection of wool, fur, hair, etc. against textile pests. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. [A] 326,451, 10.12.28, and [B] 326,567, 20.12.28).—(A) The hydroxylated condensation products obtained from phenols of the benzene series and hydroaromatic cyclic ketones are used for moth-proofing wool, fur, etc. The example is the product from phenol and cyclohexanone. (B) Symmetrical disubstituted thiocarbamides, e.g., valerylphenyl- and hexoylphenyl-thiocarbamides are similarly employed. C. HOLLINS.

Dyeing of cellulose esters or ethers. E. FISCHER, Assr. to GEN. ANILINE WORKS, INC. (U.S.P. 1,755,640, 22.4.30. Appl., 9.9.26. Ger., 17.9.25).—See B.P. 258,611; B., 1927, 874.

Dyeing of regenerated cellulose materials. BRIT. DYESTUFFS CORP., LTD., Assees. of (A, D, E, F, H) J. BADDILEY, and (B, C, G) J. BADDILEY, P. CHORLEY,

and R. BRIGHTMAN (U.S.P. 1,757,158, 1,757,497-8, 1,757,501-5, 6.5.30. Appl., [A] 8.3.28, [B, C] 16.3.27, [D] 21.5.27, [E] 26.5.27, [F] 3.12.27, [G] 6.7.28, [H] 11.12.28. U.K., [A, F] 10.12.26, [B] 16.4.26, [C] 7.9.26, [D] 13.12.26, [E, H] 7.9.26, [G] Ger., 2.5.27).—See B.P. 283,319, 270,883, 281,410, 287,214, 280,320, 281,767; B., 1928, 189; 1927, 520; 1928, 121, 402, 49, 118.

[Carroting] treatment of animal hair and wool with chlorine. Е. Вöнм (U.S.P. 1,756,723, 29.4.30. Appl., 22.11.27. Austr., 1.12.26).—See B.P. 281,646; B., 1928, 520.

Printing colours. K. H. MEYER, J. MÜLLER, and W. HOFFMANN, Assrs. to I. G. FARBENIND. A.-G. (U.S.P. 1,756,951, 6.5.30. Appl., 7.1.28. Ger., 7.1.27).—See B.P. 292,655; B., 1928, 681.

Treatment of materials made of or containing cellulose derivatives. G. H. ELLIS, ASST. to CELANESE CORP. OF AMERICA (U.S.P. 1,757,519, 6.5.30. Appl., 25.3.27. U.K., 30.10.26).—See B.P. 280,698; B., 1928, 86.

[Apparatus for] washing, desulphurising, bleaching, and similar treatment of artificial silk. C. LANDESKROENER (B.P. 305,980, 7.1.29. Ger., 13.2.28).

Machines for dyeing, washing, mercerising, or otherwise treating skeins of textile threads. C., G., and F. BONNET (Soc. VEUVE BONNET AINÉ ET SES FILS) (B.P. 327,399, 29,12.28).

Dye vats for dyeing. F. A. BERNHARDT A.-G., and T. KUHNEL (B.P. 327,782, 25.1.29).

Dye jigs. S. WALKER & SONS, LTD., G. E. WALKER, and J. MACE (B.P. 327,781, 25,1.29).

Means for dyeing yarn. J. LEVY (B.P. 328,099, 2.4.29).

Method and apparatus for dyeing or other liquid treatment of silks and other fabrics. C. P. Cole, SEN. (B.P. 306,462, 20.2.29. U.S., 20.2.28).

Treatment of textile yarns and threads in wound form with fluids. Treatment with air or gases of textile yarns. J. BRANDWOOD (B.P. 328,013-4, 16.1.29).

[Means for] coating of fabrics with cellulose derivatives. G. S. WALLIS (B.P. 328,431, 22.4.29).

Wetting agents (B.P. 298,559 and 326,815).-See III.

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

Synthesis of ammonia by the high-pressure method and the production of the necessary hydrogen. G. CLAUDES (Oesterr. Chem.-Ztg., 1930, 33, 64-65).—A review of the development of the Claude process. A. R. POWELL.

Applications of hydrogen peroxide in industry. G. ADOLPH (Z. Electrochem., 1930, 36, 146-149).—A general survey: the preparation and properties of the compound are also described. H. F. GILLBE.

Rapid differentiation of precipitated calcium carbonate and pulverised chalk or limestone. J. RANEDO (Anal. Fis. Quím., 1929, 27, [tecn.], 168-170). —The sample (0.5 g.) is mixed with 10—15 c.c. of water and centrifuged for a few minutes. The precipitated carbonate may be distinguished from the pulverised mineral by the appearance of the supernatant liquid and by the smaller volume of the precipitate.

H. F. GILLBE.

Barium aluminates. E. MARTIN (Chim. et Ind., 1930, 23, 564-572).-Aluminium hydroxide, when calcined at a controlled rate and then hydrated afresh, differs in its properties from the original compound, as the process of calcination complicates the alumina molecule in the same way as it affects ferric oxide or silica. This behaviour offers an explanation of the complexity of barium aluminates prepared by heating mixtures of barium carbonate and aluminium hydroxide. Solutions of barium aluminates are unstable, yielding a precipitate containing a less proportion of barium than the solution. The author has in this way isolated a crystalline compound of composition 10Al₂O₃,11BaO. Precipitation with excess of calcium chloride has indicated the existence of a series of compounds of the formula nAl_2O_3 , (n + 1)BaO. These are simplified by hydrolysis, the final product being Al₂O₃,2BaO. The author has, however, prepared at the temperature of the electric arc the compound Al₂O₃,3BaO, which is not obtainable at temperatures below 1500°. Its solutions are much more stable, and it is likely to be the most satisfactory form for industrial purposes.

C. IRWIN.

Analysis of crude phosphates. A. SUCHIER (Z. angew. Chem., 1930, 43, 313–314).—Precise details are given for a method of determining the phosphoric acid in crude phosphate containing 25-38% P₂O₅, in which the acid is precipitated with ammonium molybdate, the precipitate is taken up in ammonia, and then the acid is reprecipitated from the solution by addition of magnesia solution. S. K. TWEEDY.

Coal and carbon as raw materials. MATIGNON.— See II. Rarer constituents of clays. FIOLETOV.— See VIII. "Kalkammonsalpeter." NEHRING.— See XVI.

See also A., May, 552, Copper-zinc oxide catalysts (ABORN and DAVIDSON). Catalysts for synthesis of methyl alcohol (NATTA). 553, Synthesis of nitrogen dioxide (WESTHAVER and BREWER). 555, Concentration of hydrogen peroxide solutions (HURD and PUTERBAUGH). Production of hydrogen peroxide (ASKENASY and Rose). 556, Production of barium oxide (Askenasy and Rose). 561, Determination of halogen in insoluble halides (KLEIN). Direct determination of bromide in presence of chloride (LONGINESCU and PIRTEA). Determination of selenium, tellurium, and gold (SOMEYA). 562, Determination of phosphoric acids (HINSBERG and LASZLO ; BRESTAK and DAFERT). 564. Determination of aluminium in presence of manganese (LUKAS and JILEK). Determination and separation of rare earths (Moser and SIEGMANN).

PATENTS.

Contact process for manufacturing sulphuric acid. H. T. MERRIAM, Assr. to GEN. CHEM. Co. (U.S.P. 1,737,320, 26.11.29. Appl., 17.12.27).—The gases obtained by roasting pyrites or smelting sulphide ores, after leaving the purifiers, are caused to mix with the hot gases produced by combustion of Louisiana brimstone, the amounts of the two gas streams being regulated to give the proper temperature for conversion and the required concentration of sulphur dioxide. Preheating the purified gas or disposing of the surplus heat of the brimstone gas is thus avoided, and the relatively low sulphur dioxide content of the purified gas is increased. W. J. WRIGHT.

Manufacture of alkali hydroxides. I. G. FARBEN-IND. A.-G. (B.P. 303,366, 29.12.28. Ger., 31.12.27).— An alkali salt soluble in water and in liquid ammonia, *e.g.*, sodium chloride, is treated under pressure with aqueous ammonia of 50% concentration or above. Liquid ammonia may be added to an aqueous solution of the salt, or water to a solution of the salt in liquid ammonia, the alkali hydroxide being precipitated.

F. G. CLARKE.

Production of alkali carbonates and ammonia by saponification of calcium cyanamide. M. BUCHNER (U.S.P. 1,737,297, 26.11.29. Appl., 27.7.26. Ger., 21.7.24).—Calcium cyanamide is "saponified" under pressure in presence of an alkali fluoride, the calcium fluoride is removed by filtration, and the filtrate heated to liberate ammonia and yield an alkali carbonate. The calcium fluoride may be caused to react with silicon fluoride and an alkali salt in presence of an acid, thereby producing an alkali silicofluoride, which on heating forms alkali fluoride and silicon fluoride. The calcium chloride formed may be converted into calcium carbonate and ammonium chloride. W. J. WRIGHT.

Manufacture of ammonium chloride crystals. IMPERIAL CHEM. INDUSTRIES, LTD., and C. W. BUNN (B.P. 326,642, 23.2.29).—Before a solution of ammonium chloride is crystallised, with agitation, a small proportion (0.1%) of a substance which forms mixed crystals or a double salt with ammonium chloride, *e.g.*, manganous or iron chloride, is added. Small spherical crystals are formed which pour well and do not cake.

F. G. CLARKE.

Purification of waste alkali liquors. I. G. FARBENIND. A.-G. (B.P. 314,812, 1.7.29. Ger., 2.7.28).-The liquor (from artificial silk manufacture etc.) is treated with an alkali manganate or permanganate. Manganese dioxide is precipitated and the organic impurities are oxidised to carbon dioxide which reacts with the sodium hydroxide formed to produce sodium carbonate. The latter may be separated out almost completely by cooling, and may be fused, after addition of a further quantity, with the manganese dioxide formed to produce suitable fresh manganate or permanganate; sodium hydroxide may also be employed for this purpose, but when only carbonate is used sodium hydroxide is formed in the alkali liquor, and so the process becomes continuous. S. K. TWEEDY.

Extraction of borax [from rasorite etc.]. T. M. CRAMER (B.P. 326,116, 3.7.29. U.S., 19.12.28).—Minerals containing prismatic borax are heated above 100° and under pressure. The borax dissolves in its own water of crystallisation and the solution is separated

off from the gangue, which does not slime. Suitable apparatus is described for a continuous process.

S. K. TWEEDY.

Manufacture of sodium formate. R. KOEPP & Co., and T. BADENHAUSEN (G.P. 457,112, 17.1.25).— Carbon monoxide is led into a suspension of calcium sulphate in 10% sodium formate solution at 160—170° under pressure, and hourly or continuous additions of a suspension of lime in 20% sodium sulphate (or formate) are made, sodium formate and calcium sulphate being removed from time to time. The formate is obtained in high concentration after filtration. C. HOLLINS.

Manufacture of alkaline-earth cyanides. I. G. FARBENIND. A.-G. (B.P. 303,115, 27,12.28. Ger., 28.12.27). —A mixture of equivalent amounts of an alkali cyanide and an alkaline-earth salt, the acid residue of which yields with the alkali used a salt soluble in liquid ammonia, is treated with liquid ammonia either below its b.p. or at a higher temperature under a pressure dependent on the relative solubilities of the individual components. H. ROYAL-DAWSON.

Treatment of thiocyanates. C. J. HANSEN, Assee. of H. KOPPERS A.-G. (B.P. 311,725, 12.11.28. Ger., 15.5.28).—The thiocyanates, e.g., ammonium thiocyanate, are decomposed by heating in aqueous solution at 220— 350° under pressure in autoclaves, or by treatment at the ordinary pressure with steam superheated above 200°. The products are cooled and treated for the recovery of ammonia, or, after removal of carbon dioxide, of ammonium sulphide solution, or they may be worked up together with the spent liquors from the scrubbing operation of a thionate process, e.g., that described in B.P. 309,116 (B., 1930, 546). L. A. COLES.

Decomposition of raw phosphates. A. MESSERSCHMITT (B.P. 306,086, 6.2.29. Ger., 15.2.28. Addn. to B.P. 300,961; B., 1930, 57).—The reducing agents employed in the prior process are replaced, wholly or partly, by calcium sulphide, *e.g.*, alkali waste, or Leblanc soda or potash contaminated with calcium sulphide. S. K. TWEEDY.

Production of dried [calcium] superphosphate. CHEM. IND. A.-G. (CHEM. IND. U. PAPIERFABR. A.-G.), and H. MEYER (B.P. 304,697, 23.1.29. Ger., 24.1.28).— Superphosphate is stored until the calcium sulphate present is hydrated (1—4 days), and is then dried at a temperature insufficient to convert the phosphoric acid into insoluble form. F. G. CLARKE.

Reduction of gypsum. (SIR) G. C. MARKS. From G. POLYSIUS A.-G. (B.P. 326,612, 23.1.29).—In the production of sulphur oxides for the manufacture of sulphuric acid from gypsum, the charge of gypsum, aluminous material, and an excess of reducing agent is burned in the form of granules in a rotary furnace. The charge does not cake on the furnace walls.

F. G. CLARKE.

Manufacture of organo-metallic [iron] compounds. A. CARPMAEL. From SCHERING-KAHLBAUM A.-G. (B.P. 304,731, 24.1.29).—Oxygen carriers for oxidations below 40° are obtained by reducing hæmin with hyposulphite or cysteine, treating the resulting ferrous complex compound with bases (nicotine), and adsorbing the product on starch, animal charcoal, silica gel, etc. C. HOLLINS.

Production of phosphoric acid and hydrogen. M. LARSSON, ASST. to DU PONT AMMONIA CORP. (U.S.P. 1,756,429, 29.4.30. Appl., 31.3.25. Swed., 15.4.24).— See F.P. 595,987 ; B., 1926, 320.

Catalytic oxidation of ammonia. O. BALZ and F. REUSCHER, ASSTS. to I. G. FARBENIND. A.-G. (U.S.P. 1,754,345, 15.4.30. Appl., 3.8.25. Ger., 22.12.24).— See G.P. 431,506 ; B., 1926, 915.

Manufacture of basic calcium hypochlorites. S. URANO and S. IMAI (U.S.P. 1,755,677, 22.4.30. Appl., 15.3.26).—See B.P. 266,180; B., 1927, 299.

Manufacture of coated [calcium] phosphide. F. HEBLER (U.S.P. 1,757,713, 6.5.30. Appl., 23.7.27. Ger., 14.8.25).—See B.P. 279,751; B., 1928, 14.

Manufacture of pure lead hydroxide from impure lead sulphate. R. DALOZE (U.S.P. 1,757,902, 6.5.30. Appl., 8.11.26. Fr., 12.10.26).—See F.P. 636,163; B., 1930, 324.

Liquid-air oxygen-producing plant. O. SIMONIS (U.S.P. 1,757,022, 6.5.30. Appl., 9.4.26. U.K., 21.1.26). —See B.P. 269,661; B., 1927, 482.

Device for mechanically emptying superphosphate chambers. J. ZATHEY, and TOWARZYSTWO ZAKLADÓW CHEMICZNYCH "STREM" SPÓLKA AKCYJNA (B.P. 328,486, 4.6.29).

Gases as solid blocks (B.P. 327,414). Freezing mixtures (B.P. 327,038).—See I. Ammonia and hydrogen sulphide from gases (B.P. 307,903 and 309,116).—See II. Bricks etc. (B.P. 327,247).—See IX. Conductivity of solutions (B.P. 309,025).—See XI.

VIII.—GLASS; CERAMICS.

Theory of the strength of thermally toughened glass. J. T. LITTLETON, JUN., and F. W. PRESTON (J. Soc. Glass Tech., 1929, 13, 336-349 T).-It is shown that the optimum desirable heat treatment for an ordinary soda-lime glass rod is one which introduces 3500 lb./in.² of axial tension, the strength being thereby increased 50% with respect to plain tension. If the modulus of rupture of annealed glass were t, then, considering bending, for optimum heat treatment the central tension, f, should theoretically be $1 \cdot 2t$, and the modulus of rupture, q, of the toughened glass $3 \cdot 42t$. With less than optimum central tension, $q = t + 2f_0$; with more, $q^2 = 12f_0 \times$ $(2t-f_0)$. In practice the case is much more complicated, though the results deduced were of the right order. Thus it was generally easily possible to raise the modulus of rupture to 2.5 times its value for annealed glass. Theoretical curves showing the values q/t against f_0/t and also modulus of rupture against strain at centre of specimen (measured in wave-lengths of birefringence per in.) had some experimentally determined points plotted on them which were in very fair agreement. M. PARKIN.

Strength of glass containing cracks. L. H. MILLI-GAN (J. Soc. Glass Tech., 1929, 13, 351—360 T).—The rate at which cracks in glass extended and the forces required to cause complete rupture of such glass were considerably influenced by external factors, such as presence of water. Small glass plates with a transverse, wheel-cut scratch across the middle of one face were broken by loading the centre of the plate with the scratch facing downwards. The mean values for the breaking loads of bars treated under the following conditions, viz., (a) dry, (b) wetted, (c) wetted then dried, (d) freshly oiltreated (paraffin), (e) sodium silicate treated, were, in the same order: 960, 780, 1050, 1124 (check 1223 against 1012 dry), and 1148 g. The mechanism by which liquids thus affected the strength was not apparent, and though the effect of the sodium silicate was to cement the crack, the low rise in strength was somewhat surprising. M. PARKIN.

Analysis of glasses containing phosphate. J. D. CAUWOOD, J. H. DAVIDSON, and V. DIMBLEBY (J. Soc. Glass Tech., 1929, 13, 270-279 T).-The method for removing phosphorus pentoxide from glass by means of silver carbonate and nitrate already described (B., 1928, 404) was found to be unsatisfactory in the case of a complex glass containing more than 5% P₂O₅. The For methods finally recommended are the following. simple glasses with less than 6-7% (Fe₂O₃ + Al₂O₃) the phosphate solution is treated with 30 c.c. of ammonium nitrate solution (340 g. per litre) and 5 c.c. of concentrated nitric acid, the solution is heated just to boiling, and the required amount of hot ammonium molybdate solution added to precipitate the phosphorus pentoxide as phosphomolybdate. After settling, filtering, and washing with ammonium nitrate solution, the filtrate, after neutralising with ammonia solution and acidifying with acetic acid, is treated with 4% lead acetate solution to precipitate excess molybdate as lead salt, and, after boiling, filtering, and washing, the excess lead is removed by hydrogen sulphide. After boiling off excess gas the bases are determined as usual, aluminium and zinc being separated by the basic acetate method. For glasses in which $(Fe_2O_3 + Al_2O_3)$ is above 6-7%, or for those containing also lead and barium, hydrochloric acid should be used in place of acetic acid. A rapid method for determination of calcium in presence of phosphorus is to add ammonium carbonate to a hydrochloric acid solution until slight turbidity is produced, followed by ferric chloride solution, a few drops at a time, till the liquid above the ferric phosphate is brown. The bulk is then made up to 400 c.c., the solution boiled for 1 min., filtered, etc., and calcium determined as usual in the filtrate. M. PARKIN.

Absorption of glasses in the ultra-violet region. P. GILARD and P. SWINGS (Bull. Acad. roy. Belg., 1929, [v], 15, 749—755).—Details are given of a simple method of determining the percentage transmission of ultraviolet light by glass. An examination of a number of glasses indicates that the transmission is increased by the presence of nickel oxide and that barium oxide is more effective than calcium oxide in producing transparency in the region 2700—3300 Å. F. G. TRYHORN.

Conversion of quartz of different grain-size into silica-stone in presence of various fluxes. H. SALMANG and B. WENTZ (Keram. Runds., 1929, 37, 711-716; Chem. Zentr., 1929, ii, 3175).—Successful products obtained by heating mixtures of sand, lime, sulphite liquor, ferric oxide, and sodium and potassium

carbonates at 1410° are attributed to the fine grain and to the presence of sodium ferrite. A. A. ELDRIDGE.

China clay. J. E. AITKEN (Proc. Tech. Sect. Papermakers' Assoc., 1929, 10, 213—220).—A popular account of the occurrence, mining, purification, and use of China clay for papermaking. T. T. Ports.

Rarer constituents of clays. A. FIOLETOV (Keram. Runds., 1929, **37**, 659—663; Chem. Zentr., 1929, ii, 3246).—The clays examined contained $1-1\cdot5\%$ TiO₂, probably as rutile, and $0\cdot1\%$ V, probably finely divided as sulphide. Zirconium is often absent, but sometimes is present up to $0\cdot1\%$. A. A. ELDRIDGE.

Treatment of certain Western [Canadian] clays to overcome drying defects. H. FRÉCHETTE and J. G. PHILLIPS (Canada Dept. Mines, Invest. Ceramics and Road Materials, 1929, No. 697, 4-16).-The serious drying defects due to the high shrinkage of a laminated plastic clay known as "gumbo," and of "Redcliff" clay, both from the Winnipeg district of Canada, may be overcome either by preheating the material to 450-550° or by the use of grog together with the addition of chemical coagulants, e.g., ferric or sodium chloride. The former process would have to be preceded by a drying operation to reduce the moisture from about 33% to 5%, and thus involves considerable capital expenditure. The addition of grog or of coagulants separately was completely unsuccessful, but additions of 25-50% of grog and of up to 5% of a chemical coagulant gave satisfactory results; ferric chloride or a mixture of ferric and sodium chlorides was the most effective. C. A. KING.

See also A., May, 569, Fireclays of southern Saskatchewan (HUTT). Kaolin minerals (Ross and KERB). 570, Kaolinite (SETO).

PATENTS.

Manufacture of strengthened glass. H. D. MURRAY and D. A. SPENCER (B.P. 327,121, 24.12.28).— The shock-absorbing layer of a composite glass comprises layers of regenerated cellulose united by means of gelatin or a soluble gum, preferably in the presence of a mounting medium (acetic acid) comprising a solvent for the substratum and the binder. F. G. CLARKE.

Manufacture of composite materials and the like [non-splintering glass]. H. DREVFUS (B.P. 326,520, 12.10.28 and 18.7.29).—Cellulose ether and ester films are made to adhere to glass by incorporation of a synthetic resin, *e.g.*, the resin from phenol and furfuraldehyde, aniline and furfuraldehyde, formaldehyde, and *p*-toluenesulphonamide, or acaroid resin. C. HOLLINS.

Manufacture of transparent fused silica. H. GEORGE, Assr. to Soc. QUARTZ & SILICE (U.S.P. 1,755,953, 22.4.30. Appl., 9.3.28. Fr., 23.3.27).—See B.P. 287,522; B., 1928, 642.

Production of ceramic material and binding agent therefor. V. M. GOLDSCHMIDT and R. KNUDSEN, Assrs. to BORGESTAD FABRIKKER (U.S.P. 1,756,786, 29.4.30. Appl., 18.10.26. Nor., 24.10.25).—See B.P. 260,298; B., 1928, 232.

Manufacture of glazed non-vitreous pottery. J. W. MELLOR (Re-issue 17,656, 6.5.30, of U.S.P. 1,666,828, 17.4.28).—See B., 1928, 368. Apparatus for handling and emptying glassmelting pots. N.V. MAATS. TOT BEHEER EN EXPLOIT. VAN OCTROOIEN (B.P. 317,860, 23.8.29. Ger., 25.8.28. Addn. to B.P. 212,250).

Making laminated glass [containing layers of celluloid]. L. J. KOLB, Assees. of R. A. GIBBS (B.P. 315,834, 28.6.29. U.S., 19.7.28).

Furnace linings (B.P. 327,390).—See I.

IX.—BUILDING MATERIALS.

Trass and sand as additions to cement. R. GRÜN (Chem. Erde, 1930, 5, 113—145).—Tests were made on the addition of trass and sand to Portland cement and slag-cements, the materials being either ground together or simply mixed. The products were tested after exposure to air, water, or magnesium sulphate solution for various periods of time (3 days to 24 months). It was found that the addition, by simple mixing, of up to 40% of trass increases the strength and resistance to wear of the product. L. J. SPENCER.

Sand-cement [mixtures]. A. MADINAVEITIA and A. BOOTELLA (Anal. Fis. Quim., 1929, 27, [tecn.], 164—167).—It is suggested that the peculiar properties of sand-cement mixtures are due to the colloidal nature of the finely-divided cement particles which in the wet mixture carry a positive charge while the sand particles are negatively charged; the mixture thus forms a more compact mass than is obtained by the use of cement alone, in which case all the particles are similarly charged. The hypothesis is supported by measurement of the densities of cement and of sandcement mixtures; a contraction in the latter case, greater than that due to the quantity of cement present, is attributable to electrostatic attraction of the particles. H. F. GILLBE.

Hot cement. N. DAVEY (Cement, 1930, 3, 413—418). —Doubt has been expressed as to the quality of cement which arrives at its destination, for use, in a heated condition. Physical tests made on new cement which had a temperature of 120° showed that no reduction in the strength of concrete need be expected on account of the higher temperature at which it was mixed.

C. A. KING.

Road tar. P. B. NICHOLSON (Gas J., 1930, 190, 197—198).—It is suggested that lack of uniformity in tar supplied for road dressing is responsible for poor demands for this material. R. H. GRIFFITH.

Tar roads for average and heavy traffic. MÜLLER (Gas- u. Wasserfach, 1930, 73, 279—284).—A summary of methods and costs of road construction and maintenance involving the use of tar in conjunction with various aggregates. Tar macadam manufacture receives special attention, and reference is made to the advantage of laying this material hot, whereby a far more viscous tar may be utilised; the addition of asphalt to the tar is regarded as lacking justification. The grading of the aggregate and the physical properties of the tar used in the preparation of tar concrete are of great importance, and the standard specification for this type of road construction is quoted. The preparation and application of Dammann (Essen) asphalt is described, and another type of material claimed to give a very satisfactory surface consists of calcareous limestone previously impregnated with hot tar under vacuum. Brief reference is made to the use of tar emulsions for patching and grouting. D. G. MURDOCH.

Asphalt emulsions. GRÄFE and FLECK.-See II.

PATENTS.

Means for measuring the permeability of sands and other aggregates. BRIT. CAST IRON RES. ASSOC., W. J. REES, and J. G. A. SKERL (B.P. 327,306, 19.4.29).— The aggregate (e.g., foundry sand) is packed into a cylindrical container having apertures at both ends, the whole being then secured over an opening in a gas chamber provided with a manometer. Coal gas is introduced into the chamber at the lower end and the time taken for gas to escape through the sand in sufficient quantity to be ignited by a pilot flame is noted. F. G. CLARKE.

Manufacture of bricks, blocks, slabs, tiles, pipes, etc. F. P. JONES (B.P. 327,247, 25.2.29).— A plastic mass is prepared from a waste lime-containing sludge, e.g., alkali waste, and clay, shale, marl, ground slate, or mixtures thereof, and the articles formed therefrom are burned in a closed kiln. By using appropriate proportions and temperatures, products having different colours, porosity, hardness, etc. are obtained. F. G. CLARKE.

Composition capable of being moulded. MICHELIN & CHE. (B.P. 317,073, 11.7.29. Fr., 11.8.28. Addn. to B.P. 263,138; B., 1927, 367).—Moulded compositions made as described in the prior patent are rendered less porous by plunging them into molten sulphur.

H. ROYAL-DAWSON.

Preservation of wood. I. G. FARBENIND. A.-G. (B.P. 302,698 and 303,168, [A] 20. and [B] 27.12.28. Ger., [A] 20. and [B] 29.12.27).—Wood is impregnated (A) with a higher fatty ester, ether-ester, or mixed ester of a carbohydrate (e.g., cellulose trilaurate, laurylated starch), or (B) with a diazo compound, preferably stabilised as zinc chloride double salt or naphthalenesulphonate, e.g., the diazonium sulphate from 5-nitro-oanisidine. C. HOLLINS.

Improvement of asphalt and bituminous masses. K. WINKLER (B.P. 307,465, 8.3.29. Ger., 8.3.28).— Mixtures obtained by boiling drying oils with metal oxides until they thicken are incorporated with natural or artificial asphalts, pitches, etc., and the whole mixture is again boiled for a short time. About 5% of the oil mixture, containing 2-5% of metal oxide, may be used. The metal oxides may be partly replaced by sulphur or sulphur compounds. Asbestos or cellulose, and sand, lime, or other fillers, may be added also. The products are impervious to water, tough, and highly adhesive. A. B. MANNING.

Charging apparatus for vertical kilns for burning cement, lime, and the like. E. SCHWENK and A. HAUENSCHILD (B.P. 327,679, 31.12.28).

Manufacture of faced articles of cement, such as slabs, panels, cornices, mouldings, etc. H. G. C. FAIRWEATHER. From O. L. MCDERMOTT (B.P. 327,584, 16.4.29). Building blocks. A. INGRAM (B.P. 327,766, 17.1.29).

Composite plaster boards or slabs intended particularly for building purposes. A. HARLEY (B.P. 328,326, 26.1.29).

Production of flooring and paving. C. GARTEN-MANN and K. RINGOLD (C. GARTENMANN & CIE.) (B.P. 304,199, 12.1.29. Ger., 16.1.28).

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

Decomposition of carbon monoxide in the iron blast furnace. F. Wüst (Z. anorg. Chem., 1930, 188, 143-151).-The conditions under which carbon monoxide is decomposed in the blast furnace with separation of carbon are discussed on the basis of numerous analyses of gas drawn from different levels. At any particular temperature a certain degree of reduction of the ore is required for the separation of carbon, since the local concentration of carbon dioxide at the surface of the unreduced ore, due to its high rate of accumulation and slowness of diffusion, displaces the carbon monoxidecarbon dioxide equilibrium in the direction of the monoxide. The decomposition of the monoxide occurs chiefly at 600-700°, not at 500° as would be expected from laboratory experiments. F. L. USHER.

Decomposition of blast-furnace slag. F. HART-MANN and A. LARGE (Arch. Eisenhüttenw., 1929-1930, 3, 615-625; Stahl u. Eisen, 1930, 50, 517-518).-Blastfurnace slags containing 41-54% CaO were fused, allowed to cool slowly to various temperatures, quenched, and examined for the presence of y-dicalcium silicate which causes them to disintegrate. All slags with more than 51% CaO disintegrated immediately after quenching from below 1300°; those with 47-51% CaO disintegrated immediately when quenched from 1100-900°, according to the lime content, but only slowly when quenched from lower temperatures. Slags with less than 47% CaO were stable after quenching from below 1300°, but those with 46-47% CaO had a slight tendency to disintegrate after quenching from 1000-1100°. Increase in the manganese content reduces the maximum amount of lime present in the stable slags and also renders them brittle; alumina, on the other hand, increases the stability of the slags with a high lime content, whilst magnesia still further increases the stability and strength of the slags. Ferrous oxide, above 10%, causes the socalled "iron disintegration" to take place; these slags must be quenched from 800°. The yellow glow observed on exposing slags containing y-dicalcium silicate to ultra-violet light is apparently due to the presence of impurities and is not a property of the γ -form of the A. R. POWELL. silicate.

Reduction of Anshan iron ore. S. MITA (J. Ferrous Met. Anshan, Japan, 1929, 31, 1067—1102).— A study of the relation between temperature and reduction velocity, using hydrogen and dried Anshan hæmatite. CHEMICAL ABSTRACTS.

Growth of grey cast iron by repeated heating. T. TERAO (Suiyokaishi, 1929, 5, 814—815).—Heating at 200° for 2 hrs. and cooling were repeated 40 times, the volume change being measured; for constant silicon content the effect of the carbon content was small, whilst the increase was the greater the greater was the silicon content. CHEMICAL ABSTRACTS.

Cause of graphite formation in cast iron. H. NISHIMURA (Suiyokaishi, 1929, 5, 763—769).—A discussion in which the view that graphite is formed solely by decomposition of Fe_3C is attacked. In a ternary diagram it is assumed that the primary surface of Fe_3C exists only in the range where the silicon content is small, and the primary surface of graphite exists over the range where the silicon content is large; sulphur causes supercooling and increase in the stability of Fe_3C . CHEMICAL ABSTRACTS.

Effect of alloying elements on the iron carbide in cast iron. F. ROLL (Giesserei, 1929, 16, 933—936; Chem. Zentr., 1929, ii, 2930).—The iron carbide is the more stable the more vanadium, chromium, or manganese is present; cobalt, nickel, copper, and zinc decompose the carbide. Tungsten, uranium, and lead promote the formation of graphite; tin produces grey cast iron, and molybdenum, boron, aluminium, silicon, germanium, phosphorus, oxygen, and sulphur partly preserve and partly decompose the carbide.

A. A. ELDRIDGE.

Galvanic corrosion on cast-iron pipes. R. J. KUHN (Ind. Eng. Chem., 1930, 22, 335-341).-A study of the extensive corrosion of cast-iron service pipes laid in the soil of the New Orleans district showed that the metal was distinctly electropositive in situ, and that the rate of corrosion was proportional to the difference of potential of pure iron in the electromotive series, and the actual potential of the pipes in the earth. This difference is not attributed to direct leakage from current-carrying cables, but is thought to be due to the presence of oxide films acting similarly to mill-scale on steel. The most efficient cure up to the present has been a system of electrolysis drainage, by connecting electrically pipes liable to be affected to the negative system of public electric plants. C. A. KING.

Formation of graphite during solidification of cast iron. T. Kasé (Sci. Rep. Tôhoku, 1930, 19, 17-35). —The determination of the change of electrical resistance in the vicinity of the eutectic temperature, thermal analyses, and microscopical examination of cast iron when cooled under various conditions have been made. It is concluded that the adoption of the double diagram which gives two horizontal lines corresponding to the cementite-austenite and graphite-austenite eutectic is unreasonable. W. E. Downey.

Mechanism of nitriding of pure iron. B. TAZAWA (J. Study Ferrous Met., Japan, 1929, 106, 375–401).— When iron is heated in ammonia at 600°, 670°, or 760°, the nitrogen content of the outer layer $(8 \cdot 1-11 \cdot 1\% \text{ N})$ varied sinusoidally with time; the interior layer was composed of the eutectic mixture and the core of ferrite.

CHEMICAL ABSTRACTS. Experiments with coal-fired pot-annealing furnaces. H. STÄBLER (Stahl u. Eisen, 1930, 50, 381— 391).—An attempt has been made to elucidate some questions regarding annealing time, fuel consumption,

choice of pot, etc. arising from an analysis of the details of operation of annealing furnaces in a number of works. The maximum and minimum temperatures within the heating stock, in a semi-gas-fired furnace capable of accommodating five pots, have been determined as a function of the time. The annealing time, *i.e.*, the time required for the minimum temperature within the material to reach the arbitrarily chosen value of 700°, is a linear function of the weight of the charge (W), and is given by the equation $T = T_0 + KW$, where T_0 is the time required for the inner wall of the empty pot to reach 700°. The temperature difference, $t_{\rm max} - t_{\rm min}$, when $t_{\min} = 700^{\circ}$, increases linearly with the weight of the charge until the latter reaches about 1500 kg., when it passes through a maximum and thereafter decreases. By suitably regulating the heating conditions the characteristic temperature curves $(t_{max}, and t_{min}, as$ functions of the time) can be varied to correspond with any desired heat-treatment of the material. The calculation of the efficiency of the plant from the annealing time is discussed and illustrated by one or two examples. A. B. MANNING.

Cold-working and annealing of metals and alloys. L. GUILLET and J. COURNOT (Compt. rend., 1930, 190, 905—908).—Some of the inferences of Guichard, Clausmann, and Billon (B., 1930, 331, 337) are called in question, but without production of any fresh data. The measurement of deformation, D, as 100(S-s)/S, where s is the sectional area before, and S after, deformation, is preferred. The non-dependence of hardness on method of deformation, and the alleged effects of annealing, are disputed. It is pointed out that hardness is not the only desideratum in metal for coins.

C. A. SILBERRAD.

Effect of various alloying elements on the critical points of carbon steels. A. MERZ (Arch. Eisenhüttenw., 1929-1930, 3, 587-596; Stahl u. Eisen, 1930, 50, 518 -519).-Dilatometric investigations of nickel steels show that the temperature of the critical points falls with increasing carbon content. Chromium lowers the temperature of the A3 point of iron to a minimum with 5-7% Cr; with increasing carbon content the various critical temperatures are lowered in an irregular manner. Tungsten raises the temperature of the A3 points and silicon and nickel-chromium cause a broadening of the Y-field with increasing carbon content. Manganese has a relatively small effect on the critical temperature, only a slight fall taking place with increasing manganese A. R. POWELL. content.

Apparatus for the determination of sulphur in iron and steel. ANON. (Chem.-Ztg., 1930, 54, 260).— The apparatus comprises a conical flask with two concentric long necks into which fits a double, glass, bellshaped vessel carrying a thistle funnel for admitting acid to the flask and provided with a side tube at the top of the outer bell for connexion with the usual cadmium acetate absorption vessel. A water-seal in the space between the two necks serves to prevent ingress of air, and a second seal between the two walls of the bell-jar enables hydrochloric acid to be removed from the gas stream. A. R. POWELL.

Determination of titanium in alloy steels. F. SPINDECK (Chem.-Ztg., 1930, 54, 260).—The sample (5-10 g.) is dissolved in hydrochloric acid, the ferrous chloride oxidised with nitric acid, and the solution evaporated to dryness to separate silica. The residue is extracted with 1:1 hydrochloric acid, the silica collected, ignited, and volatilised with hydrofluoric acid, and any residue dissolved by fusion with bisulphate. The resulting solution is added to the main filtrate after removal of the iron therefrom by extraction with ether. The solution is neutralised with sodium hydroxide, treated with 5 c.c. of 1: 4 sulphuric acid and 80 c.c. of saturated sulphur dioxide solution, diluted to 600 c.c., and boiled for 2-3 hrs. to precipitate metatitanic acid. The precipitate is collected, washed with 15% acetic acid, ignited, and weighed as TiO₂. A. R. POWELL.

Volumetric determination of cobalt : application to special steels. L. MALAPRADE (Bull. Soc. chim., 1930, [iv], 42405-420).—The method proposed by Job (B., 1898, Abab has been modified. The cobalt salt is oxidised with precipitation of hydrated cobaltic oxide by boiling h a large excess of hydrogen peroxide in a caustic all-a ine medium. The mixture is treated with sulphuric or hydrochloric acid and potassium iodide at 40-50° and the iodine liberated is titrated with sodium thiosulphate. Alternatively, the hydrated cobaltic oxide may be reduced with ferrous sulphate, excess of the latter being determined by permanganate titration. Only the latter method is applicable when determining cobalt in presence of not more than four times its weight of iron. Mangalese and cobalt may be determined together by using hydrogen peroxide and potassium hydroxide as the oxidising agent and proceeding iodometrically. The caustic alkali must be replaced by sodium hydrogen carbonate when determining cobalt in presence of nickel, the amount of which latter must not very much exceed the amount of cobalt. In presence of zinc and aluminium the oxidation is effected in caustic alkaline medium. The application of the method to the analysis of cobaltchromium steel is described. S. K. TWEEDY.

Rapid determination of corrodibility. K. Kono-PICKY (Z. Elektrochem., 1930, 36, 244-248).-The corrodibility of a sample of iron or steel by a given solution may be determined by adding to the solution ferrous and ferric ions' in such proportions as to give a suitable oxidation potential, then measuring the potential of the metal in contact with the solution. Owing to reduction of ferric ions in the layer of solution in the metal surface by local currents, the measured potential is less than the calculated oxidation-reduction potential for the solution by an amount which is a measure of the corrodibility of the metal. In alkaline solutions a mixture of stannous and stannic ions may be used to give the necessary oxidation potential. Experiments made by this method on the corrosion of acid-resisting steels show that the rate of attack decreases logarithmically with the time as corrosion proceeds, and clearly reveal the effect of heat treatment and of surface defects, such as the presence of rolling-scale, on corrosion. The method is particularly suitable for detecting local defects in large pieces of metal.

R. CUTHILL.

Structure of hard brass (58% Cu). R. HINZMANN

and H. FLÖSSNER (Z. Metallk., 1930, 22, 115-118).--Extruded rods of brass with 58% Cu and 2.3% Pb usually have a needle-like structure of $(\alpha + \beta)$, the α needles being finely dispersed throughout the β -needles and thus offsetting their brittleness. The structure of the end of the rods, however, shows rounded α irregularly embedded in a ground - mass of β . Heat - treatment experiments on this type of brass have proved that the needle structure is formed directly from pure β by rapid air-cooling, whereas the granular or rounded $(\alpha + \beta)$ structure is obtained by slow cooling of β or by prolonged annealing at a temperature just below the $\beta \rightarrow (\alpha + \beta)$ transformation point. The latter treatment produces large a-grains free from twinning. Deformation of the alloy with a granular $(\alpha + \beta)$ structure followed by annealing above the recrystallisation point produces a finer-grained, granular $(\alpha + \beta)$ structure in which the α -grains are relatively small and twinning is common. Either of the first two structures may be obtained by annealing the metal above the transformation point until the α has completely disappeared; slow cooling then produces the granular, and rapid cooling A. R. POWELL. the needle, structure.

Structure of hard brass (58% Cu) after various heat treatments. P. SIEBE and G. ELSNER (Z. Metallk., 1930, 22, 109-114).-The end portions of extruded brass rods rapidly develop a coarsely crystalline macrostructure on annealing at 800°. When the rods are heated slowly to the annealing temperature, cooled rapidly, and re-annealed, the middle portions also become coarsely crystalline irrespective of the rate of heating during the second anneal. With a rapid rate of heating in the first anneal, however, a second anneal fails to produce large crystals. The thicker the rods the smaller is the tendency to form coarse β -crystals on annealing, but the structure is always coarser than that of thinner rods. The degree of decomposition of the B-crystals after cooling slowly is always greater in the end portions of the rods than in the middle, and in thick rods than in thin; the orientation of the precipitated a varies with the heat treatment and depend on the fine structure of the β from which it has separated. In the manufacture of extruded brass rod it is recommended that the ingot used should be as short as possible so that the temperature at which the last part leaves the press is not greatly different from that at which the first part was extruded ; if possible, not more than one anneal should be made. A. R. POWELL.

Ancient bronzes. G. ZENGHELIS (Chim. et Ind., 1930, 23, 556-563).—The "patina," or scale, on ancient Greek bronzes was in some cases deliberately produced by heating and exposure to vapours containing hydrogen sulphide. The corrosive scale formerly called "bronze disease" consists of a mixture of oxychlorides and carbonates and is of electrolytic origin. It cannot exist in bronzes beneath the sea owing to the absence of oxygen and carbon dioxide. Newly recovered bronzes should be tested by being kept for 2 days in an atmosphere saturated with water vapour. If a green scale develops, the bronze is treated by the Rozenberg method, in which chlorine is removed with a paste containing aluminium. C. IRWIN.

Air-hardening copper-cobalt alloy. C. S. SMITH (Min. and Met., 1930, 11, 213-215).-An alloy of copper with 3.58% Co has a homogeneous a-structure at 950°, but this changes to a duplex structure at the ordinary temperature. As the initial rate of formation of nuclei is high and the growth of the particles slow, the alloy undergoes air-hardening when allowed to cool from 900-950° in the air and age-hardening when quenched and reheated at 475-550°. When quenched in icewater the Rockwell B hardness is 14.7, which rises to 41.7 at 475° and to 54.5 at 550°. The hardness of the air-cooled alloy is 48.7, which rises to 58.6 on reheating at 475° and to 61.4 at 550°. Slower cooling in "Sil-o-cel" produces a hardness of 50, which rises to 59 on reheating at 550°. After cooling in the furnace the hardness is 22.2. The tensile strength of the hardened alloy is 51,000 lb./in.2 and the elongation 20%. When the alloy is annealed in air there is formed below the usual scale of copper oxide a layer of tightly adherent, metallic "sub-scale " which appears to consist of polygonal grains of the underlying metal surrounded by films and impregnated by grains of cobalt oxide.

A. R. POWELL.

Ouenching velocities [of various liquids for metals]. I. OBINATA (Mem. Ryojun Coll. Eng., 1930, 2, 315-330).-The rates of cooling of brass and cupronickel from 200-900° after plunging into water, toluene, liquid air, a mineral oil, and a vegetable oil have been determined. Water proved to be the most powerful quenching medium, whilst liquid air and toluene were very poor. In all cases a maximum rate of cooling occurred at a definite temperature, which was highest for water and lowest for toluene. This temperature was lowered and the initial cooling rate decreased by raising the temperature of the cooling medium. The initial cooling rate was increased, however, by raising the temperature of the metal before quenching, except in the case of water, where 650° gave the maximum cooling A. R. POWELL. rate.

Rapid method of analysis of anti-friction metals. J. BEATO (Anal. Fis. Quim., 1929, 27, [tecn.], 171-190). -The method of Oesterheld and Honegger (A., 1919, ii, 478) yields results for tin which are too low. The following method is recommended. The alloy (1 g.) is dissolved in 20 c.c. of boiling concentrated sulphuric acid and, after cooling and diluting with 100 c.c. of water, 5-15 c.c. of concentrated hydrochloric acid are added and the antimony is titrated in the hot solution with 0.1N-potassium bromate, using methyl-orange as indicator. Lead is next determined directly by weighing the precipitated lead sulphate, which may be contaminated with sulphur if there is much tin in the alloy. To the filtrate are added 50 c.c. of concentrated hydrochloric acid and 1.5 g. of aluminium in three equal portions, and the solution, which should be contained in a flask fitted with a Bunsen valve, is boiled until dissolution of the tin which first separates is complete ; after cooling, 2 g. of potassium bicarbonate and 5 c.c. of 2N-potassium iodide are added, and the solution is titrated with 0.1N-potassium bromate, using starch as indicator. Iron in moderate quantity does not influence the determination, whereas copper, and to a less extent antimony when present in considerable quantity, tends to produce low results for the tin, but this error may be reduced by prolonging the boiling during the reduction with aluminium.

H. F. GILLBE.

"Improvement" or "age - hardening" of alloys. W. GUERTLER (Z. Metallk., 1930, 22, 78-84). -The exact meaning of the terms "improvement" or "age-hardening" ("Vergütung" or "Veredelung") in connexion with the heat-treatment of alloys is discussed. It is suggested that these terms should be applied to that heat-treatment which causes an improvement of the mechanical properties of an alloy due to changes in its internal heterogeneous state unaccompanied by change of composition or by visible change in the structure and texture of the alloy. Hence, agehardening alloys must necessarily be capable of existing in different states of equilibrium with variations in the temperature, the reactions which take place in the solid state must be reversible, and it must be possible to restrain these reactions from going to completion by suitable heat-treatment and to cause them to proceed by another heat-treatment. The three principal types of age-hardening alloys are those in which (a) a compound is precipitated from solid solution, (b) the solubility of one constituent in the other increases with rise of temperature, and (c) a crystal phase is formed from or decomposed into two crystal phases during cooling. The characteristics of these types of alloys are discussed A. R. POWELL. from the theoretical point of view.

Age-hardening aluminium alloys. W. FRAENKEL (Z. Metallk., 1930, 22, 84—89).—The mechanism of the age-hardening process in copper-aluminium alloys with and without small quantities of other constituents is discussed in the light of recent research on these alloys, and the author concludes that no satisfactory explanation has been advanced to account for all the observed phenomena, especially for the fact that, in many cases, the hardness increases during ageing at the ordinary temperature and then decreases sharply before commencing to increase again on subsequent ageing at high temperatures. A. R. POWELL.

Age-hardening heavy-metal alloys. G. MASING (Z. Metallk., 1930, 22, 90—94).—A review of recent work on the development of age-hardening alloys of copper (Heusler alloys, Corson alloys, and berylliumcopper alloys) and of iron, with a brief description of the properties of the alloys and the effect of heat-treatment thereon. The mechanism of the hardening process is discussed. A. R. POWELL.

Age-hardening precious-metal alloys. L. NowACK (Z. Metallk., 1930, 22, 94—103).—Recent work on alloys containing silver, gold, and platinum which are subject to age-hardening is reviewed, and a brief account given of various new systems in which the phenomena occurs. Alloys of gold with 20-25% Pt exhibit age-hardening after quenching from 1000° and annealing at 550° ; addition of a small amount of zinc increases the hardening effect appreciably. Alloys of gold with 10% Pt or Pd and 1.5-3% Zn harden rapidly at 550° to a maximum hardness of 170. Iron-gold alloys with 15-20% Fe harden rapidly at 400°, the original hardness of the quenched alloy (100) increasing to 280 in 1 hr. Nickelgold alloys with more than 10% Ni harden, due to the slow decomposition of the solid solution, and coppergold alloys with equimolecular proportions of the elements become almost twice as hard after annealing at 200°, owing to the transformation of the solid solution into the compound CuAu; corresponding with this change the *d* increases and the electrical resistance falls. Palladium-copper and platinum-copper alloys behave similarly. A. R. POWELL.

Flowability of aluminium and alpax under constant pressure. A. COURTY (Compt. rend., 1930, 190, 936-938).-By the method previously described (cf. Saito and Hayashi, B., 1920, 159 A; Guillet and Portevin, B., 1926, 983), with addition of a device whereby the metal enters the mould under uniform pressure, thereby ensuring much more uniform results, the effect on the flowability of aluminium $(99 \cdot 8\%)$ and of alpax (Al 87%, Si 13%) of (i) temperature of pouring (575-890°), (ii) temperature of the mould (15-560°), and (iii) superheating and the period of heating before pouring has been examined. It is shown that as regards (i) flowability increases in approximately direct ratio with increase of temperature of pouring; (ii) has little effect below 200°, above which flowability is markedly increased; (iii) has little or no effect. Under similar conditions (save at the lowest temperatures, when the difference is greater) the flowability of alpax is about 30% greater than that of aluminium. C. A. SILBERRAD.

Experience with aluminium alloys in sea-water. H. BAUERMEISTER (Z. Metallk., 1930, 22, 119-128).-The behaviour of machinery parts made of cast and worked aluminium alloys in Baltic and North Sea water has been examined. None of the commercial cast alloys behaved very badly when not in contact with other metals, but all rapidly corroded in contact with brass, copper, or iron except "KS-sea-water" alloy containing 3% Mg, 3% Mn, 0.93% Sb, 0.56% Fe, 0.26% Si, and $92 \cdot 3\%$ Al. This alloy has a tensile strength of 18 kg./mm.², a yield point of 9.5 kg./mm.², an elongation of 3-8%, and a Brinell hardness of 60; tensile strength and elongation remain unchanged after prolonged immersion in sea-water, whereas a slow reduction occurs in these values for lautal and duralumin and a much more rapid reduction with silumin. Corrosion of aged alloys usually commences around rivet holes and at places where the metal has been bent, but the KS-alloy can be riveted or welded without deteriorating its resistance to corrosion. Tests with artificially produced coatings of oxide showed that these serve only to prolong the life of the metal in sea-water and do not entirely prevent corrosion. A. R. POWELL.

Texture of cold-deformed metals. F. WEVER and W. E. SCHMID (Z. Metallk., 22, 133—140).—The changes in the crystal texture of iron and aluminium after a parallelopiped plane deformation have been followed by X-ray examination and the pole figures on the crystals determined at the maximum deformation (48% and 73%, respectively) obtained. The mechanism of deformation is then explained on the basis of known laws of plastic deformation of cubic, face-centred, single crystals. The results obtained are in agreement with the assumption that deformation takes place in the (111) direction along the (011) plane as a slip plane. As the deformation to which the metals were subjected is very similar to that undergone during ordinary rolling operations, it follows that the results are directly applicable to the study of the structure of rolled metals. A. R. POWELL.

Analysis of the platinum metals. W. GRAULICH (Oesterr. Chem.-Ztg., 1930, 33, 2—4).—A scheme for the analysis of commercial platinum for palladium, gold, iridium, rhodium, and platinum is outlined, and details are given of a method for the analysis of rhodium sponge for impurities based on the insolubility of anhydrous rhodium trichloride in dilute aqua regia and the solubility of palladium, platinum, and gold in that solvent.

A. R. POWELL.

Stress-strain relation in the impact test. T. Suтокі (Sci. Rep. Tôhoku, 1930, 19, 1—15).—Stressstrain diagrams at high temperatures have been obtained with a Charpy machine, using the method of Körber and Storp. Carbon steels (0.3 and 0.5% C) in the form of Izod test-pieces were used. The highest temperatures at which perfect breaks were obtained were 600° and 650°, respectively. A piece of brittle material breaks abruptly at a maximum stress, whilst a tough test-piece fails in several steps. The bending of a test-piece increases at first almost linearly with rise of temperature, but from about 300° it begins to increase, and at 550° falls almost to the value at ordinary temperatures, and then rapidly increases. Honda's view that thermal brittleness is the combined effect of work-hardening and of the softening due to temperature is confirmed. W. E. DOWNEY.

Effect of dissolved substances on gravity concentration [of ores]. F. J. TROMP and E. BEYERS (J. Chem. Met. Min. Soc. S. Afr., 1930, 30, 226-232).-Experiments on the settling and gravity concentration of a clayey tin ore tailing after treatment with dilute acids and alkalis are recorded. Sulphuric acid retarded settling of the heavier constituents and gave a low recovery on passing the acidulated pulp along an inclined rubber-lined trough, probably owing to its flocculating action on the clay present. Lime, sodium hydroxide, and, especially, sodium carbonate deflocculated the clay and allowed the heavier tinstone to settle out freely, a recovery of over 70% of the tin being obtained from a pulp containing sodium carbonate. Settling tests on this pulp showed a large increase in the rate at which the non-clayey particles separated. A. R. POWELL.

Addition agents in electrodeposition. III. Application of the complex cation theory to baser metals. G. FUSEYA, K. MURATA, and R. YUMOTO (Tech. Rep. Tôhoku, 1930, 9, 33—56; cf. B., 1927, 632). —Complex cation formation was detected in solutions of lead fluosilicate and nitrate, ferric sulphate, chromic sulphate, copper sulphate, zinc sulphate, and possibly of nickel and cobalt salts, all containing glycine, by spectrographic, E.M.F., and migration experiments. In the case of zinc and lead the degree of complex cation formation is exceedingly high. Electrodeposition from zinc sulphate, lead nitrate, and lead fluosilicate solutions containing glycine was investigated. The glycine does not enter the deposit, nor does it diminish the crystal size of the latter, contrary to the case when silver and copper are deposited (cf. *loc. cit.*). Apparently, during the electrolysis of a salt of a metal more electropositive than hydrogen in the electrochemical series, the solution becomes deficient in hydrogen ions in the vicinity of the cathode. The complex cation consequently loses its charge in this region and becomes incapable of electrodeposition.

S. K. TWEEDY.

Electrolytic iron from sulphide ores. T. D. YEN-SEN (Min. and Met., 1930, 11, 212-213).—Electrolytic iron produced from sulphide ores contains 0.005% C, 0.007% S, and probably up to 0.01% O. The removal of this oxygen can be effected only by melting *in vacuo* with a powerful deoxidising agent. The chief use of electrolytic iron will therefore probably be for the production of silicon-iron and cobalt-iron alloys, for which, however, it does not appear to have any advantage over Armco iron. With power at 0.3 cent/kw.-hr. and scrap iron at \$15 per ton, electrolytic iron could be produced at \$80-85 per ton with a daily output of 25 tons. A. R. PoweLL.

Effect of superposing alternating currents on the electrolytic oxidation of aluminium. S. SETOH and A. MIYATA (Sci. Papers Inst. Phys. Chem. Res., Tokyo, 1930, 12, 268-274; cf. B., 1930, 16).-By superposing a suitable amount of alternating current in the electrolytic oxidation of an aluminium surface the electric energy required to obtain a certain thickness of oxide film can be reduced, and the film is more resistant to corrosion by hydrochloric acid than that obtained with direct current only. Apparatus for investigating these effects is described. If the electrolyte contains a reducing agent such as oxalic acid the film is rendered waterproof by a short steam-treatment, the length of which varies inversely with the concentration of the reducing agent. Steam-treatment applied to films first prepared in other electrolytes and then soaked in oxalic acid increases their chemical resistance. Best results are obtained when using a continuous voltage of 60 volts and an alternating current of 1.5 amp.

H. I. DOWNES.

"Stopping-off " materials for use in the electrodeposition of nickel. D. J. MACNAUGHTON and A. W. HOTHERSALL (Trans. Faraday Soc., 1930, 26, 163-172). -Stopping-off materials are necessary in electrodeposition to enable the deposit to be confined to certain areas, and a number of materials have been examined as to their suitability for use in nickel-plating. Oil varnishes and varnishes made by dissolution or suspension of india-rubber, gutta-percha, ebonite, bitumen, or shellac were unsatisfactory owing to pinholing or poor adhesion. The best material is a wax mixture containing 75% of paraffin wax and 28% of gutta-percha. By coating the areas to be plated with a paste of chalk and water the wax is prevented from adhering to these parts. The disadvantage of this mixture lies in its contaminating effect on the bath, which after several months gives brittle deposits. This is overcome by oxidising any organic materials in the bath by boiling with potassium permanganate (1-2 lb./

1000 gals.) followed by removal of any manganese in solution. C. J. SMITHELLS.

Modern electrolytic methods for the protection of metals from corrosion. W. BIRETT (Z. angew. Chem., 1930, 43, 274—277).—A review of the preparation, properties, and resistance to corrosion of electrolytic deposits of chromium, nickel-chromium, and cadmium. A. R. POWELL.

Pulverised-fuel-fired furnaces. Hollands and Lowndes.—See I.

See also A., May, 530, Melting of rhodium (Swan-GER). Recrystallisation of metals (TAMMANN and CRONE; KARNOP and SACHS). 536, Diffusion of zinc in copper crystals (ELAM). System silver-aluminium-zinc (UENO). Iron-vanadium alloys (ÔSAWA and ÔYA). 537, Composition of eutectics (STOCKDALE). 546, Deposition of zinc and cadmium from ammoniacal solutions (DOBRYSZYCKI). 552, Platinumblack catalysts (TAYLOR and others). 565, Determination of tungsten in presence of vanadium (JILEK and LUKAS). 566, Apparatus for making single-crystal wire (SUNAGA). 567, Continuous automatic purification of mercury (CORBIÈRE).

PATENTS.

Smelting of ferro-alloys in blast furnaces. F. W. DAVIS, ASST. to S. G. ALLEN (U.S.P. 1,744,213, 21.1.30. Appl., 2.6.24).—The furnace is blown with a blast containing a higher proportion of oxygen than air and the fuel is supplied in powdered or liquid form at the tuyère zone. The falling charge in the shaft is preheated by admitting quantities of oxygen-enrichened air at various points to effect combustion of the carbon dioxide produced in the tuyère zone. A. R. POWELL.

Carburising process [for case-hardening iron and steel]. A. W. MACHLET (U.S.P. 1,745,104, 28.1.30. Appl., 6.5.27).—The articles are heated in a chamber in an atmosphere consisting of 1 vol. of propane and 3 vols. of air under pressure. A. R. POWELL.

Cementation and hardening of iron, iron alloys, and steel. DEUTS. GOLD- U. SILBER-SCHEIDEANSTALT VORM. ROESSLER (B.P. 304,209 and Addn. B.P. 308,963, [A] 15.1.29, [B] 4.2.29. Austr., [A] 16.1.28, and Ger., [B] 2.4.28).—(A) Metals are case-hardened by the action of finely-divided carbon suspended in molten sodium chloride or in a low-melting mixture of salts, e.g., sodium and potassium chlorides, at above 850°, preferably at 900—950°. (B) Caustic alkalis or alkaline carbonates may be added to the bath either separately or together. C. A. KING.

Cementation and hardening of iron, iron alloys, and steel. DEUTS. GOLD- U. SILBER-SCHEIDEANSTALT VORM. ROESSLER (B.P. 310,837, 4.2.29. Ger., 1.5.28. Addn. to B.P. 304,209; preceding abstract).—The articles are case-hardened in a bath of fused alkali chloride to which is added 4—12% of a fused or granulated mass made by stirring 250—300 g. of powdered wood charcoal with 1 kg. of fused sodium hydroxide or carbonate. A. R. POWELL.

Blackening, by oxidation, of iron and steel, and articles thereof. L. TARICCO (B.P. 327,615, 14.5.29).

—The iron or steel articles are dipped at 125° into a concentrated solution of potassium hydroxide containing potassium cyanate and prepared by the addition of $2 \cdot 12$ g. of potassium cyanide to a hot solution of $22 \cdot 21$ g. of litharge in a solution of 35—85 g. of potassium hydroxide in $39 \cdot 82$ g. of water. During use the cyanate becomes reduced to cyanide and may be regenerated by boiling the bath with litharge. A. R. POWELL.

Coating of metal articles [iron pipes] with lead. S. OTIS and W. T. HERREN, ASSTS. to NAT. BOILER WASHING CO. OF ILLINOIS (U.S.P. 1,745,185, 28.1.30. Appl., 31.5.24).—The pipes are thoroughly cleaned, coated with lead by chemical or electrochemical deposition from a solution of lead salt, dipped in a concentrated acid zinc chloride solution and then into molten lead, and finally quenched in oil floating on water.

A. R. POWELL.

Treatment of [aluminium-iron] alloys. N. B. PILLING, ASST. to WESTINGHOUSE ELECTRIC & MANUF. Co. (U.S.P. 1,744,242, 21.1.30. Appl., 23.8.26).— Aluminium-iron alloys with 4—10% Al which are relatively brittle at the ordinary temperature may be rolled, stamped, or forged at 30—200° according to the aluminium content. A. R. POWELL.

Treatment of [zinc] ores. A. FOLLIET and N. SAINDERICHIN (B.P. 312,667, 28.5.29. Fr., 30.5.28).— Metals, e.g., zinc, are volatilised by the action of a current of air at 650—800° on the surface of a mixture of powdered ore, e.g., calamine, and coal to which is added a trace of an alkali chloride. The process is conducted conveniently in a rotary furnace, the hot air being directed on to the charge near the outlet end after the distillation of the fuel has been completed. C. A. KING.

Manufacture of carbonised metallic wire or ribbon. WESTINGHOUSE ELECTRIC & MANUF. Co., Assees. of C. B. UPP and L. SUTHERLIN (B.P. 305,467, 28.1.29. U.S., 4.2.28).—The wire or ribbon is passed through a tube furnace through which a current of hydrocarbon gas is passed and in which the wire is heated electrically to the carburising temperature. For example, nickel wire for the manufacture of grids for radio valves is carburised at 800° in an atmosphere of acetylene. A. R. POWELL.

Casting of magnesium or magnesium alloys. I. G. FARBENIND. A.-G., and A. L. MOND (B.P. 326,820, 19.12.28. Addn. to B.P. 187,943; B., 1923, 1137 A).— The moulding sand used is previously mixed with ammonium fluosilicate and stored for some time or it may be mixed with ammonium fluoride or ammonium hydrogen fluoride and oxalic acid just prior to use. Castings made in moulds prepared from sand so treated have a corrosion-resistant coating of magnesium fluoride and are free from oxide inclusions. (Cf. B.P. 219,753; B., 1924, 794.) A. R. POWELL.

Production of dark oxidic coatings on magnesium and its alloys. W. W. TRIGGS. From SPRENGER CORP. M.B.H. (B.P. 326,693, 23.4.29).— Articles made of these metals are immersed in a neutral bath containing one or more soluble salts of bivalent manganese and sodium chromate or dichromate, and gently heated. H. ROYAL-DAWSON.

Soldering process [for galvanised articles] J. H. NEAD, E. R. WEHR, and C. C. MAHLIE, Assrs. to AMER. ROLLING MILL Co. (U.S.P. 1,743,615, 14.1.30. Appl., 25.2.27).—To solder galvanised articles, made by dipping in a zinc bath containing more than 0.5% Al, the surface is cleaned with 20% sodium hydroxide solution, washed, and soldered in the usual way with a zinc chloride flux. A. R. POWELL.

Internal cooling of metal vessels containing acid liquids. BERNDORFER METALLWARENFABR. A. KRUPP A.-G. (Austr.P. 109,381, 14.5.25).—To diminish or completely to prevent electrical potential differences between the cooling coils and the walls of the container, the cooling tubes are coated with materials the electrical potential of which approximates as nearly as possible to that of the metal of the container. Enamels, metals, and metallic oxides are the most suitable for coatings. C. RANKEN.

Sintering apparatus [for ores]. A. HOLMBERG (U.S.P. 1,757,863, 6.5.30. Appl., 28.1.28).—See B.P. 310,089; B., 1929, 522.

Furnace for treating zinc ores and other zinciferous material. A. ROITZHEIM and W. REMY (U.S.P. 1,755,076, 15.4.30. Appl., 23.4.26. Ger., 13.11.25).— See B.P. 261,344; B., 1927, 658.

Metallurgy of metals. [Refining of copper.] H. H. ALEXANDER (U.S.P. 1,756,967, 6.5.30. Appl., 21.7.26).—See B.P. 311,812; B., 1929, 562.

Manufacture of heat-treated copper-nickel-aluminium alloys. W. A. MUDGE, Assr. to INTERNAT. NICKEL CO., INC. (U.S.P. 1,755,554-7, 22.4.30. Appl., [A] 10.6.24, [B] 31.3.25, [C, D] 13.7.25).—See B.P. 250,194; B., 1927, 302.

Refining of nickel-copper matte. F. E. LATHE (U.S.P. 1,756,092, 29.4.30. Appl., 13.12.28. Can., 27.12.27).—See B.P. 303,066; B., 1930, 64.

Protecting easily oxidisable metals such as those having a base of magnesium, aluminium, calcium, etc. G. MICHEL (U.S.P. 1,754,481, 15.4.30. Appl., 8.3.28. Fr., 12.3.27).—See B.P. 287,046; B., 1929, 562.

Pickling of metals. V. BERTLEFF (U.S.P. 1,757,829, 6.5.30. Appl., 27.6.28. Austr., 9.7.27).—See B.P. 293,701; B., 1929, 176.

Electrolytic refining of copper or copper alloys. M. HOSENFELD and G. HÄNSEL, ASSTS. to SIEMENS & HALSKE A.-G. (U.S.P. 1,757,047, 6.5.30. Appl., 24.7.26. Ger., 6.1.26).—See B.P. 264,116; B., 1927, 683.

Permeability of [foundry] sand (B.P. 327,306). See IX. Electric furnaces (B.P. 306,969 and 326,517).

XI.—ELECTROTECHNICS.

Copper oxide rectifiers. H. PÉLABON (Compt. rend., 1930, 190, 630-632).—Copper oxide rectifiers are obtained by heating copper discs in air, just below the m.p. of copper, and removing the black cupric oxide till a surface blood-red in colour appears. Microscopical examination revealed (1) a grey powdery, semi-conducting layer of cupric oxide produced during cooling in air; (2) a well-defined, pale green, heterogeneous phase composed of the mixture $(2\text{CuO} + \text{Cu}_2\text{O})$, the lower layers being the richer in cupric oxide; (3) a sharp, homogeneous, green layer of pure cupric oxide; (4) a granular, highly-conducting, eutectic layer of copper containing 3.5% Cu₂O. The seat of the rectifying properties is in the condenser effect due to the action as an insulator of the cuprous oxide in the second layer. Strong currents pass most easily from the bad to the good conductor, *i.e.*, from the oxide to the copper.

J. GRANT.

Electrolysis of water under pressure. H. CASSEL and F. TÖDT (Z. Elektrochem., 1930, 36, 241—242; cf. Schnurmann, B., 1929, 945).—It is suggested that the apparent decrease in resistance of a cell for the electrolysis of water when pressure is applied is due actually to an increase in the residual current, primarily as a result of the increased solubility of the oxygen increasing the depolarisation of the cathode. R. CUTHILL.

Breakdown of liquid insulators. F. KOPPELMANN (Naturwiss., 1930, 18, 333).—Experiments were made with pure paraffin oil and with hexane, using point discharges and also discharges from blunt surfaces. For oil which has not previously had the air removed there is an evolution of gas at the electrodes at potentials much below that necessary for breakdown. The bubbles were regular and came from isolated spots on the electrodes. After some time the evolution of gas ceased. It seems probable that, under the influence of the potential at the electrodes, charge-bearing layers are formed and as the potential is increased they are propagated through the dielectric. A. J. MEE,

Addition agents in electrodeposition. FUSEYA and others. Electrolytic iron. YENSEN. Electrolytic oxidation of aluminium. SETOH and MIYATA. Electrodeposition of nickel. MACNAUGHTON and HOTHERSALL. Protecting metals from corrosion. BIRETT.—See X. White lead. OKUNO.—See XIII. $p_{\rm H}$ of soils. DE CONNICK; SMOLÍK.—See XVI. Determination of silver in photographic layers. LÜHR.— See XXI.

See also A., May, 544, Measurement of resistance of electrolytes (SCARPA). 546, Polarographic studies with the dropping mercury cathode (DOBRYSZYCKI). 553, Preparation of salicylaldehyde (KAWADA and YOSIDA). Synthesis of nitrogen dioxide (WESTHAVER and BREWER). 562, Potentiometric determination of barium, lead, and sulphate (MUKAI). 565, Comparison of hydrogen-ion indicator electrodes in presence of ferric iron (ELDER). 580, Reduction of aldehydes (SHIMA).

PATENTS.

Electric furnace. P. L. J. MIGUET and M. P. PERRON (B.P. 313,121, 10.5.29. Fr., 7.6.28).—Current is supplied through a casing in electrical contact with an electrode suspended above the hearth, and through an inner cylinder insulated from the casing and connected with electrodes embedded in the furnace hearth.

J. S. G. THOMAS. Electric furnaces [heated by direct current]. T. D. KELLY and G. E. LEAVEY (B.P. 326,321, 22.2.29).— Furnace electrodes are connected with the terminals of a differentially wound generator, giving a decreased voltage immediately a large short-circuit occurs. [Stat. ref.] J. S. G. Тномаs.

[Two-deck] electric furnace. A. SADLER. From G. B. SHIPLEY and H. ALINDER (B.P. 326,517, 15.9.28).— A treatment tunnel having bottom charging and discharging apertures at its opposite ends is superimposed on a handling deck, and elevators operating between the two decks are arranged at the charging and discharging ends, one for raising work-carriers into the charging end of the tunnel and the other for lowering workcarriers from the discharging end. Means are provided for moving a train of work-carriers in the tunnel towards the discharging end when both elevators are raised, and for moving another train of carriers from the discharging to the charging end when both elevators are lowered. Electric-resistance heating elements are arranged in both sides of the tunnel and extend substantially from the top to the bottom thereof. A stream of reducing or deoxidising gas can be introduced into the treatment zone. J. S. G. THOMAS.

Electric annealing or like furnace. P. MENE (B.P. 306,969, 28.2.29. Fr., 29.2.28).—The heating chamber comprises vertical heating resistances arranged on the lateral walls of the chamber and horizontal heating resistances arranged beneath the top face of the hearth. The vertical heating resistances are formed by extensions of the horizontal resistances, and the whole heating system is suspended from the side walls of the heating chamber. J. S. G. THOMAS.

[Filaments for] electron-discharge tubes or thermionic valves. MULLARD RADIO VALVE CO., LTD., and B. KROL (B.P. 326,334, 28.2.29).—Fine, parallel, tungsten filaments are bound together with fine tungsten wire, and the whole is coated with the oxide of an alkaline-earth metal. J. S. G. THOMAS.

[Getter for] incandescence electric lamps. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of J. FORCE (B.P. 313,010, 4.6.29. U.S., 4.6.28).—Refractory metal powder having an affinity for oxygen, *e.g.*, tungsten or tantalum, is placed in the lamp near or at the junction of the lamp filament and leading-in conductors.

J. S. G. THOMAS.

Manufacture of Wehnelt cathodes for electricdischarge devices. N.V. PHILIPS' GLOEILAMPENFABR. (B.P. 309,581, 25.3.29. Holl., 13.4.28).—A core is coated with an alkaline-earth manganate or chromate, *e.g.*, the barium salt, and heated, preferably at about 1200°. J. S. G. THOMAS.

Manufacture of piezo-electric, pyro-electric, and the like dielectrics. TELEFUNKEN GES. F. DRAHTLOSE TELEGRAPHIE M.B.H. (B.P. 302,726, 14.12.28. Ger., 21.12.27).—Finely-divided material, *e.g.*, quartz, together with, if desired, a binding material, *e.g.*, paraffin wax, is subjected to the action of an electric field, and preferably is heated and/or subjected to high pressure.

J. S. G. THOMAS. Manufacture of electric insulations, high-tension storage batteries, and condensers. A. Jofffe (B.P. 302,686, 15.12.28. Ger., 20.12.27).—Two substances of different electrical conductivity, e.g., phenol-formaldehyde condensation products and cellulose acetate,

are dispersed in one another by emulsification, so that small particles of the material of higher conductivity are separated by thin walls, *e.g.*, up to 0.005 mm. thick, of the material of lower conductivity.

J. S. G. THOMAS.

Treating [impregnating] electrically-insulating material. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of F. W. HARRISON (B.P. 297,035, 11.9.28. U.S., 12.9.27).—Electrically-insulating material, e.g., dry cellulose pulp, cotton fibre, is compressed and immersed in oil, e.g., a mineral oil of the paraffin series, at 150—200° until evolution of bubbles ceases. J. S. G. THOMAS.

Devices for measuring the electrical conductivity and concentration of acid or salt solutions. ATELIERS J. CARPENTIER (B.P. 309,025, 8.3.29. Fr., 3.4.28).—The coils of a logometer, described in B.P. 5961 of 1911, are introduced into a Wheatstone bridge, one arm of which comprises a variable resistance in series with the solution the resistance of which is to be determined, in such manner that according to the conductivity of that solution the coils of the logometer turn through angles which can be calibrated to give directly the conductivity or concentration of the solution. Any change of conductivity of the solution due to change of temperature is compensated.

J. S. G. THOMAS.

[Assembly of parts in Leclanché-type] electric batteries. F. S. S. WATES (B.P. 327,760, 9.4.29).

Manufacture [encasing the agglomerates] of dry batteries [in braid]. Soc. ANON. ELECTROCHIM. PHEBUS, and S. DE PLOËG (B.P. 326,704, 8.5.29).

Electric accumulator. H. ELSNER (B.P. 307,927, 13.3.29. Ger., 17.3.28).

Production of galvanic elements or batteries. SIEMENS & HALSKE A.-G., Assees. of K. SCHENKEL (B.P. 301,934, 8.12.28. Ger., 9.12.27).

Incandescence electric lamps [with internal reflectors]. G. MAIN (B.P. 310,929, 29.4.29. Fr., 3.5.28).

Manufacture [sealing-off] of [leaky] electric incandescence lamps or the like. GEN. ELECTRIC Co., LTD., Assees. of PATENT-TREUHAND-GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 317,723, 13.8.29. Addn. to B.P. 242,303).

Electric-discharge tubes [for purposes of illumination]. A. E. CHAPMAN and J. VIELLE (B.P. 326,771, 18.12.28).

Fuel-burning system (B.P. 314,757).—See I. Carbon black (B.P. 326,913).—See II. Electro-paint (U.S.P. 1,744,469). Metal coat for condenser plates (U.S.P. 1,744,281).—See XIII.

XII.—FATS; OILS; WAXES.

Recovery of vegetable oils and fats by a bacterial process. J. W. BECKMAN (Ind. Eng. Chem., 1930, 22, 117—118).—Crushed copra is mixed with ground limestone and sufficient water to form a mush and is incubated at 50°, with exclusion of air, with a culture of *B. Delbrucki*, obtained from brewer's malt. The bacteria convert the sugars into lactic acid, with simultaneous production of an enzyme which converts the protein material into soluble amino-acids : the mixture gradually becomes more liquid, and after 6 days the oil can be recovered from the residue by filtration. The high temperature of reaction inhibits the growth of moulds etc., and only a small increase (from 10.6 to 13%) of free fatty acids occurs. The quality of the oil so produced is superior to the average, and its m.p. is normal. The residue, containing calcium lactate, aminoacids, and bacteria, is dried and constitutes a good cattle food. The cost of the operation is stated to be considerably cheaper than that of the standard pressing process. E. LEWKOWITSCH.

Determination of unsaturation of fats and fatty acids. I. J. VAN LOON (Chem. Umschau, 1930, 37, 85-87; cf. Inaug. Diss., Delft, 1929).—The terms "true," "apparent," and "partial" iodine values are defined and discussed. The author considers that iodine values should be determined on the fatty acids of an oil and not on the crude oil. Experiments (details to be published later) showed that, except in a few special cases, the Wijs method with prolonged reaction time gives constant and true iodine values.

E. LEWKOWITSCH.

Sub-iodine value of linseed oil. F. FRITZ (Chem.-Ztg., 1930, 54, 213).—Attempts were made to determine a characteristic sub-iodine value ("Teiljodzahl") for linseed oil by various methods, including direct titration of the oil dissolved in carbon tetrachloride with a pale Wijs iodine solution: values about 117 were obtained, but great difficulty was found in determining the endpoint. E. LEWKOWITSCH.

Bellier test for sesamé oil. E. F. Cook (J. Amer. Pharm. Assoc., 1930, 19, 361-366).—The Bellier test for sesamé oil is uncertain and the following modification is described. Two drops of the oil are added to 1 c.c. of colourless nitric acid $(d \ 1 \cdot 4)$ and, after shaking, a small crystal of resorcinol is added. On agitating, a green colour develops in the oil and extends into the acid. On the addition of either benzene or chloroform practically all the colour remains in the acid, but fades within 3-5 min. This test gave a positive reaction with all the sesamé oils examined and detected 1 pt. of the oil in 250 pts. of another fixed oil. Repeated extraction of sesamé oil with glacial acetic acid removed the material responsible for the green colour in the Bellier test. The material extracted was separated into a resinous mass, which gave a deep green colour, and sesamin, which gave E. H. SHARPLES. a negative reaction.

Composition of porpoise-jaw oil. A. H. GILL and C. M. TUCKER (Oil & Fat Ind., 1930, 7, 101– 102).—The oil from the head of a porpoise, *Tursiops* truncatus (caught off Hatteras) had: $d^{15.5}$ 0.9241, $n_D^{20.5}$ 1.4519, saponif. value 293, iodine value (Hanus) 28.3, Reichert-Meissl value 139, acid value 2.88, cold test —19°, viscosity (Saybolt) 101 sec./100° F., α +0.3° (1-dm. tube). The unsaponifiable matter (solid at 0°) dissolved completely in acetic anhydride and appeared to consist principally of dodecyl alcohol, with small amounts of a substance, m.p. 61° (tetradecyl alcohol ?). The approximate analysis of the oil is given as : dodecyl alcohol 18.7, glycerol 18.5, *iso*valeric acid $62 \cdot 6$, palmitic acid $6 \cdot 1$, oleic acid $3 \cdot 5\%$. The presence of mono- or di-valerin is suspected. E. LEWKOWITSCH.

Vegetable oils of the Union of S.S.R. V. Nature of fatty oils of Capparidaceæ in connexion with the climate of district of origin. S. L. IVANOV and J. S. ELAKOV (Chem. Umschau, 1930, 37, 83-84; cf. B., 1930, 154).-Seeds of Capparis herbacea, Willd., from Turkestan and from Crimea (rather milder climate), which represent the most northerly limits of distribution of the Capparidacea, yielded 28-30% of pale red oils having respectively: d^{15} 0.9144, 0.9102; butyro-refractometer at 25° -, 70.5; acid value 37.14 (rainy season), $7 \cdot 74$; saponif. value 200.0, 190.51; iodine value 110, 104.6-105.4; Reichert-Meissl value -, 1.1; hexabromides nil, nil; unsaturated acids -, 98.8% (Varrentrapp), or -, 84% (Bertram); saturated acids -, traces (Varrentrapp), or -, 16.5-16.65% (Bertram), or -, 12.12% (Kaufmann); thiocyanogen value 75.89%, -... Thiocyanometric analysis (Kaufmann) gave the constitution of the oil as $12 \cdot 12\%$ of saturated glycerides, 54.35% of oleic glycerides, and 33.58% of linoleic glycerides. The nature of the unsaturated acids is not clear; besides ordinary linoleic acid a monoethylenic acid, apparently of the palmitoleic type, is present; on oxidation it yields a hydroxy-acid (m.p. 118°, neutralisation value 198.5). The nature of Capparidaceæ oils from other countries is discussed.

E. LEWKOWITSCH.

Re-esterification ("Umesterung") of neutral fats with butyric acid. K. Täufel and W. Preiss (Z. Unters. Lebensm., 1929, 58, 425-433).-Re-esterification, a process whereby the two components of a glyceride may be replaced by other alcohols and acids, by heating, if necessary under pressure, in an inert atmosphere, and in the presence of catalysts, has been applied commercially to the production of edible fats (cf. B.P. 160,840 and G.P. 407,180; B., 1922, 945 A; 1925, 225). An attempt has now been made to prepare materials for use as butter substitutes by the union of neutral fats with butyric acid. A mixture of 400 g. of beef tallow with 30 g. of butyric acid was heated gradually up to 235° over a period of 70 hrs. under reflux in an atmosphere of carbon dioxide with 3% of tin filings as catalyst, 7 g. of glycerin being added in the early stages. After removal of the residual acid with sodium carbonate solution the product had a yellow colour, buttery consistency, and pleasant taste, the m.p. had fallen from 43° to 37°, and 80% of the butyric acid had entered into combination. By similarly treating a hardened blubber oil, e.g., "Candelite extra" (400 g.), with butyric acid (30 g.) and glycerin (7 g.), the product had a pleasant smell resembling that of melted butter, and its consistency and taste were similar to those of beef tallow. The m.p. had been lowered from 50.0- $51\cdot 5^\circ$ to $42\cdot 5^\circ.$ The material was very stable, and was apparently unchanged after keeping for 5 months. When kneaded with water about 51% was absorbed, whereas the original fat would absorb only 32%. When emulsified with water above the m.p. both the untreated and the "esterified " fat separated out again in 30 min. When emulsified with skim milk the emulsions of both treated and untreated fats separated when kept warm, but when stored at room temperature, although the

emulsion of the untreated fat separated, that from the re-esterified "Candelite extra" remained homogeneous. The cold fat when pressed was found to have retained about 6% of water. H. J. Dowden.

Sulphonated oils. C. RIESS (Collegium, 1930, 13-18).-Measured amounts of sulphonated oleic acid were kept for 7 days in contact with different amounts of 0.2N-sodium hydroxide, -hydrochloric acid, and -sulphuric acid, respectively, but practically no acid was split off the oil. To determine the amount of SO4 which can be hydrolysed, 5 g. of the oil should be boiled under reflux for 30 min. with 25 c.c. of N-hydrochloric or -sulphuric acid, ether and sodium chloride added to it, the product titrated with N-alkali in presence of methylorange, and the SO4 calculated from the amount of alkali remaining in excess. Excess alkali is present with the oil if the alkali titration is less than 25 c.c. The number of alkali-neutralised carboxyl groups in the oil was arrived at by titrating the oil with acid in presence of methyl-orange, and of the free carboxyl groups by titrating in alcoholic solution, using phenolphthalein as indicator. Examples of such analyses of 3 samples of Turkey-red oil are quoted, and the number of carboxyl and SO4 groups present in samples of Turkey-red oils prepared under different conditions of temperature and duration of action is given. It is shown that positive, negative, or nil Procter-Searle figures can be obtained with sulphonated oils according as the number of alkalicombined carboxyl groups are less than, greater than, or equal to that of the SO₄H groups.

D. WOODROFFE.

Sulphonated oils. III. Properties of aqueous solutions of pure sodium ricinoleate, sodium oleate, or the sodium salt of the sulphuric acid ester of ricinoleic acid. K. NISHIZAWA and K. WINOKUTI (Chem. Umschau, 1930, 37, 33-39; cf. B., 1929, 402).-The colloidal and physical properties of these salts were compared; the last-mentioned showed the greatest degree of dispersion in aqueous solution and the solution showed the greatest surface tension towards air and kerosene (sodium oleate solutions having the lowest of the three) and the smallest viscosity. The solution of the sodium salt of the ester revealed the greatest stability towards sulphuric acid, lime, and magnesia (as measured by the amounts required to produce turbidity), and, in general, this salt exhibited the peculiar properties of sulphonated oils to an enhanced degree.

E. LEWKOWITSCH.

Preparation of pure sodium sulphoricinoleate from ricinoleic acid and sulphuric acid. K. NISHI-ZAWA and M. SINOZAKI (Chem. Umschau, 1930, 37, 40– 44; cf. Grün and Woldenburg, A., 1909, i, 284).—The pure sulphuric acid ester of ricinoleic acid has been prepared for the first time from crude ricinoleic acid by the very slow addition of concentrated sulphuric acid to its ether solution at low temperatures. The influence of experimental conditions on the synthesis was investigated. Further details (accidentally omitted from previous accounts; cf. A., 1929, 1424) are given for the preparation of the pure, crystalline sodium salt of the ester. The acid potassium salt of the ester is very readily purified by recrystallisation from water, hence the new synthesis affords a ready method for the preparation from crude ricinoleic acid of the pure acid salt, and from this in turn pure ricinoleic acid can be obtained by hydrolysis. E. LEWKOWITSCH.

Oxidation of paraffin. ZERNER. Petrol-water emulsions. VARADHAN and WATSON.—See II. Tri-βhydroxyethylamine emulsions. Wilson.—See III. Fat in washed wool. KRAIS and Biltz.—See V. Fat products and leather. Schorlemmer.—See XV.

See also A., May, 561, Determination of water [in fatty substances] (NOTEVARP). 577, Polymerisation of methyl esters of highly unsaturated acids of train oil (KINO).

PATENTS.

Deodorisation of fats and fatty oils. H. BOLL-MANN, Assr. to M. F. FOSTER (U.S.P. 1,754,598, 15.4.30. Appl., 27.2.25. Ger., 3.9.24).—See B.P. 231,791; B., 1925, 459.

Bleaching of fatty oils, mineral oils, and the like. H. BOLLMANN (U.S.P. 1,754,599, 15.4.30. Appl., 16.12.25. Holl., 18.11.25).—See B.P. 245,745; B., 1927, 227.

Manufacture of anhydrous soap gels. V. R. Кокатлик (U.S.P. 1,753,659, 8.4.30. Appl., 13.5.26).— See B.P. 251,290; B., 1927, 755.

Cleansing and emulsifying agent. W. PUNGS, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,757,441, 6.5.30. Appl., 16.10.26. Ger., 21.10.25).—See B.P. 283,786; B., 1928, 237.

Treatment of soap [with rays from mercuryvapour lamps]. E. H. MORRIS (B.P. 328,043, 13.9.29).

Sulphonic acids (B.P. 298,559 and 326,815).—See III.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Catalysis in painting technique. W. OSTWALD (Z. angew. Chem., 1930, 43, 348-349).-Painters of the fifteenth century added beaten white of egg or white of egg which had been stirred with a twig from a fig tree to their paints as a binding material. The function of the twig was to break up the cell-walls of the protein; this action is shown to be due to the presence of a ferment in the sap of the fig tree. Size used in the preparation of distempers mixes completely with water only at the m.p.; at lower temperatures the mixture separates into two conjugate layers. Addition of chloral hydrate, which dissolves both in the size and water phases, lowers the m.p. of the size and hence causes the mixture to remain liquid at the ordinary temperature. A similar action is produced by hydrolysing part of the proteins in the size by addition of dilute mineral acids or by boiling with lime. A. R. POWELL.

Hiding power and tinting strength of pigments and paints. H. A. GARDNER, G. G. SWARD, and S. A. LEVY (Amer. Paint and Varnish Manufrs.' Assoc., Mar., 1930, Circ. 362, 235—272).—The available methods for determining hiding power are reviewed, such drawbacks as personal equation, limited range of applicability, etc. being indicated. The differences between the hiding powers of wet and dry films are thought to be less than those obtained by different operators when working with the cryptometer on wet films. It is considered that a simple practical test involving the brushing of paint over a surface of suitably contrasting pattern is satisfactory for normal purposes. Details of experiments using reflected and transmitted light with various types of background are given. Linoleum printed with a chessboard pattern (4-in. squares) was eventually adopted, sufficient paint being applied for perfect hiding and results being expressed as sq. ft. covered per gal. Such tests usually give results approx. 20% higher than the cryptometer readings. Tests carried out on paints aged for two weeks showed in some cases (notably that of titanium oxide) a decrease in hiding power with age, possibly due to progressive elimination of adsorbed air. A further series of experiments indicates that there is apparently no direct ratio between tinting strength and hiding power of pigments, but that the order of the pigments arranged in increasing magnitude is the same for both properties. The relation between brightness and hiding power is also discussed. S. S. WOOLF.

Identification of pigments used in painting at different periods, and other methods of examining pictures. A. P. LAURIE (Analyst, 1930, 55, 162-179). -Microscopical examination of the picture itself will yield information as to the medium, a sample of which should be mounted and treated by microchemical tests and should also be examined optically. The properties and reactions of the following ancient pigments found in illuminated MSS. and pictures are described : white lead, gold, vermilion, red lead, orpiment, massicot vellow, Naples vellow, vellow lake (Dutch pink), gamboge, malachite, verdigris, transparent copper green, Egyptian blue, ultramarine real, azurite, blue and green verditer, lakes from the Kermes insect, sapan wood, lac lakes from *Coccus lacti*, crimson and madder lakes, Tyrian purple, and smalt. A number of modern pigments are also discussed. Tests for recognising microscopical fragments of certain pigments in a dried oil film, such tests to be followed by dissolution of the particle and confirmation microchemically, are indicated and the results tabulated; confirmatory tests with potassium mercuric thiocyanate for lead, copper, and zinc salt, and the triple nitrite reaction for lead and copper, are described. The special pigments characteristic of Byzantine, Scot-Irish, and English MSS. are discussed described. and also those of the Venetian Ducali and the Coram Rege Rolls. The use of data obtained by examination of the pigments on pictures, of the brushwork, and identification of mediums is illustrated, and the application of X-rays as an additional means of deciding authenticity and for ascertaining whether there has been painting over another painting is suggested. D. G. HEWER.

What is zinc oxide? K. WÜRTH (Chem.-Ztg., 1930, 54, 201).—The technical designations of the pigments known as "zinc oxide" and "zinc white" are unsatisfactory, as the latter contains up to 99% ZnO whereas the former frequently contains only 50—60% ZnO together with other substances. It is now proposed that the name "zinc oxide white" should be employed for the former substance, and "zinc oxide colours" as a general designation for all pigments containing this constituent. H. F. HARWOOD.

Testing the permeability of "filler" films [for automobile finishing]. W. TOELDTE (Farben-Ztg., 1930, 35, 1255—1256).—Such properties as colour, gloss, durability, etc. are not of vital importance for a filler, covered as it normally is by lacquer coats and in some cases by surfacing ("insulating") coats. Porosity to air and moisture is the most significant factor in evaluating a filler, and an apparatus is described for estimating this by measuring the volume of air transmitted by isolated, dry, filler films. The decrease in porosity with increase in content of binding vehicle is demonstrated by this means. S. S. WOOLF.

Electrolytic preparation of a white lead and its properties. T. OKUNO (Mem. Coll. Eng. Kyushu, 1930, 5, 145—170).—The electrolysis of solutions of potassium chlorate and of sodium carbonate between lead electrodes has been investigated. The adsorbing power, refractive index, sp. gr., and uniformity of grain of white lead prepared electrolytically have been determined.

C. W. GIBBY.

Potentiometric determination of acidity in writing inks. H. A. BROMLEY and L. W. CAUSER (Analyst, 1930, 55, 277-279).-Callan and Horrobin's method (B., 1930, 154) has been improved by assuming an end-point corresponding to the $p_{\rm H}$ of the colour indicator used during an ordinary titration, interpolating this value into the standard equation, and then determining the null-point corresponding to E. Thus, with methylorange $(p_{\rm H} 2 \cdot 8 - 4)$, $3 \cdot 4 = (E - 0 \cdot 250)/(0 \cdot 0575)$ for a calomel half-cell, or $3 \cdot 4 = E/0 \cdot 0575 \pm K$ with a second platinum wire immersed in a standard buffer solution saturated with quinhydrone. When the latter method is used the potentiometer is adjusted to give the calculated value for E on the millivoltmeter, and the titration is continued until there is no further deflection of the galvanometer needle, which indicates the endpoint, observed by means of a magnifying glass. An agar bridge is preferable to a capillary bridge.

D. G. HEWER.

Use of iron and cobalt salts in the preparation of lacquers [for patent leather manufacture]. E. SCHAD and C. RIESS (Collegium, 1930, 20-24).-The effect of adding different amounts of hydrated ferric oxide, ferric linoleate, cobalt oxalate and linoleate was determined on (a) the duration of boiling the linseed oil; (b) the sp. gr., viscosity, colour, hardness, and elasticity of the lacquer, and (c) the colour, hardness, and elasticity of the film produced on the leather. The sp. gr. of the lacquer obtained after heating for 10 hrs. was increased by additions of the driers, either separately or together. The viscosity of the heated product was diminished by additions of 0.25% or 0.5% of cobalt oxalate, but was increased by additions of ferric oxide or cobalt and iron linoleates. The viscosity of the lacquer was increased so much after heating for 10-15 hrs. with additions of more than 0.2% of ferric oxide that it could not be determined. The lag period in the action of the ferric oxide and cobalt oxalate is probably due to the conversion of these compounds into a more active form. A sudden increase in the viscosity occurred after 25 hrs.' heating of the oil to which 0.5% of cobalt oxalate had been added ; but it was so rapid that it was

impossible to determine the end-point. The time of boiling is reduced by additions of driers, iron salts being especially effective. The time is reduced to one half by additions of 0.5-0.75% of ferric oxide. Figures are quoted to show the reduced time required for the complete drying of films prepared from lacquers to which additions of driers have been made.

D. WOODROFFE.

Analytical data of Okume resin. M. TOMEO and J. GARCÍA-VIANA (Anal. Fís. Quím., 1929, 27, [tecn.], 135-140).-Okume resin, an oleo-resin derived from a tree (? Aucoumea Klaineana) native to Spanish Guinea, has been examined after probable deterioration by storage. After filtering the fused resin from impurities, it distils at 105-205°, and yields on steam-distillation 9.9% of essential oil and 89.0% of residue. The essential oil has d^{15} 0.8670, $n_{\rm D}^{15}$ 1.4790, $[\alpha]_{\rm D}^{15}$ -27.5°, f.p. below -20°, b.p. 168°/700 mm., 175°/760 mm. (90% distils at 65-75°/25 mm. or 174-177°/760 mm.), solubility in alcohol: 1 in 7 pts. of 90%, 1 in 29 pts. of 80%, 1 in 60 pts. of 65%, acid value 1.5, ester value $12 \cdot 3$, acetyl value $0 \cdot 91$. It appears to contain 90 - 95%of an unidentified monocyclic terpene. The residue 18 completely soluble in alcohol, benzene, carbon disulphide, and ether. It has d^{15} 1.062, m.p. 90° (sintering at 65-70°), b.p. 125°, precipitation point 1.5-2, acid value 26, ester value 110, acetyl value 0.1, iodine value $25 \cdot 52$. It somewhat resembles colophony, and gives the same colour reactions. Substituted for colophony in a varnish mixture, a superior product is obtained. R. K. CALLOW.

PATENTS.

Manufacture of coating preparations and artificial materials. O. Y. IMRAY. From I. G. FARB-ENIND. A.-G. (B.P. 326,482, 8.9.28).—A cellulose ester of an acid of high mol. wt., e.g., a fatty acid, naphthenic acid, or resin acid, is dissolved in a drying oil, e.g., linseed or tung oil, further solvents or diluents and soluble or insoluble colouring matter being introduced if desired. Substances that react with one or more constituents of the preparation and promote hardening, e.g., cobalt or manganese resinate or oleate, benzyl chloride (in the presence of ferric chloride as a catalyst), may also be incorporated. S. S. WOOLF.

Coating and similar compositions. A. E. WHITE. From ELLIS-FOSTER Co. (B.P. 327,095—6, 19.9.28).— (A) A cellulose ester, e.g., nitrocellulose, is mixed with a greater amount of a synthetic resin of low acid value, produced from a natural resin or resin acid, e.g., rosin, kauri, Congo, etc., a polyhydric alcohol, e.g., glycerol, or a derivative, and an organic non-resin acid, e.g., phthalic acid. Solvents, pigments, plasticisers, etc. may be added. (B) The synthetic resin complex contains cottonseed oil or its derivatives, e.g., heattreated fatty acids. S. S. WOOLF.

Composition of matter [water-glass paint]. P. T. HANNEN and H. D. BRUCE, ASSTS. to U.S.A. (U.S.P. 1,744,116, 21.1.30. Appl., 10.4.28).—Instruments or objects, e.g., thermometers, are engraved and the engraved marks are filled in with a composition comprising a 10% solution of sodium silicate and an equal volume of water, pigmented with manganese dioxide, carbon, lead chromate, etc. [Stat. ref.] S. S. WOOLF.

Electro-paint. L. J. D. HEALY, Assr. to FISK RUBBER Co. (U.S.P. 1,744,469, 21.1.30. Appl., 27.6.25). —A mixture of uncured rubber, finely-divided asbestos, and glue, in approximately equal proportions, and a rubber solvent is claimed as an insulating paint, suitable for use in electroplating. If desired, the paint may be hardened by means of acid sulphur chloride after aircuring. S. S. WOOLF.

Painting processes. G. B. ELLIS. From M. RENSCH (B.P. 326,649, 27.2.29).—In a paint system in which the second coat is applied to the first while the latter is still wet, the paint material for the first coat is treated with a sufficient quantity of an oxide or hydroxide of an alkaline-earth metal, or of the soaps of these metals with resinic acids, oleic acid, or the acids of waxes, whilst the vehicle for the covering coat contains as an essential constituent thickened fatty oils, boiled oils, or sulphonated fatty oils etc., caoutchouc or its decomposition products, or cellulose esters or ethers.

S. S. WOOLF.

Applying a firmly-adhering metal coat to insulating plates, particularly for use in electric condensers. E. PFIFFNER, Assr. to RADIO PATENTS CORP. (U.S.P. 1,744,281, 21.1.30. Appl., 11.11.26. Ger., 12.11.25).—A sheet of cellulose ester is treated with a hydrolysing solution containing a metallic salt reactive with free cellulose to precipitate a metallic reduction product, *e.g.*, ammoniacal silver nitrate, whereby the sheet is superficially hydrolysed and a coating of silver deposited thereon. S. S. WOOLF.

Manufacture of coated articles. BRIT. CELANESE, LTD. (B.P. 303,898, 11.1.29. U.S., 12.1.28).—Intimate pulverulent mixtures of finely-divided organic derivatives of cellulose, *e.g.*, cellulose acetate, and one or more plasticisers, with or without fillers, dyes, pigments, etc., prepared (as in B.P. 282,723; B., 1928, 853) in the absence of volatile solvents or water, are applied to sheets or other articles and caused to coalesce under heat and pressure, *e.g.*, at 50—80° under 300—500 lb./in.², to form adherent coatings. S. S. WOOLF.

Paint and varnish remover. E. I. DU PONT DE NEMOURS & Co. (B.P. 315,212, 25.4.29. U.S., 9.7.28).— Solvents containing acetone (3 pts.), benzene or toluene (2 pts.), and ethylene glycol (1 pt.) are claimed.

S. S. WOOLF.

Removing paint [from metals]. J. H. GRAVELL, Assr. to AMER. CHEM. PAINT CO. (U.S.P. 1,744,463, 21.1.30. Appl., 22.6.26).—An aqueous mixture (proportions stated) of sodium cresylate and hydroxide is claimed for removing paint, *e.g.*, high-baked black enamels, from steel motor-car bodies, fenders, etc. The articles are immersed in the bath maintained at 82°, washed, dipped in dilute acid (phosphoric) to remove remaining alkalinity, again washed, and dried to fit them for re-painting. S. S. WOOLF.

Working up of crude turpentine. E. WECKER (B.P. 327,166, 29.11.28. Addn. to B.P. 213,267; B., 1925, 619).—Crude turpentine is treated below 90° in vacuo with wet steam or a mist of water or other liquid, if desired in admixture with steam or another gas or vapour. S. S. Woolf.

Production of pigments and turbidity agents. DEUTS. GOLD- U. SILBER-SCHEIDEANSTALT VORM. ROESS-LER, and L. WEISS (B.P. 327,142, 27.12.28).—Soluble or volatile compounds of titanium, zirconium, and tin, in their normal condition or as concentrated solutions, are converted into hydroxides or oxides by treatment with suitable agents, *e.g.*, alkaline lyes, superheated steam, etc., and the conversion products are (preferably forthwith) heated to 500—800° if for use as pigments or to 900—1500° for turbidity agents, highly dispersive oxides resulting. The original conversion may be effected at high temperatures, *e.g.*, 600°, in which case subsequent heating may be omitted. [Stat. ref.]

S. S. WOOLF.

Preparation of colloidally dispersed materials, especially pigments in different media. IMPERIAL CHEM. INDUSTRIES, LTD., A. J. HAILWOOD, A. SHEPHERD-SON, and A. STEWART (B.P. 326,516, 12.9.28) .- An aqueous solution of a water-soluble derivative (capable of reconversion into the insoluble form) of the substance to be dispersed, e.g., the leuco-compound of a dyestuff, or an aqueous solution of chemicals which produce the insoluble final product by interaction with other aqueous solutions of chemicals in the presence of non-aqueous media, e.g., the formation of barium chromate by addition of barium chloride to potassium chromate, is emulsified with a non-aqueous medium, e.g., linseed or castor oil, in the presence, if desired, of a protective colloid. The water-insoluble material is formed in the emulsion which is subsequently broken by suitable means, and the colloidally dispersed material collects in the non-aqueous phase, volatile matter being S. S. WOOLF. then removed.

Varnishes, lacquers, and like coating compositions. BRIT. CELANESE, LTD. (B.P. 299,781, 29.10.28. U.S., 31.10.27).—The compositions for coating metallic and other surfaces comprise a cellulose derivative (ester or ether), a volatile solvent, and a synthetic ketone-phenol-aldehyde resin of the type described in B.P. 299,065 (B., 1930, 338); gums, high-boiling solvents, plasticisers, etc. may be added as desired.

E. LEWKOWITSCH.

Brushing lacquer. S. D. SHIPLEY, Assr. to ATLAS POWDER CO. (U.S.P. 1,744,085, 21.1.30. Appl., 21.10.25). —The active solvent in the lacquer is reduced to a minimum for retention in solution of the nitrocellulose content, relatively large proportions of gasoline being used as diluent. A preferred composition is ethyl acetate 8%, camphor oil 1.5%, butyl acetate 20.5%, gasoline 37.5%, toluol 27.5%, resin solution 5%, combined with 3 oz. of nitrocellulose per gallon.

S. S. WOOLF.

Recovering vapours of varnishes and the like. D. LARKIN (U.S.P. 1,743,554, 14.1.30. Appl., 13.3.25). —Varnish-fume recovery apparatus is claimed, comprising a casing containing spaced vertical partitions having openings alternately at the upper and lower ends, vertical overflow pipes passing through the bottom wall of the casing, and vertical spray-nozzles passing through the top wall of the casing and having their discharge ends in spaced parallel relation with the intake ends of the overflow pipes. By such an arrangement a varnish-laden atmosphere when passed through the casing is folded by the partitions into parallel columns having currents moving diagonally through the spaces between the nozzles and the overflow pipes; simultaneously jets of precipitating fluid (water) are injected medially into the columns and directed downward towards the intake ends of the overflow pipes in lines at angles to the movements of the fume-currents. The water is separated from the condensed vapour by processes depending on immiscibility or difference in sp. gr., and is then returned automatically to the spray-nozzles. S. S. WOOLF.

Phenolic resins and their manufacture. H. WADE. From BAKELITE CORP. (B.P. 326,545, 15.12.28).—A fusible, non-reactive, phenolic resin is obtained by heating a fusible, non-reactive, phenol-methylenc resin, e.g., a formaldehyde resin, with furfuraldehyde, a basic condensing agent, e.g., lime, and, if desired, a small proportion of a methylene-containing hardening agent, e.g., hexamethylenetetramine, and/or a lubricant, e.g., stearic acid, at 130—150° for a time sufficient to convert the resin into a mass which is brittle when cold, but insufficient to destroy its non-reactive character. The fusible methylene resin may be heated with the lime and thereafter furfuraldehyde added and the heating continued. S. S. WOOLF.

Manufacture of phenol-formaldehyde condensation product. G. W. STRYKER (U.S.P. 1,737,031, 26.11.29. Appl., 1.10.27).—Phenol is heated and agitated with a predominating quantity of formaldehyde in the presence of a catalyst (ammonia), for not more than 80 hrs. at 48—57°, water being thereby eliminated without stratification of the mass, and the resultant thick syrupy resin is heated for 4—5 hrs. at 82—93°. S. S. WOOLF.

Manufacture of phenol-furfuraldehyde resin. E. E. NOVOTNY, Assr. to J. S. STOKES (U.S.P. 1,737,121, 26.11.29. Appl., 29.8.23) .- A potentially reactive liquid or semi-solid condensation product of phenol and furfuraldehyde is claimed, wherein the constituents are completely in chemical combination, an active compound containing the methylene linking, e.g., formaldehyde, being incorporated as hardening agent. In the absence of heat such product maintains its condition without reaction for a considerable time. The product of partial condensation of a phenolic substance with an excess over equimolecular proportions of another substance, which is itself capable both of volatilisation and of resinification by catalytic action without chemical combination with any other reagent, and which is adapted to act as an ultimate hardening agent for the intermediate condensation product, is also claimed, the condensation reaction being controlled so that it may be arrested at any desired stage. S. S. WOOLF.

Manufacture of artificial resins. BRIT. CYANIDES Co., LTD., E. C. ROSSITER, and W. C. DAVIS (B.P. 327,154, 22.12.28).—A phenol is condensed, at 120— 130° in the presence of 1—10% of its weight of dicyanodiamide, with an aldehyde, *e.g.*, formaldehyde or furfuraldehyde. S. S. WOOLF. Manufacture of objects [of high gloss] by moulding plastic masses of condensation products. A. SCHMID, and METROPOLE DEVELOPMENTS, LTD. (B.P. 326,475, 12.12.28).—Condensation products in which the process of polymerisation is effected by acid or acidyielding media are cast in mechanically robust moulds having a tin surface capable of being highly polished. S. S. WOOLF.

Manufacture of [artificial resin] foils, films, etc. WOLFF & CO. KOMM.-GES. AUF AKT., and R. WEINGAND (B.P. 318,580, 15.2.29. Ger., 6.9.28).—Viscous solutions, preferably preheated to 100°, of condensation products of aldehydes with urea or its derivatives in the presence of softening agents, *e.g.*, glycerol, methy*cyclo*hexyl adipate, etc., which have preferably been added after the commencement of the urea-aldehyde condensation, are applied to a travelling base and allowed to solidify thereon, the films thus formed being removed when they cease to be superficially sticky.

S. S. WOOLF. F. SCHLOSSE

Refining of raw oil of turpentine. F. SCHLOSSER and M. PAQUIN, Assrs. to I. G. FARBENIND. A.-G. (U.S.P. 1,755,668, 22.4.30. Appl., 31.8.25. Ger., 12.9.24).—See B.P. 239,878; B., 1925, 999.

Preparation of coloured nitrocellulose varnishes. E. RICHTER, ASST. to I. G. FARBENIND. A.-G. (U.S.P. 1,756,100, 29.4.30. Appl., 14.4.27. Ger., 1.2.26).—See B.P. 291,539; B., 1929, 614.

[Stoving] oven. H. L. WARD, ASST. to WESTERN ELECTRIC Co., INC. (U.S.P. 1,744,817, 28.1.30. Appl., 9.12.24).

Azo pigments (B.P. 302,173).—See IV. Cellulose ester coating compositions (B.P. 326,515).—See V. Non-splintering glass (B.P. 326,520).—See VIII.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Behaviour of progressively racked rubber with respect to ageing, hysteresis, m.p., and energy effects. H. FEUCHTER and E. A. HAUSER (Gummi-Ztg., 1930, 44, 1307—1308).—A condensed version of a paper already abstracted (cf. B., 1930, 112). D. F. Twiss.

Coal and carbon as raw materials. MATIGNON.— See II. Butadiene from cracked hydrocarbons. FROLICH and others.—See III.

See also A., May, 609, Isoprene and caoutchouc (STAUDINGER and others).

PATENTS.

Vulcanisation of rubber. I. G. FARBENIND. A.-G. (B.P. 311,735, 7.5.29. Ger., 15.5.28).—2-Amino-4:5dihydroglyoxalines, especially the 2-*p*-toluidino-compound, are used as vulcanisation accelerators.

C. HOLLINS.

Composite rubber-faced surfacing material. L. P. F. F. CRESSON (B.P. 325,302, 21.11.28. Addn. to B.P. 303,400).—A surfacing material comprises a base of cement or the like, reinforced with iron, if desired, and faced with rubber which has been vulcanised *in situ*, there being sufficient sulphur at the interface to cause the formation of a stratum of hard rubber; for this purpose a layer of vulcanised rubber latex composition containing sufficient free sulphur may be applied to the surface of the cement base. The rubber facing or the part of it adjacent to the base contains ingredients such as magnesite cement or lead oxide capable of combining with the silicic acid of the cement, thereby ensuring interfacial unity between the two parts.

D. F. Twiss.

Concentration of rubber latex. I. TRAUBE, Assr. to NAUGATUCK CHEM. Co. (U.S.P. 1,754,842, 15.4.30. Appl., 3.9.24. Ger., 23.10.23).—See B.P. 226,440; B., 1925, 139.

Artificial compositions, especially those resembling rubber. W. FRANKENBURGER and C. STEIGERWALD, Assrs. to I. G. FARBENIND. A.-G. (U.S.P. 1,756,943, 6.5.30. Appl., 5.7.28. Ger., 23.7.27).—See B.P. 294,474; B., 1929, 1024.

Dry moulding [of rubber articles]. W. B. WESCOTT, Assr. to RUBBER LATEX RES. CORP. (U.S.P. 1,756,411, 29.4.30. Appl., 10.12.27).—See B.P. 302,151; B., 1930, 471.

Accelerator of vulcanisation [of rubber]. J. TEP-PEMA, Assr. to GOODYEAR TIRE & RUBBER CO. (U.S.P. 1,757,930, 6.5.30. Appl., 10.12.27).—See B.P. 302,142; B., 1930, 113.

Stabilised dispersions (B.P. 301,805).—See II. Vulcanisation accelerators (B.P. 306,558 and 306,842). Vulcanised rubber (B.P. 326,525).—See III.

XV.-LEATHER; GLUE.

Manufacture and application of fat products in the leather industry. K. SCHORLEMMER (Collegium, 1929, 526-536).—Degras can be made from herring and other fish oils and is miscible with wool grease or mineral oil. Fats undergo oxidation in the leather and the acidity has been observed to increase. Sulphonated oils are used on chrome-tanned leathers. Thus 52 kg. of neatsfoot oil is treated with 3.4 kg. of concentrated sulphuric acid, kept overnight, and repeatedly washed with solutions of Glauber's salt. Pieces of pelt which had been treated with 1:1 mixture of sulphonated cod oil and sulphonated neatsfoot oil yielded a product which possessed many of the properties of leather. There was a contraction of the fibres, and this has been observed also in fat-liquoring patent leather with these oils. The Fahrion hot-water test for fat-liquored chrome leather gave values 1-2% higher than those for untreated leather. In the manufacture of sulphonated oils, 10-25% of sulphuric acid (calc. on wt. of oil) is customary. The temperature should be kept as low as possible. The time of reaction should be 24 hrs., or longer for sulphonated castor oil if the product is to give a clear solution in water. A superior product is obtained if the sulphonated oil is washed with Glauber's salt solutions than if brine liquors are employed, and it requires least sodium hydroxide addition to render it completely soluble in water. Similar effects are produced by washing sulphonated neatsfoot oil with sodium sulphate and sodium chloride solutions, respectively. The fatliquoring process is sometimes affected by the shade which is being produced. Examples are quoted where the sulphonated oil required to be more acid for dyeing blacks and less acid for certain pale shades. Sulphonated oils which have separated during storage in cold weather

can be restored to their original condition by adding ammonia and alcohol. D. WoodRoffE.

Tannins in [leaves of] chestnut and Sicilian W. MÜNZ (Collegium, 1929, 499-512).sumac. From the leaves of the chestnut (Castanea vesca) 3.8%of a tannin was isolated, which was shown to be a galloylhexose, a simpler substance than oakwood tannin, which yields more ellagic acid. The tannin from sumac leaves (Rhus coriaria) was prepared by the ethyl acetate method. Its acidity was high, but it contains no free carboxyl groups, since it is extractable from alkaline solutions by ethyl acetate. It has $[\alpha]_{D}^{20} + 53 \cdot 3^{\circ}$ in 5% solutions, increasing with increasing dilution. By acid hydrolysis $82 \cdot 2\%$ of gallic acid and 6% of dextrose were obtained; treatment with tannase afforded 88% of gallic acid and 8.2% of dextrose. On methylation with diazomethane and subsequent hydrolysis with methylalcoholic potash, only two thirds of the acid was recovered. Sumac tannin is largely pentagalloylglucose or is closely related to it. D. WOODROFFE.

Violet-fluorescing material in pine bark and its extracts. O. GERNGROSS (Collegium, 1929, 512–519). —By removing the resin from pine bark and then extracting with dry ether, an almost colourless powder was obtained by evaporating the ether. This powder is shown to be the cause of the violet fluorescence observed when infusions of pine bark or its extracts are viewed in the light of a Wood lamp. On acetylation, a hepta-acetyl compound (sinters 75°, m.p. about 100°), of empirical formula $C_{33}H_{33}O_{13}$, was obtained, which no longer showed fluorescent properties until the acetyl groups were removed. D. WOODROFFE.

Vegetable tanning materials of Lybia. G. A. BRAVO (Annali Chim. Appl., 1930, 20, 171-180).-The materials were extracted in a Procter extractor with water at about 80°, the solution being analysed by both the filter and the Baldracco-Darmstadt methods. The percentage results obtained are respectively as follows :-Root bark of Rhus oxyacantha, Cav.: tans 17.15, 15.65; soluble non-tans 6.05, 7.55; insoluble non-tans (by diff.) 61.5, 61.5; moisture 15.3, 15.3. Bark of Acacia saligna, Benth.: tans 15.55, 14.43; soluble non-tans 9.58, 10.70; insoluble non-tans (by diff.) 63.07, 63.07; moisture 11.8, 11.8. Bark of Acacia longifolia: tans 9.72, 8.58; soluble non-tans 10.84, 11.98; insoluble non-tans (by diff.) 66.87, 66.87; moisture 12.57, 12.57. Root bark of Acacia lophanta, Willd.: tans 9.06, 7.98; soluble non-tans 11.70, 12.78; insoluble non-tans (by diff.) 67.37, 67.37; moisture 11.87, 11.87. Acacia farnesiana, Willd.: tans 5.2 (filter), soluble non-tans 5.4; insoluble nontans (by diff.) 76.12; moisture 13.28. Bark of Tamarix articulata, Vhl.: tans 14.72, 14.14; soluble non-tans 9.62, 10.2; insoluble non-tans (by diff.) 61.78, 61.78; moisture 13.88, 13.88. Galls of Tamarix articulata, Vhl. : tans $36 \cdot 77 - 43 \cdot 91$; soluble non-tans $16 \cdot 76 - 9 \cdot 68$. T. H. POPE.

Water content of solid vegetable tannin extracts. W. VOGEL (Collegium, 1930, 3-13).—A solid Argentine quebracho extract contained 26.2% of moisture as it was run out of the extract plant, 25% after allowing 4 days for complete solidification, 22.2% fafter it had been kept during the hot season in an Argentine factory, 21.8% after transportation overseas, and 18.5% after 1 year in an unheated room in the temperate zone. Some bags of extract were kept for 3-4 years in a temperate climate, when the moisture content was found to be 12-13% and 14-15% for crude and sulphited extracts, respectively; this value is the average for air-dry quebracho extracts, and varies slightly with the temperature and humidity of the surrounding atmosphere. The moisture content of finely-powdered quebracho extract is lower, viz., 10% and 11-13% for the crude and sulphited extracts, respectively. Under the same external conditions, 9% and 10.5% of moisture is absorbed by the absolutely dry crude and sulphited extracts, respectively. Generally, 10-12% of water $(6\cdot7-14\cdot3\%)$ is contained in powdered, air-dry, tannin extracts. Less water is taken up by absolutely dry, powdered extracts generally than corresponds with the water content of the air-dry material. D. WOODROFFE.

Neutralisation of one-bath chrome-tanned leather. W. Schindler, K. KLANFER, and E. FLASCH-NER (Collegium, 1929, 472 - 499). - Pieces of onebath chrome-tanned leather were neutralised, and the amount of SO₄ was determined in the finished leather by the amount of 0.1N-sodium bicarbonate neutralised in warm solution. The neutralising agents could be divided into three groups : (A) sodium bicarbonate and carbonate, (B) sodium hydroxide and silicate, (C)ammonia with and without ammonium chloride. Borax is intermediate between A and B. More acid was neutralised in the grain than in the middle layer of leather treated with 2% of sodium bicarbonate or its equivalent of sodium carbonate. The difference was less marked after prolonged treatment. The acid content of the grain was much less with leathers treated with the B materials, whilst practically no acid was removed from the middle tissue. The same effect was obtained to a certain extent with borax. Practically no acid appeared to be removed from the leather by treatment with group C, although the alkalinity of the neutralising liquor was diminished. It is suggested that entry of the ammonia or ammonium salts into the chromium complex takes place. The intense neutralising effect of borax and sodium silicate, respectively, is attributed to the replacement of the combined acid in the leather by the free boric acid or silicic acid.

D. WOODROFFE.

Effect of heat on wetted vegetable-tanned leathers. V. W. J. CHATER (J. Soc. Leather Trades' Chem., 1930, 14, 28-37; cf. B., 1929, 1025).-A number of calf-pelt strips were treated with buffer solutions having $p_{\rm H}$ 1—12, then shrunk according to the author's method, the shrunken pieces being dried out and measured. The dimensions were found to be a function of the $p_{\rm H}$. Shrinkage curves were derived for beef tissue and for oak-bark- and quick-tanned leathers. The initial shrinkage temperature of these leathers was increased by soaking them in water, and still more so by soaking in solutions of formaldehyde. Shrinkage curves were derived for sole leathers in various stages of tanning. D. WOODROFFE.

Determination of sulphuric acid in leather. VON SCHROEDER (Collegium, 1929, 520-526).-Free sulphuric acid was detected, by the Balland and Maljean method (" Leather Chemists' Pocket Book," Spon, 1919, 190), in vegetable-tanned leathers on which no sulphuric acid had been used, but only sulphited extracts. Low results for alkali sulphate are obtained by van der Hoeven's method (B., 1924, 758, 841), and not all the sulphuric acid is removed from the leather by Immerheiser's method (B., 1920, 731 A). The following method has been devised by the author. The leather (20 g.) is soaked in 100 c.c. of distilled water for a few hours, the liquor poured off, the leather soaked in a further quantity of water, and this extract added to the first, the process being repeated over a period of 2 days until 1 litre of extract has been obtained. The extract is then poured through hide powder in a filter-bell, the first 150 c.c. of filtrate being rejected, and the total sulphates are determined as barium sulphate in the next 250 c.c. A second 20 g. of the leather are extracted similarly after 3-5 g. of sodium acetate have been added to it, the extract is acidified with acetic acid, filtered through a filter-bell as above, and the total sulphates are determined. The difference between the two determinations enables the free sulphuric acid to be calculated. Negligible amounts have been obtained by this method on acidfree leathers which had given a high Balland and Maljean figure. Hydrochloric acid when determined by the new method is found to be unaffected by the presence of sulphites, synthetic tannins, sulphonated oils, or D. WOODROFFE. magnesium salts.

Physico-chemical problems in the glue and gelatin industry. G. HEDRICH (Z. Electrochem., 1930, 36, 156–163).—A survey. H. F. GILLBE.

Modified shaking method for analysing tannins, and the Darmstadt apparatus. G. BALDRACCO (J. Soc. Leather Trades' Chem., 1929, 13, 365–375, and Collegium, 1929, 450–453).—See B., 1929, 485.

Lacquers for patent leather. SCHAD and RIESS. —See XIII.

PATENTS.

Dividing liquid substances into drops (B.P. 313,566).—See I. Paper etc. from leather waste (B.P. 326,936).—See V. Protecting fur, hair, etc. against moth (B.P. 326,451 and 326,567).—See VI.

XVI.—AGRICULTURE.

Classification of moorland soils (podsolised moor soils). W. KASSATKIN (Mitt. Staatl. Inst. Versuchsagron. Abtg. Ackerbau, Leningrad, 1928: No. 14, 38 pp.; Bied. Zentr., 1930, **59**, 149–150).— A discussion of the formation and classification of soils of the State Institute. A. G. POLLARD.

Soil structure. III. Influence of soil swelling on the determination of capillary and non-capillary porosity by means of saturation of soil with water. A. T. TIULIN (Rep. Agric. Exp. Stat. Perm., No. 3. 1929; Proc. Internat. Soc. Soil Sci., 1930, 5, 35).— During the saturation of soil with water for determining the capillary porosity, the swelling of the colloids is sufficient to produce false values. Replacement of water by an inert liquid, *e.g.*, xylene, overcomes this fault. Differences between the capillary and non-capillary porosity of soils indicated by water and by xylene increase with the proportion of colloids and the size of the aggregates. (Cf. B., 1929, 568.) A. G. POLLARD.

Nitrate-assimilating power of the soil, and some nitrate-assimilating soil bacteria. F. B. SMITH (Proc. Iowa Acad. Sci., 1928, 35, 69—74).—The nitrate-assimilating power of soil is measurable. CHEMICAL ABSTRACTS.

Effect of calcium carbonate and of sulphuric acid on the acidity of various peats. P. TUORILA (Wiss. Veröff. finn. Moorvereins, 1928, No. 8, 75 pp.; Bied. Zentr., 1930, 59, 103-106).-Neutralisation of acid peats was least rapid with calcium carbonate, followed in ascending order by lime, sodium carbonate, and sodium hydroxide. The effects of the hydroxide and carbonate of either base were similar at $p_{\rm H} < 6.0$, but at $p_{\rm H}$ 7.0 the hydroxides were more active. The rate of neutralisation with calcium carbonate increased with the initial $p_{\rm H}$ value of the peat. Methods for calculating the lime required for neutralisation are given. Difference in the botanical composition of the peats affected the change of $p_{\rm H}$ per unit of lime added. In individual peats this value was not appreciably influenced by the extent of humification nor by the ash content. Changes in $p_{\rm H}$ following liming were to some extent correlated with the density of the peat. Alterations in $p_{\rm H}$ resulting from treatment with a given amount of sulphuric acid tended to decrease as the total amount of acid applied was increased. The sulphuric acid of superphosphate acted similarly. A. G. POLLARD.

Lime : magnesia ratios in dolomitic limestones as influencing solution and soil reaction. W. H. MACINTYRE and W. M. SHAW (J. Amer. Soc. Agron., 1930, 22, 14—27).—The higher is the proportion of calcium, the greater is the alkalinity of carbonated water extracts and the more quickly is equilibrium attained in initial carbonated water suspensions. The effect of repeated treatment is recorded. Calcium and magnesium carbonates, when added to the suspensions, are reciprocally repressive on solubility and mutually protective to the dolomite solid phase. Acids produced in a soil dolomite medium combine preferentially with magnesium. Under humid conditions, addition of dolomitic limestone cannot produce a toxic condition from an accumulation of magnesium *per se*.

CHEMICAL ABSTRACTS.

Application of lime and phosphates to podsol soils. A. T. TIULIN and A. E. WOSBUTSKAJA (Agric. Exp. Stat. Perm, 1926, No. 1 ; Proc. Internat. Soc. Soil Sci., 1929, 4, 390—393).—Crop increases following the application of rock phosphate (with potash and nitrogen) to podsols showed two maxima in the regions $Pn 4 \cdot 0 - 4 \cdot 5$ and $7 \cdot 5 - 8 \cdot 0$. The acid maximum is attributed to increased phosphate solubility under acid conditions, and the alkaline maximum to the indirect effect of increased nitrification. Examination of the plant sap confirmed the rapid intake of phosphorus within the two optimum ranges. The value of lime used in conjunction with superphosphate lies in its stimulative effect on nitrification. (Cf. B., 1929, 758.) A. G. POLLARD.

Phosphate manuring on acid soils. H. KAPPEN (Superphosphat, 1929, 5, 199-206; Bied. Zentr., 1930, 59, 113-114).-Pot-culture trials with spurrey are described in which the efficiency of phosphatic fertilisers on acid, neutralised, and alkaline soils is examined. On acid mineral soils superphosphate was as effective as basic slag. On neutralised mineral soils superphosphate was superior to basic slag for lime-sensitive plants (spurrey), but inferior for acid-sensitive plants (rape). Superphosphate did not increase soil acidity. The neutralising effect of basic slag on acid soils was small. Rock phosphates were not sufficiently decomposed either by zeolitic acids in acid soils, or by simultaneously applied physiologically acid fertilisers, to permit of their substitution for easily soluble phosphates. The unusually great assimilating power of summer rape enables this plant to utilise rock phosphates to an extent which is independent of the degree of soil acidity.

A. G. POLLARD.

Influence of tillage on the porosity and structure of soil. Novák-ŠIMEK (Bull. Czechoslov. Acad. Agric., 1929, [v], 558; Proc. Internat. Soc. Soil Sci., 1930, 5, 33—35).—The structure of soil is examined by grading the sample in its natural condition by means of a series of sieves (20-, 10-, 5-, and 2-mm. circular holes). Analyses so made agree well with determinations of pore space. A. G. POLLARD.

Chemical characteristics of soils from the experimental fields of the Department of Agriculture of the [Russian] State Institute for experimental Agronomy. N. Sokolov (Mitt. Staatl. Inst. Versuchsagron., Abtg. Ackerbau, Leningrad, 1928, No. 12: Bied. Zentr., 1930, 59, 147–148).—The nutrient contents, absorptive capacity, degree of saturation, and relative productivity of these soils are recorded. A. G. POLLARD.

Photoactivity of [Czechoslovakian] soils. L. SMOLÍK (Bull. Czechoslov. Acad. Agric., 1929, [v], 569; Proc. Internat. Soc. Soil Sci., 1930, 5, 32).—Photoactivity in the soils is probably a variable property. Few soils exhibit photoactivity, and in upper profiles this cannot be induced by the exposure of soil to solar radiation, to a strong electric field, or by storage *in vacuo*, in oxygen, or in carbon dioxide. A. G. POLLARD.

Properties of soils which influence soil erosion. H. E. MIDDLETON (U.S. Dept. Agric., Tech. Bull. 178, 1930, 16 pp.).-A study of the physical and chemical properties of three erosive and three non-erosive soil types indicates that the properties having the greatest influence on soil erosion are indicated by the dispersion ratio, the ratio of colloid to moisture equivalent, the erosion ratio, and the silica-sesquioxide ratio. The following are tentatively suggested as limiting values for these ratios: for non-erosive types a dispersion ratio of < 15, a ratio of colloid to moisture equivalent of > 1.5, and an erosion ratio of < 10. No chemical property studied was found useful in differentiating erosive and non-erosive soils, though it is considered that the dispersivity of a soil is influenced by the quantity and nature of the exchange bases present, and the silica-sesquioxide ratio is the determining influence on physical properties. E. HOLMES.

Dynamics of physical properties of soils in different cultural conditions. N. KOURTIAKOV (Ann. Sci. Agron., 1929, 46, 460; Proc. Internat. Soc. Soil Sci., 1930, 5, 39-40).—Changes in soil porosity, aeration, and power of imbibition during a 4-year rotation are examined. A. G. POLLARD.

Dynamics of soil solutions in podsol areas. S. A. ZACHAROV (Trans. Agric. Inst., Krasnodar, 1929, 6; Proc. Internat. Soc. Soil Sci., 1930, 5, 38–39).—Factors affecting the concentration of the soil solution are examined and the seasonal changes as the solution passes from one horizon to another are described.

A. G. POLLARD.

Solubility of Van Bemmelen's A-zeolitic complex in hydrochloric acid under different conditions of time and amount of acid. R. TRNKA and HAUPT (Mitt. Czechoslov. Akad. Landw., 1929, 5, 577; Proc. Internat. Soc. Soil Sci., 1930, 5, 28).—In the extraction of soils with 20% hydrochloric acid solution (Van Bemmelen) an increase in the quantity of acid used or in the period of extraction leads to a steady increase in the amount of material dissolved. During prolonged extraction difficultly-soluble complex silicates may be decomposed. The prescribed conditions of extraction must be adhered to, since the process is not an exact one and serves merely as a means of comparison of soil properties. A. G. POLLARD.

Acid and alkaline extracts of soils. V. I. PARA-MONOV and B. P. NIKOLSKI (Mitt. Ackerbau abt., Inst. exp. Agron., Leningrad, 1929, No. 19, 24 pp.; Bied. Zentr., 1930, 59, 145-146) .-- Soils of similar degrees of unsaturation with bases but with varying humus contents were extracted with 0.05N-acid and alkali and the extracts titrated electrometrically. High proportions were present in all extracts. Acid removed more alumina from unsaturated than from saturated soils. For the titration of extracts containing aluminium, bromothymol-blue or litmus was preferred as an indicator. The use of phenolphthalein, as in the Daikuhara method, led to less satisfactory results. The amount of exchangeable bases in a soil was approximately equal to the amount of acid neutralised by the soil during the acid extraction. Certain soil minerals suffer decomposition by 0.05N-sulphuric acid. The exchangeable base content of chernozem soils was decreased by saturation with ammonia following treatment with ammonium chloride solution. Treatment with calcium chloride solution increased the exchangeable base content. Alkaline soil extracts showed considerable buffer capacity, which increased with increasing humus content and with decreasing calcium content. Organic matter in these extracts was coagulated at $p_{\rm H}$ 3–4. Aluminium hydrosol is protected by the humus and is not coagulated.

A. G. POLLARD. Soil acidity. O. ARRHENIUS (Arch. Suikerind. Ned.-Indië, 1928, [22], 511—516; Proc. Internat. Soc. Soil Sci., 1930, 5, 22—23).—Results of earlier investigations (B., 1929, 32, 569) are confirmed on other soil types. The toxicity of acid soils cannot be ascribed to the presence of soluble aluminium, the concentration of which did not exceed 1 pt. per million even in very acid soils. In determining the buffer capacity of soils by titration with soda, the calculated amounts of lime required to produce a given reaction are too low. Better results are obtained by titration with calcium hydroxide or bicarbonate. In North German and Swedish soils there is a relationship between buffer action and hygroscopicity which is not apparent in the soils of Java.

A. G. POLLARD.

Nitrogen content of the soil as related to the precipitation-evaporation ratio. H. JENNY (Soil Sci., 1930, 29, 193—206).—Relationships between the nitrogen content of soils and the mean temperature and humidity of the atmosphere are examined. In both temperate and subtropical areas the nitrogen content increases logarithmically with the N : S quotient (*i.e.*, moisture precipitation : saturation deficit in the air; cf. Meyer, B., 1926, 684). In subtropical areas the nitrogen content of timber soils is not influenced by humidity factors. In temperate soils the C : N ratio (average 11.3) does not vary with humidity conditions. A. G. POLLARD.

Periodicity of the nitrate content of soils. H. N. BATHAM and L. S. NIGAM (Soil Sci., 1930, 29, 181—190).—A survey of the nitrate contents of soils from many parts of the world shows a general similarity of seasonal changes. Nitrification is mainly controlled by the intensity of solar activity. A. G. POLLARD.

Sulphate-sulphur in certain types of soils. H. STREMME (Chem. Erde, 1930, 5, 254–259).—Peaty soils from the neighbourhood of Danzig contain small amounts of sulphates, free sulphuric acid, and sulphidesulphur, which vary at different depths and in different seasons of the year (cf. A., 1929, 168). L. J. SPENCER.

Amount of "lipoids" in the principal Moravian soils. L. SMOLÍK (Bull. Czechoslov. Acad. Agric., 1928, No. 3, 249; Proc. Internat. Soc. Soil Sci., 1930, 5, 31).—The "lipoid" content (including fats, waxes, phytosterol, phosphatides, etc.) of a number of soils was determined by extraction with ether for 6 hrs. Values varied from 0.0 to 0.8%. A. G. POLLARD.

Exchange capacity of organic and mineral soil constituents. N. Sokolov (Mitt. Ackerbauabt. Staatl. Inst. exp. Agron., Leningrad, 1929, No. 13, 13 pp.; Bied. Zentr., 1930, 59, 146—147).—The high baseexchange capacity of chernozem soils is not primarily attributable to their humus content, but depends on the nature of the parent rock and the process occurring during soil formation. Humus tends to increase the exchange capacity of chernozem soils, but decreases that of podsols owing to the progressive decomposition of the unsaturated complex. The high exchange capacity of humus-bearing marl soils is traced exclusively to the proportion of parent rock which they contain.

A. G. POLLARD.

Soil moisture phenomena in a saturated atmosphere. L. B. LINFORD (Soil Sci., 1930, 29, 227-237). —Experimental evidence is advanced indicating that the angle of contact between glass and water and between many soil minerals and water is zero or very small. Foreign matter, notably fats and fatty acids, largely increases the angle of contact. The bearing of this on measurements of the hygroscopic phenomena in soil is discussed. A. G. POLLARD.

Biochemical reactions in the formation of humus by micro-organisms in the soil. J. STOKLASA (Biol. der Pflanzen, 1929, 17, 272—295; Proc. Internat. Soc. Soil Sci., 1930, 5, 43—46).—The process of humus formation from plant materials as a result of the interrelated activities of animals, insects, and soil fungi and bacteria is examined and discussed. Humus is to be regarded as a respiratory by-product of microorganisms. Lignin compounds are the real sources of material for the production of humus, which is a mixture of decomposed and undecomposed lignocellulose, lignin, and microbiological cell substances. The nature of forest humus varies with the species of tree from which it is formed. A. G. POLLARD.

Rhythmic variations in the activity of soil microorganisms. N. JOHANSSON (Svensk Bot. Tidskr., 1929, 23, 241—260; Proc. Internat. Soc. Soil Sci., 1930, 5, 47—48).—The rate of production of carbon dioxide by soil micro-organisms is rhythmic in character. The nature of the variations in northern soils differs from that in tropical soils. Carbon dioxide production is usually greater by day than by night, differences being more marked at periods of maximum activity.

A. G. POLLARD.

Azotobacter in Finnish soils. W. BRENNER (Agrogeol. Med., Helsingfors, 1924, No. 20; Proc. Internat. Soc. Soil Sci., 1930, 5, 48).—The primary cause of the rarity of Azotobacter in the soils is their acidity and lack of buffer capacity, but instances are recorded of soils which after suitable adjustment of reaction still prove unfavourable to this organism. A. G. POLLARD.

Reaction of Finnish soils. W. BRENNER (Agrogeol. Med., Helsingfors, 1924, No. 19; Proc. Internat. Soc. Soil Sci., 1930, 5, 20-21).—Finnish soils are classified according to type, origin, and reaction.

A. G. POLLARD.

Reaction of cultivated Finnish soils. A. SAL-MINEN (J. Agric. Sci., Helsingfors, 1929, 40-48; Proc. Internat. Soc. Soil Sci., 1930, 5, 21).—A survey. A. G. POLLARD.

Variations in the reaction of cultivated soils. A. SALMINEN (J. Agric. Sci., Helsingfors, 1929, 129; Proc. Internat. Soc. Soil Sci., 1930, 5, 12—14).—Changes in the acidity of field soils at varying depths due to changes in moisture content are recorded.

A. G. POLLARD.

Influence of various mineral carbonates on soil reaction. W. BRENNER (Bull. Agrogeol. Inst. Finland, 1928, No. 25; Proc. Internat. Soc. Soil Sci., 1930, 5, 10-12).-The action of various liming materials on acid peat and clay soils is examined. By the addition of successive quantities of chalk, soil reaction gradually attains a constant $p_{\rm H}$ value of 7.0—7.2 for peats and 6.8 for clays. The neutralising value of limestone preparations of the same fineness of division are proportional to their content of calcium carbonate. The action of dolomite on soils is less definite, being more rapid with clays than with peats. The effect of fineness of grinding of chalk on its reaction with soil is small, while the soil still remains acid, but further action is slower as the particle size increases. This effect is more marked with dolomite than with chalk, and is more apparent in peat than in clay. Complete neutralisation of peat occupies several months. In general, dolomite ground to pass a 0.2-mm. sieve is a serviceable neutralising agent for acid soils if a month be allowed for its action. A. G. POLLARD.

Soil reaction and agricultural crops. A. Løddesøl (Meld. Norges Landbruksh., 1929, 9, [4-5]; Proc. Internat. Soc. Soil Sci., 1930, 5, 14-16).—Superphosphate and potash salts, applied singly or mixed, caused no change in the reaction of acid soils, but Norwegian saltpetre alone or mixed with superphosphate and potash salts produced slight changes towards alkalinity. Stall manure without artificial fertilisers did not affect soil reaction. Titration of the soils under examination showed that manuring slightly increased their acid-fixing capacity, but the effects on basefixing capacity were irregular. Use of fertiliser mixtures containing calcium increased the exchangeable calcium of soils. Soils rich in exchangeable calcium were usually correspondingly poor in exchangeable potassium and magnesium. Use of fertilisers containing potash did not increase the exchangeable potassium of soils. Relationships between the $p_{\rm H}$ value of a soil, its total content of exchangeable bases and their nature and proportion are dependent on the nature of the absorbing soil complex. A. G. POLLARD.

Soil reaction in the surroundings of Rožnov, with special reference to meadows and pastures. Novák and MALÁČ (Mitt. Czechoslov. Acad. Landw., 1928, 4, 461; Proc. Internat. Soc. Soil Sci., 1930, 5, 17—19).—Relationships between soil reaction and the growth of characteristic plants are examined in detail. Cultivated soils generally have a higher $p_{\rm H}$ value and a wider range of variation than uncultivated ones. The profiles of cultivated soils show a decrease in $p_{\rm H}$ value with increasing depth. The reaction of forest soils of similar type varies with the predominant type of tree. Particular species of grasses associated with soils of various ranges of reaction are recorded.

A. G. POLLARD.

Degradation of rendzina soils in the Moravian Karst. J. ZVORYKIN (Mitt. Czechoslov. Akad. Landw., 1929, 5, 598; Proc. Internat. Soc. Soil Sci., 1930, 5, 59-60).—Chemical and mechanical analyses of the various profiles of rendzina soils are recorded and the chemistry of their degradation processes is discussed. A. G. POLLARD.

Methods for the chemical and physical analysis of soils. I. KANIWETZ (Pub. Centrallab. Agric. Chem., Kiev, 1928; Proc. Internat. Soc. Soil Sci., 1930, 5, 40—42).—The effect of solutions of varying concentrations of hydrochloric and acetic acids and of sodium and ammonium chlorides on the dispersion of soils for mechanical analysis is examined. The best dispersion was produced by N-sodium chloride. Repeated boiling of the suspensions did not alter the degree of dispersion. Pretreatment of the soil with hydrochloric acid followed by ammonium chloride tended to reduce the observed clay fraction. The new British method for mechanical analysis is not satisfactory if a neutral salt solution or hydrochloric acid alone is used. A modified method consists in washing the soil with

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0.05N-hydrochloric acid or 0.16N-acetic acid until no more calcium is removed, then with N-sodium or ammonium chloride solution, and, finally, heating for 6-24 hrs. Subsequent analysis is thereby shortened. With humus soils containing chalk the sedimentation process is slow, and some "active" clay may be adsorbed by the humus. Changes in the colloidally dispersed soil fraction are influenced by the sedimentation period, particularly when hydrochloric acid treatment has been adopted. Samples of soil suspension for weighing are preferably evaporated on a water-bath or coagulated with 10% sulphuric acid. Use of concentrated acid leads to considerable losses in the recorded fractions. Washing of fractions <0.01 mm. in diam. on filter-paper is attended with possible loss of material. The temperature of water used for sedimentation must be controlled with care. A. G. POLLARD.

Determination of the nutrient requirement of soils. Neubauer's method. E. I. SANOTZKI and A. T. KIRSSANOV (Staatl. Inst. exp. Agron., Abtg. Ackerbau, Leningrad, 1928, No. 13, 23 pp.; Bied. Zentr., 1930, 59, 145).—Neubauer's method gives dependable results only with the heavier types of soil. The mixing of sand with soil produces very different effects on light and on heavy soils. The assimilable phosphate content is closely related to the proportion of water retained in air-dried soil samples. A. G. POLLARD.

Determination of water-soluble phosphorus compounds in soils. F. TERLIKOWSKI and L. KRÓLIKOWSKI (Rocz. Nauk Roln. Leśn. 1929, 21; Proc. Internat. Soc. Soil Sci., 1930, 5, 28—29).—Numerous comparative analyses of the soluble phosphate content of soils by Spurway's method and that of Wrangell (B., 1926, 841) are recorded. A. G. POLLARD.

Determination of the phosphate requirement of soils by pot-culture methods. ANON. (Superphosphat, 1930, 6, 25-27).—The limits of error and the significance of experimental values in the correlation with Mitscherlich pot experiments and field results are discussed (cf. Landw. Jahrb., 1928, 67, 457).

A. G. POLLARD.

Results of soil experiments in the Rhine Palatinate especially regarding their root-soluble phosphate contents. M. KLING (Superphosphat, 1930, 6, 39–43).—Analysis of a large number of soils is recorded. Among these the root-soluble phosphate contents (Neubauer) was lowest in pasture soils, higher in arable soils, and highest in vineyard soils. The proportion of root-soluble phosphate in soils below which fertilisers are necessary are, per 100 g. of dry soil : for cereals and pastures 8 mg.; for root crops, clovers, and vines 15 mg.; for tobacco 4 mg. P_2O_5 .

A. G. POLLARD.

Determining soil organic matter by means of hydrogen peroxide and chromic acid. W. T. DEGTJAREV (Soil Sci., 1930, 29, 239-245).—Modifications of Schollenberger's method (B., 1927, 662) are described. The sample used is reduced to 0.2— 0.15 g. Standard chromic acid is prepared by heating 16 g. of chromic oxide with 1 litre of concentrated sulphuric acid at 165° for 30 min. The soil is heated with 10 c.c. of the chromic acid solution at 165° in a sulphuric acid bath for 10 min., cooled, washed into a beaker, and titrated with ferrous ammonium sulphate solution in the presence of diphenylamine. A further oxidation process is described in which the crushed and sieved sample (0.15-0.2 g.) is treated in a Kjeldahl flask with 10-15 c.c. of hydrogen peroxide and to which is added carefully 10-15 c.c. of chromic acid solution. The heat generated by vigorous mixing of the contents of the flask suffices to oxidise the organic matter, and the mixture is washed out and titrated as before. A. G. POLLARD.

Determination of adsorbed bases in soils containing carbonates. I. KANIWETZ (Rep. Zentrallab. Agric. Kiev, 1928; Proc. Internat. Soc. Soil Sci., 1930, 5, 29—30).—A process for determining adsorbed bases in soils, depending on leaching with water instead of dilute acid, is examined. Continuous leaching with water affects the adsorptive capacity of soils (as determined by *N*-barium chloride) in a manner varying with the soil type. These changes are independent of temperature, and are mainly controlled by the chalk content of the soil. Changes in $p_{\rm H}$ values during leaching are small, and vary with the amount of chalk present and the carbon dioxide content of the water used. A. G. POLLARD.

Determination of $p_{\rm H}$ of soils by the quinhydrone electrode. P. DE CONINCK (Ann. Soc. Sci. Bruxelles, 1930, 50, 6—13).—Soils of different origin were suspended in water, and the $p_{\rm H}$ of the liquid extract was determined (a) with the soil in suspension, (b) after decantation, (c) after filtration, (d) after centrifuging. The $p_{\rm H}$ of the decantated liquid was also measured after filtration and centrifuging. The measurements were made over a period of several days, and although consistent amongst themselves in respect to time, the values differed for the processes (alone) used to prepare the liquid. No explanation of the results is offered. The Breckpot type of quinhydrone electrode was used.

J. O. CUTTER.

Determination of $p_{\rm H}$ values in soils. L. SMOLÍK (Bull. Czechoslov. Acad. Agric., 1929, [v], 192; Proc. Internat. Soc. Soil Sci., 1930, 5, 9-10).-In using the quinhydrone electrode for soil determinations, Veitch's hydrochloric acid-potassium chloride electrode is suitable for field work, although the saturated calomel electrode is preferable for exact laboratory determinations. The gold electrode is less sensitive than platinum. Soil suspensions used for these measurements should be well stirred. After settling, the deposited soil shows a higher $p_{\rm H}$ value than the suspension. Drying of soils at 100° decreased their PH values. Ignition decreased the $p_{\rm H}$ values of acid and neutral soils and increased that of alkaline soils. Autoclave drying of wetted soils decreased their acidity. Changes in $p_{\rm H}$ values of soils due to drying are smaller A. G. POLLARD. in light than in heavy soils.

Factors affecting the estimation of lime requirement from $p_{\rm H}$ values. M. F. MORGAN (Soil Sci., 1930, 29, 163—180).—For a series of soils of similar type the "lime-absorption factor" (lime necessary to produce an increase of $p_{\rm H}$ 1) may be calculated by means of a series of factors depending on texture and humus content. The lime-absorption factor of a soil may be expressed as $0.119 \times \text{moisture equivalent}$ (Briggs). A. G. POLLARD.

Determination of minute amounts of iodine in soils and waters. R. L. ANDREW (Analyst, 1930, 55, 269-277).-The iodine was determined by the method of von Fellenberg slightly modified. The prepared dried soil is ignited with potassium carbonate, the residue boiled with water, filtered, the filtrate evaporated to dryness, carefully ignited, cooled, 4 c.c. of 90% alcohol and 3 drops of water are added, and, after 15 min., the mixture is rubbed up, the alcoholic solution decanted, and extraction repeated three times. One drop of saturated potassium carbonate solution and 6 c.c. of water are added to the solution, the whole is evaporated, ignited, and, after cooling, 1 c.c. of 95% alcohol and sufficient water are added to give a pasty mass on stirring. The solution is decanted, extraction repeated, and, after evaporation, the very small residue is ignited; 4 drops of water are then added, the solution is transferred to the iodine extraction tube, and a series of standard tubes prepared. With small amounts (up to 0.001 mg.) of iodine 0.03 c.c. of chloroform is added to each tube, followed by 1-2 drops of sulphuric acid containing nitrite, the tube is shaken and centrifuged, and the depth of colours compared. Not less than 0.0002 mg. of iodine could be detected. In no case was there a recovery of more than 60-70% of the iodine, and the losses are not wholly due to heating. Reducing the amount of potassium carbonate did not improve the extraction. If the amount of iodine extracted is increased by one half, the quantity is a true indication of the amount in the soil. Soils from several districts of North Island of New Zealand had an iodine content of 10-2100 pts. in 10 million and potable waters of 0.0040-0.1200 pt. D. G. HEWER.

Determination of "volume-weight" of soils by means of vaseline. K. S. KIRITSCHENKO (Rep. Cuban Agric. Inst., 1929, 6; Proc. Internat. Soc. Soil. Sci., 1930, 5, 35—36).—Vaseline is used to fill the pore-space of soils in determining their volume-weight.

A. G. POLLARD.

"Kalkammonsalpeter." K. NEHRING (Z. Pflanz. Düng., 1930, 9B, 120—125).—No nitrogen losses occurred during the storage of "Kalkammonsalpeter," although unless kept dry the fertiliser tended to cake and become difficult to distribute. In soil, "Kalkammonsalpeter" reacted as physiologically neutral, and in pot cultures its nitrogen was as efficient as that of sodium nitrate. In field trials with soils exhibiting much exchange acidity the nitrogen of "Kalkammonsalpeter" was not utilised by acid-sensitive crops, e.g., turnips.

A. G. POLLARD.

Superphosphate mixtures [fertilisers]. KLEBER-GER (Superphosphat, 1930, 6, 21-22).—Field trials are quoted in a discussion of the value of "ammonium superphosphate" as compared with equivalent mixtures of simple fertilisers for the growth of barley and other cereals. A. G. POLLARD.

Content and solubility of potash and phosphates in surface and sub-soils of various types. J. HASEN-BÄUMER and R. BALKS (Z. Pflanz. Düng., 1930, 9B, 97—109).—In light and medium soils and subsoils the phosphate and potash contents (citric-soluble, rootsoluble, and soluble in 10% hydrochloric acid) varied

directly with the proportion of clay (< 0.01 mm. in diam.). The proportion of potash soluble in 10% hydrochloric acid averaged 0.93 pt. per 100 pts. of clay in surface soils and 0.87 in subsoils. The amount of potash soluble in the acid increased with the calcium content of the soil, but not directly; with higher lime contents the relative increase in soluble potassium declined. No relationship was apparent between the reaction or chalk content of a soil and the "relative solubility " or citric-solubility of phosphates or the rootsolubility of the potash. In soils of similar potash content the root-solubility and "relative solubility" of the potash was greater in the surface than in the subsoil. Similar relationships exist with the phosphates, but differences in the phosphate content of surface and subsoils are much less marked. On heavy soils the proportionality between nutrient and clay contents is irregular, notably in cases where the subsoil has a greater proportion of clay than the surface soil.

A. G. POLLARD.

Solubility of phosphoric acid compounds in certain soils. S. M. ANTONOV (Siberian Inst. Agric. & Forestry, 1928, 10; Proc. Internat. Soc. Soil Sci., 1930, 5, 27-28).-The effect of lime and of sulphuric acid on the soluble phosphate content of black earth and saline soils is examined. Lime increased the watersoluble phosphate content to an extent parallelled by increases in alkalinity. The presence of normal calcium phosphate in these soils is unlikely. Changes in phosphate solubility following acid treatment do not point to the presence of iron or aluminium phosphates. The water-soluble phosphate contents of saline soils was markedly greater than that of black earths. Liming increased the nitrate contents and crop yields of saline A. G. POLLARD. soils.

Distribution of assimilable phosphorus and potash in arable soils. T. ROEMER (Superphosphat, 1930, 6, 14-20).-There is a general parallellism, but no strict proportionality, between the results of Neubauer trials and Dirks' method for determining the assimilable nutrients in soil. The latter method is utilised for determining the amounts of assimilable potash and phosphate at various soil depths. Below the cultivated surface layer the phosphate content declines sharply. Phosphatic fertilisers affect the surface soil only ; below plough depths differences in the assimilable phosphate contents are small. Extensive root development of deep-rooting plants occurs in soil layers poor in nutrients. Distribution curves of fertilisers in various soil layers after the customary cultural operations are recorded. A. G. POLLARD.

Rapid method of determining the effect of phosphate fertilisers on the yield of crops. A. NEMEC (Compt. rend., 1930, 190, 1071-1073).--Addition of phosphate to soils markedly deficient in phosphorus does not cause an increase in the yield of the crops grown in them when the content of ferric oxide exceeds 50 mg. per kg. The soils do not utilise the added phosphate. The iron oxide content is determined colorimetrically by treating the 1% citric acid extract of the soil with 10% hydrochloric acid and a few drops of potassium permanganate solution, diluting, and adding

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potassium thiocyanate. The colour is matched with a standard prepared from ferric chloride. Determination of the water-soluble silica also shows the effect of the added phosphate (cf. B., 1928, 420). Combination of the two methods gives a rapid method for determining the phosphoric acid requirement of the soil and the probable effect of added phosphate on the yield of crops.

H. BURTON.

Determination of the manurial requirement of soils. G. BARBIER (Ann. Sci. Agron., 1929, 46, 292; Proc. Internat. Soc. Soil Sci., 1930, 5, 61-62).—A critical discussion of existing methods.

A. G. POLLARD.

Use of stall manure. L. L. BALASCHEV (Mitt. staatl. Inst. exp. Agron., Leningrad, Ackerbauabt., No. 21, 36 pp.; Bied. Zentr., 1930, 59, 155—156).— The analysis and efficiency of various types of stall manures is recorded. Horse manure is more effective than cattle manure, whether fresh or rotted. The use of peat litter is advantageous. Manuring with straw, spread in spring and ploughed in at midsummer, gave with the first crop positive results in some cases and negative in others. In all cases subsequent crops benefited. The risk of denitrification is small.

A. G. POLLARD.

Phosphate content of soil and phosphate manuring. O. ENGELS (Superphosphat, 1930, 6, 22—24),—A. general review of the phosphate question in Germany. A. G. POLLARD.

Effect of lime on the root solubility of phosphates and potash in arable soils. M. GRAČANIN and A. NĚMEC (Z. Pflanz. Düng., 1930, 9B, 126-131).-In a number of soil types examined no relationship existed between the root-soluble contents of potash and phosphate and the proportion of calcium soluble in 10% hydrochloric acid. By the addition of increasing amounts of lime the assimilability of potash and phosphates was shown to increase within the range $p_{\rm H}$ 4.4-6.9. This effect was relatively greater in soils which were naturally poor in root-soluble nutrients. Addition of chalk to soils already containing 5-13% CaO and with $p_{\rm H}$ 7.4-8.3 reduced the root-soluble phosphate content. Similar but less well-defined results were obtained for potash, but the liming of soil rich in root-soluble potash tended to reduce potash assimilation by plants.

A. G. POLLARD.

Fixation and mobilisation of phosphoric acid in different layers of chernozem. A. A. BYTCHINNE (Ann. Sci. Agron., 1929, 46, 575; Proc. Internat. Soc. Soil Sci., 1930, 5, 27).—Differences in the fertility of chernozem surface and subsoils are mainly due to differences in the easily assimilable phosphate contents. Towards the end of a fallow season there is a relative decrease in the proportion of easily assimilable phosphate present, especially in the subsoil. The fixation (immobilisation) of phosphate under these conditions is ascribed to the micro-organisms, which multiply considerably during the fallow period and utilise the soluble phosphate. A. G. POLLARD.

Action of carbon dioxide in causing dissolution of soil phosphate. A. T. SCHLESING and D. LEROUX (Compt. rend., 1930, 190, 989–991).—The action of moist air containing 4.4% CO₂ on a soil poor in lime could not be differentiated, by the determination of soluble phosphate, from that of air containing less than 0.004% CO₂, even at the end of 2 years. The production of soluble phosphate in calcareous soils is small, and is increased only slightly by the presence of carbon dioxide in the water used for extraction. In the case of acid soils the amount of soluble phosphate is considerably greater, and is again slightly increased by the presence of carbon dioxide. T. H. MORTON.

Principles of liming [of soils]. A. KIRSSANOV (Mitt. staatl. Inst. exp. Agron., Leningrad, 1929, No. 1, 60 pp.; Bied. Zentr., 1930, 59, 150—151).—The lime requirement of a number of podsol soils was determined by the litmus test of the potassium chloride extract, by Mitscherlich method, and by examination of the growth of clover. On soils of this type good crop yields can only be obtained by the use of lime and fertilisers.

A. G. POLLARD.

Capacity of different types of peat soils to absorb ammoniacal nitrogen. P. TUORILA (Wiss. Veröff. Finn. Moorkulturvereins, 1929, No. 9; Proc. Internat. Soc. Soil Sci., 1930, 5, 66-67) .- Examination of aqueous ammoniacal solutions shows that within the range $p_{\rm H}$ 9.5-12 changes in the concentration of undissociated ammonium molecules and in the rate of evaporation of ammonia are small. From $p_{\rm H}$ 9.5 to 5.0 variations in these values are approximately inversely proportional to the hydrogen-ion concentration. The fixation of nitrogen by peat is largely a function of its acidity. The ammonia-fixing power of peat may be calculated from its "lime condition." Treatment with the amount of ammonia so calculated brings the reaction of the peat to $p_{\rm H}$ 6.5-6.8. Losses of ammonia from peat-water mixtures with $p_{\rm H} < 6.5$ are insignificant, but above $p_{\rm H}$ 6.5 the evaporation of ammonia is considerable. Peats of various types have very different ammonia-fixing powers, and these bear no relationship to the amount of humus material present. Ammonia is a more efficient neutralising agent for the acid substances in peat than is calcium carbonate. The use of peat for preventing losses of ammonia from liquid manure is discussed. The covering of manure heaps with a thick compact layer of peat is recommended. A. G. POLLARD.

Influence of moisture on nitrification, and the mobilisation and immobilisation of phosphoric acid and calcium in soil. P. HIRKO (Pub. Centrallab. Agric. Chem., Kiev, 1928; Proc. Internat. Soc. Soil Sci., 1930, 5, 69).—Nitrification in soils increased with their moisture contents up to 60% of their maximum capacities, but decreased at 80% of this value. Both in manured and unmanured soils, increased moisture contents corresponded with a reduction in the amounts of phosphate soluble in water and in 2% acetic acid, and an increase in the water-soluble calcium content. Under the conditions of the experiment there was a definite relationship between the proportions of phosphoric acid and calcium. A. G. POLLARD.

Nitrogen manuring of fish-ponds. KUHNERT (Z. Pflanz. Düng., 1930, 9B, 109—111).—A reply to Walter and Nolte (B., 1930, 162). A. G. POLLARD.

Plant-food requirement of rice. W. F. GERICKE

(Soil Sci., 1930, 29, 207-225).-The nutrient requirement of rice cannot be determined by growth to maturity in complete nutrient solutions. Under these conditions the plants absorb more mineral matter than is utilised for growth purposes. Relationships between crop yield and the absorption of a particular element depend on the total quantity of that element absorbed, the period during which absorption takes place, and the time required for the element to be utilised by the plant. Plants grown to maturity in a complete nutrient absorbed more calcium, magnesium, phosphorus, and sulphur than when partly grown in a complete nutrient and subsequently transferred to a solution deficient in these elements. Factors of primary importance to the growth of rice are those affecting the absorption and utilisation of phosphorus, nitrogen, and iron. The concentration and relative proportions of other essential elements in the nutrient solution are of lesser significance, provided they do not affect the availability of the former group. Of the elements present in the seed, iron is the first to become a limiting factor in growth. The work of Espino (Phil. Mag., 1920, 16, 455) is adversely criticised. A. G. POLLARD.

Top-dressing of potatoes with lime. F. MÜNTER (Z. Pflanz. Düng., 1930, 9B, 111-120).-Quicklime, applied as a top-dressing to potatoes, has no injurious effect even when, in wet weather, some scorching of the leaves occurs. On neutral soils in dry areas no advantage is obtained by top-dressing with lime. On soils of $p_{\rm H} < 5.5$ lime is necessary and is preferably applied before planting the seed tubers. Light dressings of lime on sugar beet and potatoes may be applied a considerable period after sowing without risk of injury. In some cases the starch content of potatoes is increased by liming. A. G. POLLARD.

Pasture management. Seasonal composition of certain South African pasture grasses in relation to their manuring and intensity of grazing. R. R. STAPLES and A. J. TAYLOR (S. Afr. J. Sci., 1929, 26, 139-153; Union of S. Afr., Dept. Agric., 1929, Div. Chem. No. 104).-The crude protein content of frequently-cut grass was much greater than that of the matured herbage, but proportionally less than is recorded in Europe. The phosphate content of fortnightly-cut grass was five times that of mature pasturage, but the calcium content remained practically unaltered. Application of complete fertilisers did not appreciably affect the protein or calcium content of frequently-cut herbage, but the phosphate content and total yield were markedly increased. Frequent cutting reduced the total annual yield of dry matter, and certain of the natural herbage plants of the veldt were practically eliminated in the process. A. G. POLLARD.

Phosphorus fertilisation of meadow land. II. E. TRUNINGER (Landw. Jahrb. Schweiz, 1929, 43, 653-698; Chem. Zentr., 1929, ii, 3177).-Fertilisation for 10 yrs. with 90 kg. P_2O_5 per hectare annually did not produce phosphate saturation in the top layer. Various types of phosphorus fertiliser were compared; application of superphosphate to acid soil is not recommended.

A. A. ELDRIDGE. Effect of Indigofera endecaphylla on the nitrogen

and organic matter contents and the mechanical constitution of tea soils at Peradeniya. A. W. R. JOACHIM (Trop. Agriculturist, 1930, 74, 137-140).-Growth of a cover crop of Indigofera endecaphylla on tea soils prevented loss of the finer soil particles by erosion and considerably increased the soil content of nitrogen and organic matter. A. G. POLLARD.

Plant metabolism studies as an aid in determining fertiliser requirements. H. R. KRAYBILL (Ind. Eng. Chem., 1930, 22, 275-276; cf. Hepler and Kraybill, N.H. Agric. Exp. Sta. Tech. Bull. 28, 1925).-A preliminary paper, in which the value of a knowledge of the effects of the essential nutrients on plant metabolism is emphasised. A. G. POLLARD.

Value of results of local fertiliser trials in Sweden. G. SUNDELIN (Nord. Jordbrugsforsk., 1928, 102-119; Bied. Zentr., 1930, 59, 159-161).-The customary 8-plot fertiliser trials are discussed. Oneyear trials are of little value, and repeated trials are still liable to considerable error. A. G. POLLARD.

Determination of total nitrogen of plant extracts in presence of nitrates. G. W. PUCHER, C. S. LEAVEN-WORTH, and H. B. VICKERY (Ind. Eng. Chem. [Anal.], 1930, 2, 191-193).-Olsen's method (B., 1928, 101) for the determination of the nitrogen content of soils has been modified to apply directly to aqueous solutions. A suitable volume of the extract is mixed with 20-40 c.c. of water in a 700-c.c. Kjeldahl flask; 10 c.c. of sulphuric acid (1:1) and 3 g. of reduced iron powder are added, and the mixture is shaken for 10 min. It is then heated and boiled for 5 min., cooled, and 30 c.c. of concentrated sulphuric acid, a drop of mercury, a few angular quartz pebbles, and 5 g. of anhydrous sodium sulphate are added. The contents are digested until the acid layer is clear and the precipitate assumes a yellow colour. After heating for a further 1-2 hrs., a few crystals of potassium permanganate are added, the mixture is cooled, diluted with 300 c.c. of water, and 3-5 g. of sodium thiosulphate are introduced, followed by a small piece of paraffin, an excess of sodium hydroxide, and a little zinc. The ammonia is then distilled into acid in the usual manner. Ranker's observation (B., 1927, 536) that the salicyclic acid-zinc method gives inaccurate results when applied to aqueous extracts of plant tissues containing nitrates has been confirmed.

E. H. SHARPLES.

Soil researches on sugar plantations. O. ARRHEN-IUS (Med. Proefstat. Java-Suikerind., 1928, [15]; Proc. Internat. Soc. Soil Sci., 1930, 5, 25-26).-Chemical analyses of plantation soils are recorded and the planning of field trials and evaluation of results are A. G. POLLARD. discussed.

The phosphate question in sugar-cane culture in Java. O. ARRHENIUS (Arch. Suikerind. Ned.-Indië, 1929, [3], 77-96; Proc. Internat. Soc. Soil Sci., 1930, 5, 24-25).-Soils are classified according to their contents of phosphate soluble in 2% citric acid solution. Results agree closely with field trials. In sand cultures optimum growth of sugar cane is obtained with nutrient solutions containing 2-9 mg. P205 per litre. The intake of phosphate by sugar cane is practically constant

throughout the whole growth period. (Cf. B., 1929, 756.) A. G. POLLARD.

Cylinder for separating fine soil particles by decantation. L. SMOLÍK (Bull. Czechoslov. Acad. Agric., 1929, [iv], 470; Proc. Internat. Soc. Soil Sci., 1930, 5, 32).

Studies of roots in plantations and in alkaline soils. P. MAGYAR (Recherches Forestières, Sopron, 1929, 31, [2]; Proc. Internat. Soc. Soil Sci., 1930, 5, 56).

See also A., May, 565, Detection of nickel in plants (MARTINI).

PATENTS.

Insecticides. A. CARPMAEL. From I. G. FARB-ENIND. A.-G. (B.P. 326,803, 19.12.28).—A thioether, e.g., thio-m-cresol benzyl ether, or an ether (anisole, dibenzyl ether, diphenyl ether, etc.) is intimately mixed with cyclohexanone and tetrahydronaphthalene, with or without addition of another insecticide or of a powdered filler (talcum). The mixtures are effective against chicken lice. C. HOLLINS.

Production of potassium ammonium sulphate [mixed fertiliser]. R. GRIESSBACH and O. SCHLIEP-HAKE, ASSTS. to I. G. FARBENIND. A.-G. (U.S.P. 1,754,358, 15.4.30. Appl., 23.8.28. Ger., 16.9.27).—See B.P. 300,402; B., 1929, 68.

XVII.—SUGARS; STARCHES; GUMS.

Physical and chemical properties of sugar in affination and decolorisation. W. KONN (Z. Zuckerind. Czechoslov., 1930, 54, 173-186).-On washing raw beet-sugar with water (up to 30% by wt.), the colour, luminescence, and electrical conductivity all decrease, and crystals are obtained a normal solution of which has a colour equal to 1.17° Stammer and contains 0.5%of ash. When a 40% solution of pure sugar is used (up to 100% by wt. of the sugar treated), crystals are obtained which in their physical and chemical properties almost correspond to Czechoslovakian domestic sugar. In decolorising washed sugar with bone-char the best effect is obtained with 2%, whereby 56% of the colour is removed, the luminescence is diminished from 26 to 12 units, and the carbonate ash is reduced to 23% of its original value. Using kieselguhr, Norit, and Carboraffin, the conductivity remains in each case unaltered, but the colour and luminescence both fall.

J. P. OGILVIE.

Decrease of the salts in carbonatation [of sugar juice] as observed by electrical conductivity measurements. K. SANDERA and V. PREININGER (Z. Zuckerind. Czechoslov., 1930, 54, 247-253).-By plotting curves for values of alkalinity and electrical conductivity, the influence of certain salts on the course of carbonatation was determined. It was shown that the chloride, sulphate, phosphate, hydroxide, oxalate, citrate, aspartate, and glutamate of potassium and the sulphates of calcium and magnesium, or their corresponding ions, are eliminated from solution in agreement with previous results established by means of analytical methods. It was possible not only to follow these effects during the course of carbonatation from an initial alkalinity of 0.36% down to neutrality, but the authors were also able to demonstrate that each anion

forming insoluble calcium salts acts moreover in a very characteristic manner, either in exercising a secondary effect on the formation of buffer mixtures, or else in modifying the adsorbing power of the precipitate.

J. P. OGILVIE.

Sample dryer. HOPPER.—See I. Decolorising power of active carbon. EDELSTEIN.—See II. Soils of sugar plantations. Phosphates and sugar-cane culture. Arrhenius. Sugar cane [growth].—Pardo. —See XVI.

See also A., May, 581, Determination of sugars in solution (MEIJER). 583, Digoxin—a new glucoside (SMITH). Influence of neutral salts on hydrolysis of starch (ANGELESCU and MANOLESCU).

PATENT.

Production of glutaminic acid [in sugar factories]. K. BROMIG, ASST. to DEUTS. GOLD- U. SILBER-SCHEIDEANSTALT VORM. ROESSLER (U.S.P. 1,755,683, 22.4.30. Appl., 8.3.27. Ger., 22.3.26).—See B.P. 320,589; B., 1930, 77.

XVIII.—FERMENTATION INDUSTRIES.

Industrial dehydration of alcohol : production of water-free alcohol for motor fuels etc. H. GUINOT (Internat. Sugar J., 1930, 32, 77–82).— Modern methods (here outlined) for the production of absolute alcohol by taking advantage of the formation of an azeotropic mixture with benzene, will involve, starting from rectified alcohol at 94% (by wt.), a maximum expenditure of 2000 lb. of dry steam to make 100 gals. of alcohol at 100%. This steam consumption is reduced to 1350 lb. if one is content with alcohol at 99.7%, whilst, starting from alcohol at 92%, the steam consumption is about 1600 lb. to obtain alcohol at 99.7%. Hydrocarbon consumption is said always to remain less than 0.2% of the production of hydrated alcohol. J. P. OGILVIE.

Alcoholometric corrections for temperatures below 0°. F. BORDAS and E. ROELENS (Compt. rend., 1930, 190, 923).—It is proposed to determine corrections of alcoholometric tables between 0° and -30° by measurements made with a cylindrical vessel containing 300 c.c. of alcoholic liquid, placed in a large vessel containing acetone cooled by solid carbon dioxide, the whole being placed in a heat-insulated vessel. No results are given. C. A. SILBERRAD.

Recovery of oils and fats. BECKMAN.—See XII.

See also A., May, 640, Action of amylase from Sorghum vulgare on potato starch (PATWARDHAN). Amylase from Eleusine Coracana (PATWARDHAN and NARAYANA). 642, Survival of dried yeast (KRASSIL-NIKOV). Nitrates as source of nitrogen for growth of yeast (PIRSCHLE).

PATENTS.

Manufacture of yeast. "SELBI" (Soc. D'EXPLOIT. DE LICENCES DE BREV. IND.) (B.P. 304,314, 7.1.29. Fr., 19.1.28).—Vinasses from the distilleries of molasses, sugar factories, or yeast factories are used as the sole medium for the culture of alimentary or any other yeast. The pitching yeast may be previously cultivated in sterilised vinasses with added ammonium sulphate and sodium phosphate, and thereafter used to ferment the vinasses with added superphosphate. C. RANKEN.

Filtration of beer wort for further treatment, and of beer and other foaming liquids. L. NATHAN, Assr. to HANSENA A.-G. (U.S.P. 1,754,432, 15.4.30. Appl., 6.9.27. Ger., 7.9.26).—See B.P. 280,395; B., 1928, 104.

Improvement of brewing waters. E. JALOWETZ (U.S.P. 1,755,544, 22.4.30. Appl., 18.8.26. Austr., 20.11.25).—See B.P. 261,708; B., 1927, 430.

Dry distillation of vinasses under reduced pressure. J. GUILLISSEN, ASST. to UNION CHIM. BELGE, Soc. ANON. (U.S.P. 1,756,191, 29.4.30. Appl., 8.11.23. Belg., 15.12.22).—See B.P. 208,516; B., 1924, 802.

Feeding-stuffs etc. (Austr.P. 107,279—107,281).— See XIX.

XIX.—FOODS.

Chemical and physico-chemical changes induced in wheat and wheat products by elevated temperatures. II. W. F. GEDDES (Canad. J. Res., 1930, 2, 65-90; cf. B. 1930, 262).-A detailed examination of the influence of time and temperature of heating samples of unbleached flour, milled from Western Canadian, hard red, spring wheat, on biochemical properties related to "strength," showed that for the most part the changes investigated were associated with decreasing baking quality. Gluten quality was impaired in all heat-treated samples. High positive correlations were obtained between viscosity, gas retention, and loaf volume ; decrease in viscosity was approximately a linear function of the temperature for constant time of heating. Ease of peptisation of flour proteins showed a progressive decrease with increased heating. High positive correlations were obtained between loaf volume and percentage of protein peptised. Marked decrease in diastatic activity followed severe heat-treatment, but decrease in proteolytic activity was first evident. A full bibliography is appended.

E. HOLMES.

Chemical and physico-chemical changes induced in wheat and wheat products by elevated temperatures. III. Influence of germ constituents on baking quality and their relation to improvement in flour induced by heat and chemical improvers. W. F. GEDDES (Canad. J. Res., 1930, 2, 195-213; cf. preceding abstract).-A detailed investigation to determine the cause of improved baking qualities observed after different heat-treatments of various grades of flour and on added germ is described. The main conclusions from the results (for details of which the original must be consulted) are as follows. Heat-treatment of straightgrade flour either matured with nitrogen trichloride, or previously extracted with ether, or of unaged fifthmiddlings flour results in very little improvement in baking quality and very little response to the bromate method (addition of 0.001% of potassium bromate to the baking formula). Addition of germ to fifth-middlings flour causes a marked reduction in baking quality (poorer handling qualities of the dough, underfermented characteristics, decrease in loaf volume, and coarse, open texture) by the basic procedure, but the deleterious effects of germ are reduced by increase in the fermenta-

tion time, addition of bromate, or previous heat-treatment of the germ. The response to bromate decreases with increasing preheating treatment, and it is postulated that the improvement of natural flour induced by proper heat-treatment and the response to bromate are both associated with the presence of germ in the flour, and depend on the oxidation of certain germ constituents, probably the phosphatides. In agreement with this view addition of lecithin to middlings flour causes a marked response to bromate treatment, and heat-treatment of the germ induces a marked increase in hydrogen-ion concentration of the aqueous extract ($p_{\rm H}$ 6.51 for raw germ changing to $p_{\rm H}$ 5.93 after heating at 121° for 3 hrs.), and a decrease in the iodine value ([Wijs] 125.6 and 111.5° , respectively) of the residue from the ether extract. Heat-treatment is therefore detrimental to the gluten, but markedly decreases the deleterious effects of germ constituents; hence unaged flours containing low-grade mill-streams may show considerable improvement in baking quality after heat-treatment despite the injury to gluten quality, but the improvement will not equal that induced by chemical improvers which act primarily on the germ constituents. The suggestions of Kent-Jones (B., 1929, 463) are shown to be untenable both from theoretical and experimental considerations. J. W. BAKER.

Relation between protein content and quality of wheat, as shown by different baking methods. R. K. LARMOUR (Cereal Chem., 1930, 7, 35-48).-Experimental milling and baking tests were carried out on 286 samples of pure varieties of wheat grown in Saskatchewan during 1926-8. Results showed that when the flour was baked by a simple formula of flour, water, salt, yeast, and sugar, the correlation factor between the protein content and the quality, as measured by baking tests, was too low to justify the practical value of the crude protein test in predicting quality. When, however, 0.001% of potassium bromate was added to the basic baking formula the correlation with protein content was high enough to warrant the commercial use of the protein test as a factor in the classification of hard spring wheat. E. B. HUGHES.

Evaluating the quality of wheat varieties by cooperative tests. C. O. SWANSON (Cereal Chem., 1930, 7, 66—78).—Co-operative work was carried out by seventeen cereal chemists on Tenmarq, Kanred, Turkey, Blackhull, and Superhard wheats to determine the milling and baking qualities of Tenmarq, a new hybrid wheat developed by the Kansas Agricultural Experiment Station. Details of the methods used and the results of the tests are given. "Tenmarq" is shown to be superior to the other varieties tested. E. B. HUGHES.

Bacteriology of wheat and flour. D. W. KENT-JONES and A. J. AMOS (Analyst, 1930, 55, 248–268).— The enumeration of blood-heat organisms in flour is made by transferring 10 g. of flour to a sterilised, widemouthed glass bottle containing 100 c.c. of a sterile 0.5% solution of sodium chloride and 10 g. of purified, ignited sand. The mixture is shaken for 2 min. and, as soon as the bulk of sand has settled, 5 c.c. of the suspension are transferred to a narrow-necked bottle containing 45 c.c. of sterile 0.5% sodium chloride solution. After shaking, 5 c.c. of the liquid are transferred to

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another similar bottle containing 45 c.c. of sodium chloride solution. Finally 1 c.c. is transferred to a Petri dish to which are added the contents of a 10-c.c. tube of sterile, neutral agar melted in boiling water and cooled to 45°. The agar and extract are mixed and, when the agar has solidified, the inverted dish is incubated at 37° and a count taken in 48 hrs. Cool organisms are enumerated in the same way except that a nutrient gelatin plate is prepared from the final dilution and counts are made in 48-72 hrs. In each case the count multiplied by 1000 is regarded as giving the number of organisms per g. of flour. Counts made on samples of flours taken over a period of several weeks showed that contamination of flour with both blood-heat and cool organisms increases greatly as the grade of flour becomes lower. Lengthening of conditioning time, omission of washing, etc. also increase the number, and always cool organisms were more numerous than blood-heat ones. It is considered that patent flour at the time of milling should contain not more than 20,000 blood-heat organisms per g. and the straight-run flour not more than 50,000. Under normal conditions of storage both types of organism decrease considerably, and moisture content is a more important influencing factor than air temperature. In all cases blood-heat organisms die off more quickly than the cool ones. Most normal patent flours gave a negative result for the B. coli test with 0.025 g. and a positive one with 0.05 g., but results did not follow the bacterial content. Practically all bread made in this country contains "rope" organisms, but is rarely stored under conditions sufficiently favourable for its rapid growth. Bacterial counts were also made on wheats, and washing and brushing processes were found to reduce the bacterial content about 60%. D. G. HEWER.

Buffer intensities of water extracts and suspensions of various flours at different H-ion concentrations. G. E. HoLM and E. GREWE (Cereal Chem., 1930, 7, 49—58).—The hydrogen-ion titration curves of water extracts and suspensions of various grades of flour from hard and soft wheats are compared. By plotting against $p_{\rm H}$ the equivalent of acid or base required to change the $p_{\rm H}$ value by one unit, curves are obtained which show the variation of buffer intensity with $p_{\rm H}$. The relation of buffer intensity to grade, ash content, and phosphorus content is discussed. E. B. HUGHES.

Staling of bread. W. PLATT (Cereal Chem., 1930, 7, 1-34).—The changes taking place during the staling of bread are divided into three sections: (a) loss of volatile constituents, including water, alcohol, aldehydes, carbon dioxide, and traces of organic compounds; (b) the changes due to oxidation, considered to be of minor importance, and (c) the "inherent" staling, a term covering the complex physical and chemical changes occurring within the loaf. An historical survey with full references is given and a method of ascertaining the degree of staling by measurement of the compressibility of the crumb is described. E. B. HUGHES.

Value of the viscosimeter in a commercial flourmill laboratory. A. R. SASSE and J. T. PEARSON (Cereal Chem., 1930, 7, 79-82).—An account of the application of the MacMichael viscosimeter to measurement of the viscosity of acidified (lactic acid) flour-water suspensions. The viscosity due to the starch was found to be negligible, the important factors being the amount and quality of the protein and amount of ash. The effect of variation in protein content was eliminated by adjusting the concentration of the suspension so as to keep the protein content constant. The authors conclude that the use of the viscosimeter is not sufficiently standardised to give results of use other than in the particular laboratory where obtained, and that viscosity tests add nothing to the information obtainable from the usual protein and ash tests. E. B. HUGHES.

New aids in the ashing of flour. F. M. WALTERS (Cereal Chem., 1930, 7, 83—87).—Addition of oxides of lanthanum, yttrium, cerium, and thorium accelerates the combustion of flours, and the time may be reduced from 5 hrs. to 25—30 min. The flour is made into a paste with a solution of lanthanum nitrate giving a known weight of the oxide on incineration, and this is subtracted from the final ash. Duplicate results are obtained, but they do not agree with those obtained using the official A.O.A.C. method. The hygroscopicity of the ash is not altered by the addition of the oxides. E. B. HUGHES.

Determination of ash [of flour] by direct weighing. J. L. SPALDING (Cereal Chem., 1930, 7, 88—91).—This method, in which the flour is incinerated in an unweighed crucible and the ash knocked out on to the balance pan and weighed, is compared with the official A.O.A.C. method, and the accuracy of the former is found to be the greater. The maximum variation in duplicates by direct weighing is 0.003%, and by the A.O.A.C. method 0.010%. The greater variation in the A.O.A.C. method is due to moisture absorbed by the crucible. E. B. HUGHES.

Quick ash determination [in flour] by magnesium acetate-alcohol method. J. L. SPALDING (Cereal Chem., 1930, 7, 93—97).—The sample of flour is moistened with an alcoholic solution of magnesium acetate and incinerated at a dull red heat in the presence of oxygen, ashing being complete in 15—20 min. An empty crucible and a crucible containing flour of known ash are incinerated at the same time for control purposes. Results agree well with those obtained by using the standard A.O.A.C. method, E. B. HUGHES.

Metallic discoloration of Cheddar cheese. E. G. Hood and A. H. WHITE (Sci. Agric., 1930, 10, 520-522). —Brownish discolorations in a cheese consignment were found to contain ferrous iron, and were traced to the presence of small particles of "steel wool" used in scouring the vats. A. G. POLLARD.

Sample dryer. HOPPER.—See I. Recovery of oils and fats. BECKMAN.—See XII. Caffeine in tea. von MIKO.—See XX.

PATENTS.

Improving the usefulness of feeding-stuffs. E. MISLIN (Austr.P. 107,279, 2.4.17. Addn. to Austr.P. 103,891; cf. U.S.P. 1,685,004; B., 1928, 912).— In the process described in the prior patent, the previously prepared material is heated with alkalis or acids at about 100° before sterilisation, then neutralised and treated with bacteria or yeasts. Only a portion of the material may be treated with the organism, the remainder being later mixed intimately with the fermented product and the mixture allowed to undergo after-fermentation. W. J. BOYD.

Decomposition and improvement of feedingstuffs and foods. E. MISLIN (Austr.P. 107,280—1, 2.5.19).—(A) Material of animal or vegetable origin is treated with micro-organisms from pentosan culture (Austr.P. 103,891; cf. preceding abstract) and then gradually warmed to 40—50°. (B) Feeding-stuffs obtained as described in the prior patent are soaked with vinasse, gradually mixed with bran, straw, etc., and kept at above 38° for some time. W. J. BOYD.

Souring of sap-containing vegetable matter in silos in preparation of a preserved feeding-stuff. GÄRTNER & AURICH (G.P. 447,063, 28.10.20).—Urea or an equivalent amount of a nitrogenous salt is added to the material as it is deposited, in such proportion that it serves as food for the lactic acid bacteria with economy of the plant proteins, until sufficient lactic acid has been produced to arrest further bacterial action. In this process an electric current may be passed through the mass and pressure may be applied. W. J. BOYD.

Production of soluble albumin. E. M. MEYER (U.S.P. 1,754,521, 15.4.30. Appl., 20.10.25).—See B.P. 260,224 ; B., 1927, 922.

Extraction of albumino-caseins of vegetable origin, and separation of such albumino-caseins from amylaceous matter. H. BEAUFOUR (U.S.P. 1,755,531, 22.4.30. Appl., 11.10.26. Fr., 23.10.25).— See B.P. 260,242; B., 1927, 539.

Manufacture of a vegetable alimentary extract. J. PERINO (U.S.P. 1,754,434, 15.4.30. Appl., 18.10.27. Ger., 22.10.26).—See B.P. 279,487; B., 1929, 263.

Freezing of fish [by means of cooled brine spray]. STERILEX, LTD., and A. E. SHERMAN (B.P. 328,396, 19.3.29).

Concentration of liquids (Austr.P. 107,317).— See I.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Acid-base equilibrium of tincture of digitalis. J. C. KRANTZ, JUN. (J. Amer. Pharm. Assoc., 1930, 19, 366-370).- Experiments on buffering the menstruum and on the buffer capacity of tincture of digitalis, and the effect of ageing on the $p_{\rm H}$ of the tincture indicate that the extractive material of the digitalis leaves possess sufficient buffer capacity to bring the $p_{\rm H}$ of each of the finished tinctures close to the $p_{\rm H}$ of the unbuffered tincture ; the buffer influence of the tincture is apparently dependent on the organic extractive material from the drug. A very slow decrease in $p_{\rm H}$ occurs on keeping; one sample decreased from 5.88 to 5.38 after being kept for 2 years, but the change was more rapid in certain samples stored in direct light. The Van Slyke " β " for the tincture has been determined for strong acids and bases. E. H. SHARPLES.

Stability of infusion of digitalis, B.P. F. WOKES and G. K. ELPHICK (Quart. J. Pharm., 1930, 3, 73-75). —Infusion of digitalis, B.P., preserved by the addition of chloroform (0.3%) or thymol (0.064%), does not decrease appreciably in physiological activity for at least 3 weeks (cf. Haag and Hatcher, B., 1929, 835). H. E. F. NOTTON.

Stability of salts of ergotoxine and ergotamine. F. WOKES and G. K. ELPHICK (Quart. J. Pharm., 1930, 3, 59-72).-In continuation of previous work (B., 1929, 1031), the stability of solid and liquid preparations of ergot alkaloids has been examined. Ergotoxine phosphate in a vacuum over phosphoric oxide loses its specific physiological activity at the rate of about 10% yearly. In presence of air decomposition is more rapid. The deterioration, if any, of ergotoxine ethanesulphonate in air-filled closed tubes is less than 5% yearly. The phosphate in 0.01% solution at 0° loses half its activity in 6 months, and in 0.1% solution loses one third of its activity in 2-4 months. At 37° decomposition is several times more rapid. Commercial solutions of the phosphate and of ergotamine tartrate deteriorate at similar rates. H. E. F. NOTTON.

Manufacture of guaiacol and phenacetin. J. SCHWYZER (Pharm. Ztg., 1930, 75, 495—498, 509—510, 518—521).—Methods and apparatus are described for the manufacture of phosgene and methyl and ethyl chlorides; for the conversion of phenol into o- and p-nitrophenols, p-phenetidine, phenacetin, o-anisidine, guaiacol, guaiacol carbonate, benzoate, and orthophosphate, and potassium guaiacolsulphonate, and for the conversion of chlorobenzene into o- and p-chloronitrobenzenes, o-nitroanisole, and p-nitrophenetole.

H. E. F. NOTTON.

Evaluation of drugs containing caffeine. I. Tea. G. VON MIKÓ (Magyar Gyóg. Társas. Ert., 1929, 5, 384—399; Chem. Zentr., 1929, ii, 3045—3046).—A rapid macro-method, and micro-methods (refractometric and micro-Kjeldahl) for the determination of caffeine in tea are described. A. A. ELDRIDGE.

Technical preparation of tartar emetic. F. CHEMNITIUS (Chem.-Ztg., 1930, 54, 214).—The manufacture by the interaction of a boiling solution of commercial tartar and excess of freshly melted and ground antimony oxide is described. After 2 hrs.' boiling the solution is filtered and crystallised on threads in leaden tanks. Vessels of wood or lead are used throughout the process. E. LEWKOWITSCH.

Stability of solutions of arsenious and mercuric iodide, U.S.P. X. W. J. HUSA and W. W. F. ENZ (J. Amer. Pharm. Assoc., 1930, 19, 328-341).-Donovan's solution is essentially a solution of arsenious acid, mercuric hydrogen iodide, and hydriodic acid, and deterioration results in oxidation to arsenic acid both by the air present in the bottle and by the oxidising action of iodine and water. The stability is increased (a) by storage in amber bottles, well-filled bottles, and in a refrigerator; (b) by replacement of the air in the bottle by an inert gas; and (c) by replacement of 25% of the water by honey or syrup. Changes in the proportions of the ingredients, the use of porcelain or Wedgwood mortars, or variations in the method of preparation have no influence on the stability; the presence of metallic mercury is also ineffective, and free arsenic dissolves and increases the arsenic content. The rate of deterioration increases with increasing acidity or basicity, but the addition of calcium carbonate in sufficient amount to neutralise the acid present $(p_{\rm H},$ when freshly prepared, is about 1.2) has a marked preservative influence; a neutral solution, having the same chemical composition as the official U.S.P. preparation, but varying in the method of preparation, was found to be much more stable. The addition of 0.4% of oxalic acid, "methenamine," terpin hydrate, or hypophosphorous acid retards the deterioration, but of these it is only practicable to use terpin hydrate. Apparently light of wave-length 3200—4600 Å. is responsible for most of the deterioration.

E. H. SHARPLES.

See also A., May, 599, Derivatives of 6-amino-3hydroxybenzoic acid (Puxeddu and Sanna). 609, Constituents of Arctium Lappa (SHINODA). Rotenone from Derris root (Takei and others). 617, Reactions of antipyrine (Ekkert). 623, Microchemical reactions of pilocarpine and cocaine (WAGENAAR). Reactions of atropine and related compounds (Ekkert). Harmine (KREITMAIR; WOLFES and IVERS). 624, Strychnos alkaloids (LEUCHS and HOFFMANN). 625, Strychnine and brucine (ASHLEY and others). Microchemical reactions of apomorphine (WAGE-NAAR). 629, Microchemistry of cystine (WAGENAAR). Microchemical contributions (VAN ZIJP). 639, Detoxication of chloroform (FÜHNER).

PATENTS.

Manufacture of ureides of dialkylacetic acids. F. HOFFMANN-LA ROCHE & CO. A.-G. (G.P. 459,903, 23.4.26. Switz., 20.1.26. Cf. B.P. 264,804; B., 1927, 573).—Further to the B.P., diethylbarbituric acid is heated with 3% aqueous ammonia to give diethylacetylcarbamide, m.p. 207°. C. HOLLINS.

Tobacco poor in nicotine and its manufacture. GEN.-DIREKTION DER OESTERR. TABAK-RÉGIE (B.P. 307,703, 11.3.29. Ger., 10.3.28).—Nicotine-free tobacco prepared by extraction is mixed with untreated tobacco to produce a mixture of low nicotine content yet of good colour and flavour. E. B. HUGHES.

Manufacture of cotarnine derivatives. E. MERCK CHEM. FABR., Assees. of M. OBERLIN (G.P. 456,856, 23.10.25).—Narcotic, analgæsic products similar in character to pyramidone, but possessing also hæmostyptic properties, are prepared by condensing cotarnine base (or a salt with sodium ethoxide) with a reactive pyrazolone. *E.g.*, with 1-phenyl-3-methyl-5-pyrazolone there is obtained a *product*, m.p. 175—177° (decomp.) [hydrochloride, m.p. 188° (decomp.); hydrobromide, m.p. 171° (decomp.)], whilst that from 1-phenyl-2:3-dimethylpyrazolenone has m.p. 220° (decomp.). C. Hollins.

Manufacture of ar-tetrahydro- β -naphthol derivatives. CHEM. FABR. VON HEYDEN A.-G., Assees. of D. LAMMERING (G.P. 457,060, 10.2.25. Addn. to G.P. 414,261; B., 1925, 865).—An anthelmintic is obtained by condensing the chloroformate of ar-tetrahydro- β naphthol with anthranilic acid to give the *urethane*, m.p. 175° (decomp.). C. HOLLINS.

Manufacture of therapeutical media [arsenicals]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 326,789, 13.11.28).—An aminoalkyl or alkylated aminoalkyl group is introduced by the usual methods into the amino- or hydroxyl groups of aminophenolarsinic acids; the products may be reduced alone or with other arsinic acids to give arsenobenzenes. Arsanilic acid is dissolved in alkali and warmed with β -diethylaminoethyl chloride at 60° to give 4- β -diethylaminoethylaminobenzenearsinic acid, which is reduced with hyposulphite and magnesium chloride to the corresponding arsenobenzene. C. HOLLINS.

Manufacture of derivatives of organic arsenic antimony compounds. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 326,537, 13.12.28).—Arylamines carrying both arsinic and stibinic acid groups, or their reduction products, or amino-substituted arsenostibinobenzenes, $\mathbb{R} \cdot \mathbb{A} s: \mathrm{Sb} \cdot \mathbb{R}'$, are solubilised by conversion into their formaldehyde-bisulphite compounds. Products from 3:4'-diamino-4-hydroxyarsenostibinobenzene (prepared from the corresponding arsine and stibinous chloride), and from bis-(3-amino-4-hydroxybenzenearsenostibino)-3-amino-4-hydroxyphenylarsine, ($\mathbb{A} \cdot \mathbb{A} s \cdot \mathbb{Sb}$)₂ $\mathbb{A} s \cdot \mathbb{A} r$, are described. The latter compound is obtained from 3-amino-4-hydroxyphenylarsine by treatment with the potassium salt of antimonyl-1:2dihydroxybenzene-3:5-disulphonic acid.

C. HOLLINS.

Manufacture of soluble organic antimony compounds. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 326,533, 12.12.28).—An o-dihydroxylated compound carrying sulphonic or carboxylic groups is treated with antimony pentoxide or an antimonate; examples are potassium pyrocatecholdisulphonate or pyrogalloldisulphonate with antimonic acid, or the diethylaminoethyl alcohol salt thereof. The products have low toxicity and high therapeutic value.

C. HOLLINS.

Metal containers for ether. MALLINCKRODT CHEM. WORKS (B.P. 300,641, 5.11.28. U.S., 17.11.27).—See U.S.P. 1,697,320 ; B., 1929, 453.

Aminoalkylamino-derivative of aromatic aminohydroxy- or polyamino-compounds. W. SCHULE-MANN and W. KROPP, Assrs. to WINTHROP CHEM. Co., INC. (U.S.P. 1,757,394, 6.5.30. Appl., 30.6.27. Ger., 8.7.26).—See B.P. 303,093 ; B., 1929, 265.

Barbituric acid compound. F. HEFTI (U.S.P. 1,757,906, 6.5.30. Appl., 2.8.28. Switz., 9.3.28).—See B.P. 307,484; B., 1930, 264.

Iron organic compounds (B.P. 304,731).-See VII.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Determination and separation of silver chloride [from photographic layers] by sedimentation. Nature and origin of the high silver values. H. H. SCHMIDT and F. PRETSCHNER (Z. wiss. Phot., 28, 35– 40).—By a suitable treatment of the neutral emulsion with alcohol or by formation of a calcium oxalate precipitate therein a rapid sedimentation of the silver halide and a filtrate free of the latter are obtained, and a silver determination is thus easily effected. Rapid sedimentation also results when sulphosalicylic acid is added, this process being suitable when silver halide is

to be determined. Sodium sulphite dissolves 75% of the silver values, thus supporting the authors' theory of the presence of an organic silver compound. An organic silver compound which is soluble in sodium sulphite also appears to be formed by the action of silver nitrate on the gelatin, and these compounds are believed to be identical. The latter contains no nitrate, is difficultly soluble, and cannot be completely washed out of the jelly. It is reduced by the developer, and is the cause of the cloudiness produced by longer development of silver chloride or silver chloride-bromide paper emulsions since, with its removal by centrifuging or by dichromate-sulphuric acid treatment, this trouble is obviated. The observed variation in the silver values when using different halides is probably directly connected with the fact that the addition of potassium chloride replaces less silver halide from the compound than addition of potassium bromide or iodide.

H. I. DOWNES.

Gravimetric determination of excess silver in photographic layers. H. ARENS and W. JESSIEN (Z. wiss. Phot., 1930, 27, 273-278).-The authors have repeated the work of Schmidt and Pretschner (B., 1928, 625) and obtain similar results, but do not regard the silver found as having been present originally as free silver in the emulsion tested. The present authors find that if instead of nitric acid other agents (e.g., caustic soda, chromic acid, ammonium persulphate) are employed to decompose the gelatin, no silver is detectable in the product. They conclude that the silver ions found by the method of Schmidt and Pretschner (method A) arise from the interaction of the silver halide with gelatin and nitric acid, with the formation of silver nitrate and of halogen derivatives of phenolic compounds known to be contained in the gelatin. This mechanism is suggested by the production of ionic silver when silver chloride is treated by method Ain the presence of phenol, even if dextrin be employed in place of gelatin, or again in the entire absence of a protective colloid. No silver is produced in the last two cases in the absence of phenol. Again, if a chloride emulsion be centrifuged, the sum of the silver ions found in the solid and liquid phases by method A is not equal to that found in the uncentrifuged emulsion; this is to be expected from considerations of mass action if the silver were not originally present, but were formed during the process. L. V. CHILTON.

Gravimetric determination of excess silver in photographic layers. H. H. SCHMIDT and F. PRET-SCHNER (Z. wiss. Phot., 1930, 28, 30—34).—The objections raised by Arens and Jessien (preceding abstract) and by Leszynski (A., 1930, 305) to the authors' theory that the high silver values in photographic layers are due in part to the presence of metallic silver and in part to an organic silver compound, and the alternative theory of Arens and Jessien that during the nitric acid treatment silver halide is reduced, the halogen being organically bound by the gelatin and the reduced silver going into solution, are discussed. Evidence is set forth from the present authors' earlier work (cf. B., 1928, 625; A., 1929, 894, 1405) in support of their theory, the experimental work on which Arens and Jessien base their objections being criticised.

H. I. DOWNES. Determination of traces of silver in photographic layers. F. LÜHR (Z. wiss. Phot., 1930, 27, 283-303).-The differential electro-titration method of Cox (A., 1925, ii, 999) is applied to dilute solutions of silver nitrate, full experimental details being given. In this method two titrations are performed simultaneously, one in advance of the other by a constant small amount; the end-point is signalled by a sharp maximum in the P.D. between the two cells, which are connected in series and contain equal quantities of the solution under test. The sharpness of the end-point increases as the "start" given to one titration is decreased ; a 0.02-c.c. "start" gives, with the apparatus described, a very sharp end-point without plotting the results, but the same maximum is recognisable, on plotting, even with a 2.0-c.c. "start." The method is only slightly affected by the action of light, and least so when chloride or iodide is employed in titration. It will detect 0.001 mg. Ag with an error of less than 1%, when using 0.0001N-potassium iodide, and may be applied to emulsions if the gelatin be first broken down with nitric acid $(d \ 1 \cdot 2)$. The applicability of the method in the presence of gelatin is not greatly dependent on the gelatin concentration; 0.01 mg. Ag may be detected to within 100% in the presence of 0.35 g. of gelatin, and 0.005 mg. Ag to within 20%. The products of hydrolysis of the gelatin are neutralised with ammonia and acidified with glacial acetic acid before titration, to avoid corrosion of the silver electrodes and errors L. V. CHILTON. introduced thereby.

between photographic charac-Correlations teristics in the normal and in the solarised regions of exposures. A. P. H. TRIVELLI and E. C. JENSEN (J. Franklin Inst., 1930, 209, 37-81).-The sensitometric constants of 14 commercial brands of plate covering the complete range of speed from the fastest to the slowest were investigated in the normal and the over-exposure regions, the results being treated statistically by use of the Bravais-Pearson correlation coefficient. The correlations found, by normal exposures, between grain-size, maximum density, contrast, H. and D. speed, and threshold value do not extend into the region of solarisation; some correlation does appear, however, between (i) the H. and D. speed, the threshold value at which solarisation commences and that at which the first reversal of solarisation occurs, and (ii) the solarisation threshold and the exposure which produces a maximum ratio of density to exposure. The results are considered in relation to sensitivity theories and are shown to favour the "concentration speck" theory of Sheppard and others, on the one hand, and the regression theory of solarisation (Lüppo-Cramer) on the other. L. V. CHILTON.

Reactions involved in the various methods employed for the dissolution of the silver image. A. SEYEWETZ (Bull. Soc. Franç. Phot., 1930, 17, 17-24). —The investigations are mainly concerned with the ease and completeness of the removal of the reaction products and with the effect of traces of these products and of subsidiary reactions with the gelatin on the stability of the treated film. In the first type of silver solvent, in which the silver is removed as a water-soluble salt by means of an oxidising agent in presence of sulphuric acid, ceric sulphate is satisfactory, but must be freed from chloride before use in order to avoid the formation of silver chloride by the chlorine liberated by the acid. Potassium permanganate, followed by bisulphite or sulphite to remove the manganese sesquioxide, is very satisfactory at low temperatures, but above 20° or in cases of prolonged treatment a rapid decomposition of the gelatin takes place. Concentrated solutions of alkali dichromates are recommended for rapid work on heavy silver deposits, but the silver dichromate formed from the reaction of silver sulphate with the excess dichromate must be removed by treatment with bisulphite. Benzoquinone or its sulphonate is more rapid in action than ammonium persulphate, but considerably slower than the above-mentioned solvents, probably due to its tendency to render the gelatin insoluble. With the second class of solvent, in which a water-insoluble silver compound is first formed and removed by sodium thiosulphate, the following substances in conjunction with sodium thiosulphate work satisfactorily: potassium ferricyanide, with or without the addition of potassium chloride or bromide, chromic acid, potassium dichromate and hydrochloric acid, potassium chlorochromate, iodine, and benzoquinone and hydrochloric acid. The chemical processes involved are represented by equations, and formulæ suitable for use as silver solvents are given.

J. W. GLASSETT.

See also A., May, 555, Photochemical reduction of silver salts by pinachrome (STEIGMANN). 593, 1-Methylnaphthalene and derivatives (STEIGER : VESELÝ and others).

PATENTS.

Photographic films [for kinematography]. FILM OZAPHANE (B.P. 301,879, 6.12.28. Fr., 7.12.27).-A cellulose film (0.02-0.06 mm. thick) is sensitised by the " ozalid " process or by impregnation with a suitable diazo compound and a coupling agent. By using such thin film in conjunction with an impregnation method of sensitising, it is possible to obtain an image sufficiently sharp for projection purposes. [Stat. ref.]

J. W. GLASSETT. Photographic sensitising. C. ROCHRICH (B.P. 304,597, 18.1.29. Ger., 21.1.28) .- Colloid layers which have been treated with sensitising baths, e.g., dichromate solutions, are finally treated, either before or after drying, with an aqueous solution of alcohol (10% of alcohol), which serves to prevent the crystallisation of the chemicals at the colloid surface.

J. W. GLASSETT.

Manufacture of light-sensitive materials. M. P. SCHMIDT and W. KRIEGER, Assrs. to KALLE & Co. A.-G. (U.S.P. 1,756,400, 29.4.30. Appl., 28.1.28. Ger., 22.2.26).—See B.P. 311,196; B., 1929, 624.

Desensitiser and desensitisation of light-sensitive photographic materials. B. WENDT, Assr. to AGFA ANSCO CORP. (U.S.P. 1,753,911, 8.4.30. Appl., 28.12.28. Ger., 3.2.28).—See B.P. 314,144; B., 1929, 738.

[Tri-colour filter-selector for] colour photography. Soc. FRANÇ. CINÉCHROMATIQUE (PROC. R. BERTHON), Assees. of Soc. CIVILE POUR L'ETUDE DE LA PHOT. ET DE LA CINÉMAT. EN COULEURS (B.P. 314,995, 1.7.29. Fr., 6.7.28).

XXII.—EXPLOSIVES: MATCHES.

See also A., May, 560, Determination of water [in explosives] (NOTEVARP).

PATENTS.

Production of explosives. M. HAHN and M. WOLF (B.P. 326,974, 27.2.29).-Burnt lime is dissolved in nitric acid, and the solution diluted according to the desired explosive power. Cellulose in the form of powdered peat, sawdust, etc. is added to the solution until a consistent, non-sensitive mass is obtained; the product is then dried, rendered sensitive by further addition of the lime-acid solution, and again dried for H. ROYAL-DAWSON. use.

Production of explosives. M. HAHN and M. WOLF (U.S.P. 1,751,326, 18.3.30. Appl., 20.3.29. Ger., 31.1.29).-See B.P. 326,974; preceding.

Denitration of waste [sulphuric] acid mixtures. W. Büsching (U.S.P. 1,755,768, 22.4.30. Appl., 15.8.27. Ger., 3.9.26).—See B.P. 276,972; B., 1929, 75.

XXIII.—SANITATION; WATER PURIFICATION.

Air-conditioning in the [paper] press room. J. W. GRAHAM (Proc. Tech. Sect. Papermakers' Assoc., 1929, 10, i, 153-158) .- A lecture, mainly on hygro-T. T. POTTS. metry.

Estimation of dust in mine air. J. Boyd (Third Empire Min. Met. Congr., Apr., 1930, 23 pp.).-Methods available for making the determination are reviewed, and the results obtained when applying them on the C. W. GIBBY. Witwatersrand are given.

Sampling of waters for oxygen determination. E. MERKEL (Chem.-Ztg., 1930, 54, 214).-A device for drawing the sample rapidly without mixing air into the water is described : the bottle is closed by a cork carrying two tubes, and filled through the wider tube (which reaches to the bottom of the vessel), while the air is displaced quietly through the other tube the opening of which is just below the cork. A convenient all-metal device (Merkel-Hehl) has been made on the E. LEWKOWITSCH. same principle.

Removal of phenols from effluents. HOROVITZ-VLASSOVA.-See II. Determination of iodine in water. ANDREW.-See XVI.

See also A., May, 645, Germicidal efficiency of "electrolytic chlorogen" and formalin on bacterial spores (AYYAR).

PATENTS.

Manufacture of toilet material. T. HASHIMOTO (U.S.P. 1,756,152, 29.4.30. Appl., 17.11.28).—See B.P. 323,321; B., 1930, 218.

Disinfecting, insect-destroying, deodorising, or perfuming process and [vacuum-cleaner] appara-ELECTROLUX, LTD. From INVENTIA tus therefor. PATENT-VERWERTUNGS-GES. (B.P. 328,242, 15.11.26).